Abstracts Presented at the International Neuropsychological Society, British Neuropsychological Society and the Division of Neuropsychology of the British Psychological Society Joint Mid-Year Meeting

July 6-9, 2005

Dublin, Ireland

WEDNESDAY, JULY 6, 2005

4:30–5:30 PM **Poster Session 1: Cognitive Functions and Neuropsychology**
Concourse Area

1.	MITCHELL, DJ	Ethanol and Low Frequency Event-Related EEG Rhythms in a Working Memory Task in Humans.
2.	ARMSTRONG, CL	Normal variants in CNS myelin effect control processes in selective attention.
3.	LAPOINTE, LL	Mobile Phone Cognitive Distraction: Relative Degradation of Choice Reaction Time, Working Memory, Lexical Decision-making and Form Discrimination.
4.	BAYLESS, JD	Neuropsychological Correlates of Dichotic Word Listening Test Performance.
5.	COCKBURN, J	Effects of Cognitive Task Output Condition on Postural Control in Older Adults.
6.	CALDU, X	DAT 40 bp VNTR Polymorphism Influences CPT Performance in Normal Subjects.
7.	BULTITUDE, JH	Putting Attention on the Line: Investigating the Activation-Orientation Hypothesis of Line-Bisection Bias.
8.	LEJBAK, LK	A male advantage for object and location but not verbal working memory 'n back' tasks.
9.	WHEATLEY, AC	Visual Processing in the Visual Variant of Alzheimer's disease, Parkinson's disease and typical Alzheimer's disease.
10.	EDWARDS, MG	Pointing and Grasping to Two-Dimensional and Three-Dimensional Targets with Optic Ataxia.
11.	BURRACK, AK	Visual Capture of Touch in a Patient without Touch.
12.	MUELLER, SC	Dissociating Gender Differences in Spatial Abilities using Virtual Environments.
13.	LEJBAK, LK	The female advantage for an object-location working memory task occurs regardless of verbalizability of the objects.
14.	LOETSCHER, T	Misoplegia Without Hemiplegia.
15.	HUITEMA, R	Walking Trajectory in Neglect Patients.
16.	CORBALLIS, MC	Hemineglect in a Callosotomized Patient: A Triple Dissociation?
17.	BARRETT, AM	Motor-intentional Visual Grasp after Right Thalamic Stroke.
18.	ESKES, GA	Wheelchair Navigation and Neglect: The Influence of Spatial Reference Frames.
19.	OTA, H	Functional and Anatomical Dissociation of Body-centered and Stimulus-centered Frames in Spatial Neglect.
20.	YOSHIZAKI, K	The Effect of the Mental Rotation on the Unilateral and Bilateral Hemispheric Processing.
21.	BRAMAO, M	Schooling and Hemispheric Specialization: A Dichotic Listening Study.
22.	MENDONCA, A	The Effects of Literacy on Errors in a Dichotic Listening Task.
23.	REIS, AI	Literacy: A Cultural Influence on the Hemispheric Balance in the Inferior Parietal Region.
24.	COOPER, TJ	Hemispheric Differences in Face Recognition: ERP and Behavioural Evidence from a Face Priming Task.
25.	O'KEEFFE, FM	Awareness Deficits and Neuropsychological Impairment after Traumatic Brain Injury.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

THURSDAY, JULY 7, 2005

11:15 AM–12:45 PM Poster Session 2: Memory, Frontal Systems, Executive Functions

Concourse Area

1.	JODZIO, K	Verbal Working Memory and Language Restitution in Stroke-induced Aphasia: Evidence for Common Underlying Processes.
2.	MOTOMURA, N	Memory function in cases with Heubner's recurring artery occulusion.
3.	NARBERHAUS, A	Memory impairment in adolescents with antecedents of prematurity and perinatal asphyxia (PA) or intraventricular hemorrhage (IVH).
4.	MACKAY, A	Executive Contributions to List Recall Among Older Adults.
5.	GILLESPIE, DC	The Longitudinal Impact of Right Hemisphere Stroke (RHS) on Memory Functioning.
6.	CHUNG, J	Memory Performance of Hong Kong Chinese older people with Mild Cognitive Impairments (MCI).
7.	BASTIN, C	Dissociation between recall and recognition memory in amnesia: The case of a patient with hippocampal damage following carbon monoxide poisoning.
8.	ALBUQUERQUE, L	CVLT in patients with frontal or temporal lesions: primacy effects.
9.	LAATU, S	Semantic Memory Deficits in Alzheimer's Disease, Parkinson's Disease and Multiple Sclerosis.
10.	NAGAHARA, N	The Effects of Alcohol and Cigarettes on Memory in Middle- and Elder-Japanese.
11.	RITTER, E	Autobiographical and Topographical Recognition Memory in Mild Cognitive Impairment.
12.	FAISCA, LM	A Dynamic Analysis of Clustering and Switching Strategies in Semantic Verbal Fluency.
13.	WALKER, NB	Visuo-spatial Working Memory Impairments in Early-stage Problem Drinkers.
14.	JANSARI, AS	An overworked Central Executive? Dissociations in Working Memory in a neuropsychological patient with a selective Short-Term Memory disorder.
15.	SUZUKI, M	Temporal context memory disorder after orbitofrontal and basal forebrain lesions.
16.	MEIJS, C	Learning Strategies in Healthy Children Aged 6-12 Years on a Pictorial Verbal Learning Test and the Influence of Age and Sex.
17.	MICKLEY, N	Predictors of Working Memory in Reading Disabled and Chronologically Age-Matched Children.
18.	AFFENTRANGER, T	Adaptive Behaviour in Prefrontal Lesions: Hyper- and Hypoadaptation and Side of Lesion.
19.	SAMSON, D	Dissociating Self-Perspective Inhibition and Other-Perspective Taking when Reasoning about Other People's Beliefs.
20.	PARKS, RW	Self-Ratings Using Frontal Systems Behavior Scale (FrSBe) in Schizophrenia.
21.	SPIKMAN, JM	Interactions Between Executive Dysfunction and Deficits in Social Cognition in TBI Patients With Frontal Lesions.
22.	BLANCO-MENENDEZ, R	Double Dissociation in Logical Thought Processes.
23.	VAN ZANDVOORT, MJ	Theory of Mind or Complexity? A study in patients with Korsakoff's Syndrome.
24.	MENESES, RF	The Effect of Time on Executive Functions.
25.	HABER, AH	Convergence and Divergence in Performance on Executive Functioning Measures in a TBI Population.
26.	MOURATIDIS, M	The Classical Stroop as a Pharmacological Tool in Tiagabine Treatment of Smokers.
27.	CHOUDHRY, RK	Frontal Lobe Behavioural Syndromes in Early Parkinson's Disease: Implications for Cognitive and Functional Impairments.
28.	BOEKA, A	Neuropsychological Task Performance of Women with Bulimia Nervosa.
29.	NIKI, C	Disorganization of Sequential Actions in Patients with Right Frontal Lobe Damage.

1:00–3:00 PM Symposium 1

Social and Emotional Consequences of Childhood TBI
Chair: Vicki Anderson
Room: Ulster

1.	ANDERSON, VA	Social and emotional consequences of childhood TBI.
2.	DOB, R	Post Traumatic Stress Disorder and Cognitive Impairment in Children with Traumatic Brain Injury.
3.	ANDERSON, VA	Understanding predictors of functional recovery and outcome five years following early childhood head injury.
4.	JACOBS, R	Moral reasoning and adaptive behavior following focal frontal lesions in childhood. Are these skills localized to specific prefrontal regions in children?
5.	DOOLEY, J	Social information processing after closed head injury.
6.	TAYLOR, GH	Long-Term Outcomes of Pediatric Traumatic Brain Injury (TBI).
7.	MCDONALD, S	Loss of empathic reactions to emotionally charged information in people with TBI?

1:00–3:00 PM Paper Session 1

Memory I
Chair: Albert Postma
Room: Lansdowne

1.	VAN ASSELEN, M	Neuroanatomical Correlates of spatial memory.
2.	POSTMA, A	Spatial and Temporal Order Memory in Korsakoff Patients.
3.	FOTOPOULOU, A	Confabulation: The Construction of Motivated Memories.
4.	SCHNIDER, A	Spontaneous confabulation due to deficient on-line filtering upcoming thoughts. A test of the theory.
5.	AKANUMA, N	Hemispheric Differences in Recognition Memory Networks in Unilateral Temporal Lobe Epilepsy: A Study with Intracarotid Amobarbital Test and [18F]FDG-PET.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

1:00–2:30 PM **Poster Session 3: Neuroimaging, Cognitive Neuroscience, Language, Emotion**
Concourse Area

1.	RISBERG, J	Methodology and Clinical Applications of a New Tomographic Technique for Absolute Measurements of Gray and White Matter Blood Flow.
2.	BRAGA, LW	Using FMRI to Evaluate Rehabilitation Programs in TBI Throughout Different Stages of Life.
3.	HOPKINS, RO	Hippocampal Volume Following Carbon Monoxide Poisoning: Predictors and Neuropsychological Correlates.
4.	WILDE, E	Cognitive Control in Relation to DTI in Children with Severe TBI.
5.	WIEBE, D	An Exploratory Study of Brain Structures and Emotional Dysregulation in Affective Disorders.
6.	BALCONI, M	Encoding and Retrieval of Emotional Facial Expressions in Two Different Tasks.An ERP (Event-related | Potentials) Analysis.
7.	CHAN, RC	Brain activation during the performance of neurological soft sign items: a functional MRI study in healthy subjects.
8.	BURRACK, AK	The Incidence of *Mitempfindung* in Synaesthetes and Non-Synaesthetes.
9.	ANDREWES, DG	Lateralization of the Startle Reflex Circuit in Humans: An Examination with Monaural Probes following Unilateral Temporal Lobe Resection.
10.	MAJERUS, S	Verbal Short-Term Memory in Children and Adults with a Chromosome 22q11.2 Deletion: A Specific Deficit for the Retention of Serial Order Information?
11.	SCHWEINBERGER, SR	Face-selective MEG Responses in Ventral Temporal Cortex to Repetitions of Faces.
12.	KAUFMANN, JM	Neural Correlates of Learning Faces versus Learning People.
13.	VERDEJO, AJ	The Effects of Sustained Affective Context on Decision-Making Performance: Preliminary Results in Substance Dependent Individuals and Normal Controls.
14.	DANIELS, BJ	Neural Activation in Non-Fluent Aphasics Following Language Rehabilitation: An fMRI Study.
15.	NEWHOFF, M	Measuring Working Memory in Aphasia.
16.	HARRINGTON, GS	Neural Basis of Recovery for Chronic Broca's Aphasics.
17.	PURDY, M	The relationship between executive function and communication in aphasia.
18.	RAYMER, AM	Gesture Training Effects for Noun versus Verb Retrieval in Aphasia.
19.	WOLL, B	Therapeutic Intervention for Sign Language Dysarthria Following Cerebellar Stroke: A Case Study.
20.	LAUTERBACH, MH	Naming Errors in Healthy Elderly: The Influence of Stimuli, Education and Gender.
21.	DE HAAN, EH	Selective Sparing of Colour Naming in an Anomic Patient.
22.	SCHMIDT, BT	Working Memory Compensates for Poor Oral Reading in Adults.
23.	NISHIYAMA, S	Mechanism for Selective Impairment of Reading Following Occipital Lobe Damage.
24.	BALCONI, M	Consciousness and Emotional Facial Expression decoding. Subliminal and Supraliminal Stimulation Effect on ERPs.
25.	HARCIAREK, M	Secondary Mania and Depression Following Right Hemisphere Ischemic Stroke.
26.	LAWSON, C	Processing Emotion in Huntington's Disease.
27.	MONTAGNE, B	The Effect of Post-stroke Depression on the Recognition of Emotional Facial Expressions.
28.	MILDERS, M	Deficits underlying changes in social behaviour following head injury.

3:30–4:50 PM **Symposium 2**
Unilateral Spatial Neglect: Typology to Treatment
Chair: Anjan Chatterjee
Room: Pembroke

1.	CHATTERJEE, A	Unilateral Spatial Neglect: Typology to Treatment.
2.	COSLETT, H	Neglect sub-types.
3.	CHATTERJEE, A	In and out of awareness.
4.	HEILMAN, KM	Approach-Avoidance Neglect.
5.	ROBERTSON, I	How might neglect rehabilitation work?

3:30–4:50 PM **Paper Session 2**
Memory II
Chair: Andrew Mayes
Room: Lansdowne

1.	EVANS, JJ	You Don't Need a Hippocampus to Acquire Knowledge, But It Helps: A Study of the Aquisition of Semantic Knowledge and Autobiograhical Episodic Memory in Amnesia.
2.	REED, LJ	The Neural Correlates of Retrograde Memory Impairment: An Integrated Structural, Functional and Neuropsychological Study of Memory Impaired Patients.
3.	JANSARI, AS	Anomalous findings in retrograde memory and intact anterograde recognition memory: A follow-up study of a sub-clinical epileptic patient showing Long-Term Amnesia.
4.	MARKOWITSCH, HJ	Functional Brain Imaging of Stress-Related Retrograde Amnesia.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

3:30–5:00 PM **Poster Session 4: Child Neuropsychology**
Concourse Area

1.	>ANNETT, RD	Relationship of Child Continuous Performance Test Scores to Intelligence, Memory, Academic and Behavioral Function.
2.	WASSENBERG, R	Development of higher-order receptive language and its relations to executive functioning and sex.
3.	RIVLIN, E	Neurodevelopmental Aspects of a Conjoined Twin:Assessment, Progress, Ethical Issues.
4.	ROBISON, MA	Visual Processing in Children with Spina Bifida and Hydrocephalus: A Cognitive Neuropsychological Perspective.
5.	DORRIS, L	Childhood Narcolepsy: A Quantitative Study of Psychosocial and Cognitive Functioning.
6.	GIMENEZ, M	Semantic Fluency Impairment Correlates with Gray Matter Decrease of Thalamus in Adolescents with Antecedents of Prematurity.
7.	ESPY, KA	Executive Functions in Infancy? Infant Visual Expectancies Predict Later Executive Control in Preschool Children born Preterm.
8.	DORRIS, L	The Spectrum of Childhood Amnestic Disorders: Aetiology, Diagnosis and Rehabilitation.
9.	YEATES, K	Post-Concussive Symptoms and Post-Traumatic Stress Symptoms in Children with Mild Head Injuries: Are They One in the Same?
10.	PATRICK, PD	MRI Patterns in Children Following Severe Traumatic Brain Injury and Association with Prolonged Low Response States.
11.	PATRICK, PD	Dopamine Agonists in Low Response Children/Adolescents Following Traumatic Brain Injury.
12.	O'TOOLE, KM	Recovery from Focal Brain Lesions Due to Pediatric Arteriovenous Malformations Viewed from a Developmental Neuropsychological Algorithm.
13.	BUTLER, RW	Neurodevelopmental Status of Infants Undergoing The Norwood Procedure for Hypoplastic Left Heart Syndrome With and Without Ventricular Assist.
14.	FAGERLUND, AM	Characteristics of a Finnish Cohort of Children and Adolescents with FASD.
15.	MABBOTT, D	Attention, Processing Speed, and Working Memory in Children Treated with Surgery Alone or Surgery and Cranial Radiation for Posterior Fossa Tumors.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

FRIDAY, JULY 8, 2005

9:00–11:00 AM **Symposium 3**
Preterm Birth. Impact on Brain Maturation and Cognitive Development
Chair: Peter Anderson
Room: Ulster

1. ANDERSON, PJ — Preterm birth. Impact on brain maturation and cognitive development.
2. ANDERSON, PJ — Reductions in regional brain volumes in very preterm children at term equivalent. Relationship with cognitive development at 2 years of age.
3. WOODWARD, LJ — Neurodevelopmental outcomes of children born very preterm: Relationship with MRI abnormalities at term.
4. ANDERSON, PJ — The relationship between severity of germinal matrix/intraventricular haemorrhage and cognitive functioning.
5. ELGIN, J — Persistent executive deficits in very preterm children are associated with brain development at term.
6. TAYLOR, HG — Neuropsychological sequelae of <1000 g birth weight: Specificity and association with neonatal complications.
7. ESPY, K — Perinatal acidosis and specific outcomes at age 3 years in children born preterm.

9:00–11:00 AM **Paper Session 3**
Traumatic Brain Injury
Chair: Huw Williams
Room: Lansdowne

1. MALEC, JF — Predicting Long term Community Re-integration after Traumatic Brain Injury: The Role of Pre-injury Factors, Injury Severity, Early Disability, and Depression.
2. OBONSAWIN, MC — TBI Survivors and Carers See the Same Range of Personality Changes After TBI, but See It Differently.
3. YEATES, GN — The Dimension of Family Context for Awareness of Disability After Acquired Brain Injury (ABI).
4. SKILBECK, C — Outcome Following Mild Traumatic Brain Injury (TBI): The Assessment Of Cognitive & Psychological Problems For The Tasmania Neurotrauma Register.

11:30 AM–1:00 PM **Poster Session 5: Psychopathology, Neuropsychiatry, Forensic Neuropsychology**
Concourse Area

1. SIMARD, M — Severe Impairment of Episodic Memory in Elderly Patients with Late-Onset Depression and Low Hachinski scores.
2. EGELAND, J — Only a Minority of Subjects with Depression are Cognitively Impaired.
3. WITHALL, A — Aspects of Executive Function in Major Depressive Disorder Predict Social and Occupational Outcome.
4. HO, M — A Test of a Multiplicative Hyperbolic Model of Impulsive Choice in Humans.
5. PEACH, RK — Acquired Dyslexia as Conversion Disorder: Identification and Management.
6. BANKS, S — Neuropsychiatric Symptoms in Early and Late Stage Behavioral Variant Frontotemporal Dementia and Primary Progressive Aphasia.
7. JODAR, M — Dissociative Identity Disorder Like: A Case Study with Dementia.
8. PLUCK, G — Clinical Factors Influencing Neuropsychological Complaint in People Undergoing Electro Convulsive Therapy.
9. MCHUGH, T — Utility of the Proposed DSM-IV Criteria for Postconcussional Syndrome (PCS).
10. KEISKI, M — The Role of Effort in Depression-Related Deficits in Verbal Memory.
11. SANZ DE LA TORRE, J — The Clinical Usefulness of the Repeatable Battery for Assessment of Neuropsychological Status (RBANS) in Schizophrenia Patients: A Pilot Study in Spanish Population.
12. CHAN, RC — Neurological signs in medication naive schizophrenia.
13. VARGAS, ML — Executive Dysfunction Evaluated with the BADS in Schizophrenia: a Cognitive Endophenotype Clinically Valid.
14. MATSUI, M — Characteristics of neuropsychological profile in patients with schizotypal disorder.
15. KANEDA, Y — Determinants of Work Outcome in Schizophrenia and Schizoaffective Disorder: A Role of Cognitive Function.
16. TURGEON, M — An investigation of timing error detection and correction in schizophrenics.
17. ROSS, SR — Detecting Incomplete Effort Using the Seashore Rhythm and Speech-Sounds Perception Tests in Suspected Head Injury.
18. VILAR, R — The Relationship between Various Malingering Tests in a Spanish Sample.
19. PECK, EA — The Utility of the Rarely Missed Index from the WMS-III to Detect Malingering in a Combined Clinical and Forensic Sample of Patients.

11:00–2:30 PM **Poster Session 6: Medical Neuropsychology, HIV/AIDS, Specific Learning Difficulties, Mathematics in Children**
Concourse Area

1. SPOONER, DM — Performance of Postmenopausal Women on Traditional and Everyday Memory Tasks: A Comparison of HT and Non-HT Users.
2. EK, L — Patterns in cognitive dysfunction in a cross-sectional sample with low-grade glioma.
3. VAN DEN BERG, E — Mild Impairments in Cognition in Patients with Type 2 Diabetes Mellitus.

4.	BRANDS, I	Cognitive Functioning in Elderly Persons with Type 1 Diabetes Mellitus.
5.	JANSEN, N	Neuropsychological Effects of Chemotherapy Only in Children Treated For Acute Lymphoblastic Leukemia (ALL).
6.	MESSINIS, L	Neuropsychological deficits in Greek patients with chronic hepatitis C virus(HCV)infection.
7.	SPOONER, DM	Neuropsychological Functioning Following Adjuvant Chemotherapy for Treatment of Breast Cancer: A Longitudinal Study.
8.	POUTIAINEN, ET	Cognitive Functioning After Resuscitation from Sudden Cardiac Arrest Is Related to Long Term Survival of the Subjects.
9.	ELKADI, S	The Impact of Congestive Heart Failure (CHF) on Cognitive Function.
10.	FOX, AM	Detecting Suboptimal Effort During Cognitive Screening in Substance-Dependent Clients.
11.	RIS, M	Neuropsychological Correlates of Adult Antisocial Behavior in an Early Lead Exposed Cohort.
12.	VASSILEVA, J	Neuro-Cognitive Sequelae of Heroin Use and Psychopathy.
13.	MANNING, V	Trajectories of Neuropsychological Recovery in Alcohol-Dependent In-Patients Undergoing Medically Assisted Alcohol Withdrawal using CANTAB.
14.	LOPEZ-JIMENEZ, A	Influence of the use of heroin on verbal fluency performance.
15.	PARKER, RS	"Chronic Postconcussive Complaints as Indicators of Unhealed Injuries and Physiological Dysregulation".
16.	LOJEK, E	Limitations of Classification Systems Based on Severity of Deficit Criteria. The Case of Neurocognitive Impairment in HIV Infection.
17.	WALDROP, D	Cortisol Response Mediates Cognitive Function in HIV Infection.
18.	MESSINIS, L	Neuropsychological performance among symptomatic and asymptomatic HIV infected patients in a Greek sample.
19.	WILKIE, FL	Effects of Age on Stroop Performance in HIV Infected Primary Spanish-Speaking Adults.
20.	HUTCHISON, CW	A Novel Measure of Cognitive Function that is Highly Sensitive to HIV-Related Cognitive Impairment.
21.	MARCHETTA, N	Assessing Verbal Learning and Memory Functioning in Adults with Attention Deficit Hyperactivity Disorder (ADHD).
22.	FOLEY, JA	Neuropsychological Assessments Used in Scottish Learning Disability Services: An Audit.
23.	NIELSEN, K	Gender Differences in Writing of Dyslexics in a Family Genetics Study.
24.	NIELSEN, K	Contribution of Motor Planning to Functional Reading and Writing Systems.
25.	PONCELET, M	The Acquisition of New Orthographic Sequences in Dyslexic Children.
26.	EWING-COBBS, L	Sources of Individual Differences in Mathematical Computation and Fluency in Children.
27.	MOLFESE, D	Electrophysiological Correlates of Math Processing in Children.
28.	BARNES, M	Mathematical Processing in Spina Bifida: Implications for Math Disability Models.
29.	BULL, R	Executive Functioning as a Longitudinal Predictor of Mathematics Ability.
30.	ELLEFSON, M	Executive Functions, Switch Costs, and Arithmetic Achievement in Early Primary School.

1:30–3:30 PM

Symposium 4
Assessment of Multitasking Behaviour: From Laboratory-based Tasks to Real Life Scenarios
Chair: Raymond Chan
Room: Ulster

1.	CHAN, RC	The construct validity of three ecologically valid tests of multitasking: a preliminary study from healthy subjects.
2.	CHAN, RC	Assessment of Multitasking Behaviour: From Laboratory-based tasks to Real Life Scenarios.
3.	MANLY, T	The clinical effects of non-informative cues on multitasking.
4.	LEVINE, B	More than you bargained for: Neuropsychological and neuroanatomical correlates of the R-SAT.
5.	MACKINLAY, RJ	Multitasking in autism spectrum disorder.
6.	GARAVAN, H	Attention Switching and Working Memory in Drug Abused Subjects.

1:30–3:30 PM

Paper Session 4
Dementia
Chair: Linda Clare
Room: Lansdowne

1.	STOPFORD, C	Phenotypic Variations in Alzheimer's Disease.
2.	RAMSDEN, C	Everyday Action Performances in Alzheimers Disease: The Role of Working Memory in Everyday Action Task Performances.
3.	JULIEN, C	Semantic Dementia and Concepts of Number.
4.	GADE, A	Frontotemporal Dementia Related to Chromosome 3 (FTD3): Preclinical Neuropsychological Screening.
5.	MCMONAGLE, P	The Evolution of Aphasia in Cortico-basal Degeneration.
6.	PENDER, N	Investigating Recall-Recognition Discrepancies in Huntington's Disease Using the Dual Route Signal Detection Model of Recognition Memory.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

4:00–5:40 PM **Symposium 5**
Neuropsychological Contributions to the Assessment and Management of Patients With Very Low Levels of Awareness
Chair: Barbara Wilson
Room: Lansdowne

1.	WILSON, BA	Neuropsychological contributions to the assessment and management of patients with very low levels of awareness.
2.	OWEN, A	Using a Hierarchical Approach to Investigate Residual Auditory Cognition in Persistent Vegetative State.
3.	BADWAN, D	Low Awareness States - Diagnostic Dilemmas and Resolutions.
4.	GILL-THWAITES, H	The Sensory Modality Assessment and Rehabilitation Technique.
5.	REIMER, M	Quality of Life and the Minimally Conscious State.
6.	MCMILLAN, TM	Ten Year Follow-up of a Potential Treatment Withdrawal Case.

4:00–5:30 PM **Poster Session 7: Neurological Disorders**
Concourse Area

1.	THOMASON, KE	Transient Cognitive Impairment in Children with Epilepsy.
2.	CLARKSON, AJ	Adjustment to Life Following Temporal Lobectomy for Refractory Epilepsy.
3.	CHE DIN, N	Predictors of Memory in Adolescents with Epilepsy.
4.	GIOVAGNOLI, A	Drawing from Memory and Semantic Memory Deficits in Temporal Lobe Epilepsy.
5.	WHITTIER, N	Personality Assessment Inventory (PAI) Findings in Individuals Diagnosed with Multiple Sclerosis (MS).
6.	ALLEN, JB	Self-report Accuracy of Patients with Multiple Sclerosis.
7.	DELUCA, J	The relationship between subjective and objective measures of everyday life activities in persons with multiple sclerosis.
8.	LAATU, S	The Effects of Rivastigmine on Cognitive Impairments in Multiple Sclerosis: A Case Study.
9.	BARKER, LA	Relationships Among Fatigue, Mental Effort and Cognitive Performance in Individuals with Multiple Sclerosis and College Students.
10.	CHELUNE, GJ	Risk of Processing Speed Deficits Among Patients With Relapsing Remitting and Secondary Multiple Sclerosis.
11.	FLAHERTY-CRAIG, CV	Impaired Social Judgment in Amyotrophic Lateral Sclerosis.
12.	MAMOLO, CM	Limb Apraxia, Aphasia, and Cognitive Function.
13.	KLAASSEN, EB	Electrophysiological Correlates of Preparatory Motor Processes.
14.	HANNA-PLADDY, B	Dopaminergic Modulation of the Spatiotemporal Features of Limb Sequences in Parkinson's Disease.
15.	DESMARAIS, G	An Investigation of the Pantomime and Imitation Performance of Apraxic Patients: A Contrast between Accuracy and Impairment.
16.	DIJKERMAN, C	Interference of grasping observation during prehension, a behavioral study.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

SATURDAY, JULY 9, 2005

9:00–11:00 AM **Symposium 6**
Recent Developments in Neuropsychological Approaches to Awareness
Chair: Linda Clare
Room: Lansdowne

1.	CLARE, L	Recent Developments in Neuropsychological Approaches to Awareness.
2.	CLARE, L	Can Cognitive Neuropsychological Models help in understanding impaired awareness?
3.	RAFAL, R	Consciousness is Gated by Attending for Action.
4.	HANNESDOTTIR, K	Primary Versus Secondary Anosognosia in Alzheimers Disease.
5.	O'KEEFFE, F	Awareness of Deficits Measures and their Relation to Neuropsychological Abilities in Traumatic Brain Injury and Three Tauopathy Patient Groups.
6.	OWNSWORTH, T	A Metacognitive Intervention for Enhancing Error Awareness and Functional Performance in Naturalistic Settings.

9:00–10:30 AM **Poster Session 8: Traumatic Brain Injury, Stroke**
Concourse Area

1.	MCMILLAN, T	Midiagnosis of Post Traumatic Stress Disorder After Traumatic Brain Injury.
2.	BEECKMANS, K	Assessment of emotional and behavioural functioning after moderate to severe traumatic brain injury: A comparison of self- and other-report of the Neuropsychology Behavior and Affect Profile.
3.	MALEC, JF	Relationships of Early Patient and Significant Other Disability Assessments after Traumatic Brain Injury to Their Long Term Perceptions of Outcome.
4.	FISH, J	Neuropsychological Correlates of Prospective Memory Performance in Acquired Brain Injury.
5.	FORMAN, AC	The Effectiveness of an Adjustment Group on Improving Mood in Brain Injury Patients.
6.	PAGULAYAN, KF	Lack Of Awareness in Traumatic Brain Injury: How Prevalent is the Problem?
7.	PAGULAYAN, KF	Recovery of Psychosocial and Physical Limitations Over One Year After Traumatic Brain Injury.
8.	ARIZA, M	Neurobehavioural Dysfunctions and Regional Ventricular Dilation after Severe TBI.
9.	CHAN, RC	Examination of postconcussion-like symptoms and its neuropsychological correlates in college students.
10.	HUNTER, JV	Magnetic Resonance Spectroscopy in Relation to Cognition in Children After TBI.
11.	SHUTTLEWORTH-EDWARDS, A	Residual Deficits in Visuo-perceptual Processing in Players of Rugby Union from School through to the Professional Level.
12.	THOMAS, M	Subjective Quality of Life in the First Year Following Traumatic Brain Injury.
13.	KIDD, NR	The Assessment of Neuropsychological, Cognitive and Emotional Variables of Financial Competency in Acquired Brain Injury.
14.	CAHILL, L	Long-term Language Deficits Following Subarachnoid Haemorrhage of Aneurysmal Origin.
15.	MICHIELS, K	Do mood changes after stroke affect subjective and objective memory ?
16.	JUNCADELLA, M	Study of Memory and Visuospatial Functioning Patients with Subcortical Vascular Lesions.
17.	LINCOLN, N	Validation of Screening Measures for Depression and Anxiety in Stroke Patients with Communication Problems.
18.	WHITE, DA	How Mild Is Mild Stroke? From Cognition to Everyday Life.
19.	CONNOR, LT	How Mild Is Mild Stroke? Impact on Executive Abilities.
20.	MORRISON, T	How Mild Is Mild Stroke? Impact on Performance of Real World Tasks.
21.	EDWARDS, DF	How Mild Is Mild Stroke? Impact on Activity Participation and Quality of Life.

11:00 AM–12:30 PM **Poster Session 9: Dementia**
Concourse Area

1.	GRIFFITH, R	Posterior Cingulate MRS is Associated with Cognitive Impairment in Amnestic MCI.
2.	CHEY, J	Cognitive Aging and Development of Dementia: A Six-Year Follow-Up Study on Community-Residing Elders.
3.	CHEY, J	Clock Drawing, Literacy, and Education in Dementia Evaluation.
4.	ESTEVEZ-GONZALEZ, A	Reproductive period and cognitive performance in postmenopausal MCI women.
5.	MATHIAS, JL	Differentiating Between Frontotemporal Dementia and Alzheimers Disease: A Meta-analytic study.
6.	TOMASZEWSKI FARIAS, S	Degree of everyday functional impairment differs across subtypes of Mild Cognitive Impairment (MCI).
7.	KESSELS, RP	Implicit and Explicit Memory for Spatial Information in Alzheimer's Disease.
8.	VOGEL, A	Category Cued Recall in the Diagnosis of Mild Alzheimer's Disease.
9.	COEN, RF	Copying Pentagons: What is "Normal"?
10.	HERNANDEZ, M	Adaptation, Standardization and Validation of the "Addenbrooke Cognitive Examination" (ACE) as a Brief Cognitive Test for Dementia: a Pilot Sudy on Spanish Older Adults.
11.	FRIEDMAN, TW	The SCIT: A Possible Predictor of Those at Risk of Developing MCI.
12.	STOKHOLM, J	Relationships Between Cognitive and Behavioural Measures of Executive Function in Patients With Mild Alzheimer's Disease.
13.	VAN WALSEM, RM	The Use of the MacArthur Competency Assessment Tool for Clinical Research in Patients with Mild Alzheimer's Disease and Healthy Elderly.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

14. PETERS, F — A case series study of phonological and lexico-semantic processing at different stages of Alzheimer's Disease.
15. WIARDA, MG — Stability of Attention Span as Measure of Concentration in Patients with White Matter Lesions.
16. DONNELLY, K — From Theory to Evidence Based Practice: Cognitive Screening in Primary Care.
17. NEWSON, M — Evaluating Two Versions of the MMSE Pentagon Copying Task.
18. BARRETT, AM — Self-estimated Walking Speed in Parkinson Disease (PD).
19. TROSTER, AI — Apolipoprotein E Genotype Influences the Cognitive Phenotype of Parkinson's Disease.
20. ERHAN, HM — Neuropsychological Outcome Following Deep Brain Stimulation of the Subthalamic Nucleus in a Woman with Premorbid Psychiatric History: A Case Presentation.
21. STOLWYK, RJ — Neuropsychological Function and Driving Ability in People with Parkinsons Disease.
22. LUKATELA, K — Naming Deficits in Early Parkinson's and Alzheimer's Dementia.
23. MEERSMANS, M — Effects of serial position on episodic verbal memory in patients with advanced Parkinson's disease.
24. MEERSMANS, M — Quality of Life predictors after bilateral Deep Brain Stimulation of the subthalamic nucleus in patients with advanced Parkinson's Disease.

11:30 AM–12:50 PM Symposium 7
The Functional and Neural Basis of Prospective Memory
Chair: Tom Manly
Room: Lansdowne

1. MANLY, T — The functional and neural basis of prospective memory.
2. SHUM, D — Prospective memory following Traumatic Brain Injury in Children and Adolescents.
3. ELLIS, JA — Aging and the accessibility of retrieval cue information in a delayed intention task.
4. D'YDEWALLE, G — Brain regions associated with retention and retrieval in event–based prospective memory: Evidence from functional magnetic resonance imaging.
5. BURGESS, PW — The role of rostral prefrontal cortex (Area 10) in prospective memory.

11:30 AM–12:50 PM Symposium 8
Some New Ideas About Cognitive and Motor Recovery After Traumatic Brain Injury
Chair: Robin Green
Room: Pembroke

1. GREEN, R — Some New Ideas about Cognitive and Motor Recovery after Traumatic Brain Injury.
2. MELO, B — Cognitive and Motor Recovery after Traumatic Brain Injury.
3. GREEN, R — Cognitive and Motor Recovery from TBI' - Symposium Overview: Conceptual Framework, Summary of Presentations and Implications for Neurorehabilitation.
4. CHRISTENSEN, B — Competition between Cognitive and Motor Recovery after Traumatic Brain Injury.
5. NGO, L — Can Brief and Intensive Cognitive Stimulation Enhance Cognitive Functioning: Development of a Normal Control Model.

1:30–3:00 PM Poster Session 10: Assessment
Concourse Area

1. ALLEN, JB — Cross-cultural Differences in Facial Recognition on the Wechsler Memory Scale.
2. TAUB, A — Realiability of the Portuguese Version of the Zarit Caregiver Burden Interview.
3. SHORES, EA — Excluded Letter Fluency (ELF) Test: Norms and Test-Retest Reliability Data for Healthy Young Adults.
4. CHAN, RC — The development of a Chinese equivalence version of Letter-Number Span Test.
5. MERTEN, T — Information, Warning, Coaching - How Much Do They Need? An Analogue Study on Feigned Cognitive Symptoms.
6. GOMEZ-RUIZ, I — Discriminative Capacity of the Bilingual Aphasia Test of M. Paradis for the Clinical Diagnosis of Spanish Bilingual Persons.
7. SOPENA, S — Establishing the Reliability of the European Brain Injury Questionnaire (EBIQ).
8. HENRY, JC — Pilot Study; Neuropsychological Assessment of Adults with Mild/Borderline Intellectual Disabilities.
9. CAVENEY, AF — Brief Computer-based Cognitive Screening Measures in a Psychiatric Population: Feasibility, Psychometric Properties, and Factor Structure.
10. KANEDA, Y — A Reanalysis of the Cognition Subscale of the Positive and Negative Syndrome Scale (PANSS).
11. WIARDA, MG — Development of a New Screening for Cognitive Impairment (Mannheim Aphasia and Cognition Screening, MACS)
12. VANIER, M — Comparison of Three Measures of Fitness to Drive after Stroke: Preliminary Data on a Pilot Study.
13. SCHWEIGER, A — A Clinical Construct Validity Study of a Novel Computerized Battery for the Diagnosis of ADHD in Young Adults.
14. SMIGIELSKI, JS — Assessment of Effort in a Clinical Setting: Findings and Conceptual Issues.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

1:30–2:50 PM **Symposium 9**
Mild Traumatic Brain Injury: Incidence, Neuropsychological Profiles and Management
Chair: Huw Williams
Room: Lansdowne

1. WILLIAMS, H — Mild Traumatic Brain Injury: Incidence, Neuropsychological profiles and management.
2. YATES, PJ — Determining risk Factors for Mild Head Injury and Mild Traumatic Brain Injury in an U.K. health district.
3. WALL, SE — The Effects of Recent and Historical Concussion on Neuropsychological Test Performance in Jockeys.
4. KING, N — Mild Head Injury and the Post Concussion Syndrome: Aetiology, assessment and intervention.
5. SCARCIA, MJ — The Assessment of Executive Function following Mild Traumatic Brain Injury.

1:30–2:50 PM **Symposium 10**
Models of Neurocognitive Outcome After Developmental Disorders of the CNS: Moderating Effects of Biology, Age, Time, and Reserve
Chair: Maureen Dennis
Room: Pembroke

1. DENNIS, M — Models of Neurocognitive Outcome After Developmental Disorders of the CNS: Moderating Effects of Biology, Age, Time, and Reserve.
2. FLETCHER, JM — Spina Bifida: Genes, Brain, and Behavioral Outcome.
3. YEATES, KO — The Concept of Reserve Capacity in Pediatric Neuropsychology: Research Findings and Clinical Implications.
4. TAYLOR, H — Developmental Change Following Early Brain Insults: The Importance of the Environment.
5. LANDRY, SH — Spina Bifida: School-Age Cognitive Abilities Moderated by Preschool Abilities and Parenting.

3:00–4:30 PM **Poster Session 11: Aging, Cognitive Intervention**
Concourse Area

1. >SPAAN, PE — Episodic and Semantic Memory Functioning in Very Old Age: Explanations from Executive Functioning and Processing Speed Theories.
2. BOURNE, VJ — Childhood Intelligence And Cognitive Decline In Later Life: Evidence For The Cognitive Reserve Hypothesis.
3. OOSTERMAN, J — Blood Pressure: its Relation to Pain and Cognition.
4. LEJBAK, LK — Predictors of Subjective Memory Complaints in Young, Middle-Aged, and Older Adults.
5. VAN PAASSCHEN, J — Physical Activity and Executive Functions in Older People with Mild Cognitive Impairment.
6. KINSELLA, GJ — Multi-Tasking and Prospective Remembering in Older Adults.
7. ITO, E — Influence of Leisure Activities on the Cognitive Maintenance in Normal Aging People.
8. PEDERSEN, AD — Age of Brain Injured Citizens Influences Staff Appraisal of Unsatisfied Needs.
9. MEIJER, W — The Effects of Irrelevant Speech on Verbal Memory in Aging Individuals.
10. ALHOLA, PJ — Attention During Sleep Deprivation After Menopause: Does Hormone Therapy Have an Effect?
11. BOLEWSKA, A — The Utility of Computer Supported Training in the Rehabilitation of Brain Damaged Patients with Attention and Memory Disorders.
12. SIMARD, M — Errorless Learning and Spaced Retrieval Techniques in Mild Cognitive Impairment of the Amnestic Type : A Case Study.
13. BATEMAN, A — Single Case Study to Assess the Efficacy of "Neurotext"– a Memory and Alerting System using Text Messaging.
14. GRACEY, F — No Room For Error? Identity, Cognitive Therapy and Rehabilitation of Executive Impairment. An Illustrative Single Case.
15. SANCHEZ-CARRION ABASCAL, R — New Technology Applied in Neuropsychological Treatment Following TBI (EuroPaNet Project).
16. GENETTI, M — The Coded Diary of an Amnesic.
17. STIGSDOTTER NEELY, A — Collaborative Intervention in Pathological Aging.
18. TATE, RL — Determining the Methodological Quality of Single-case Experimental Designs in Neuropsychological Rehabilitation Research.
19. STEFANATOS, G — Activational effects of a neuropharmacologic treatment in aphasia.
20. ARANGO, JC — Using the spacing effect to improve memory of everyday activities in individuals with neurological impairments.
21. PENKMAN, L — Case Study: Prophylactic Academic Intervention for Children Treated with Cranial Radiation Therapy.
22. TWAMLEY, EW — Cognitive Training to Address the Neuropsychological Impairments of Schizophrenia.

3:20–4:40 PM **Symposium 11**
Innovative Methodologies for the Exploration of Language Breakdown in Dementia
Chair: Judit Druks
Room: Lansdowne

1. DRUKS, J — Innovative methodologies for the exploration of language breakdown in dementia.
2. DRUKS, J — Naming of Actions and Objects in Alzheimers disease.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

3.	CARROLL, E	Non-verbal Assessment of Semantic Feature Knowledge in Semantic Dementia.
4.	GARRARD, P	The Effects of Very Early Alzheimers Disease on the Characterisitcs of Writing by a Renowned Author.
5.	FUNNELL, E	Story Processing in Semantic Dementia.

3:20–4:40 PM

Paper Session 5
Assessment
Chair: Robin Green
Room: Pembroke

1.	CRAWFORD, JR	Estimation of Premorbid WAIS-III IQs and Indexes Using a Revised Spot-The-Word Test and the NART.
2.	DAWES, S	The Clinical Utility of a Cluster Method for Analyzing Neuropsychological Test Data.
3.	SKELTON, RW	Psychometric Validation of the Functional Outcome Profile (FOP) For Use in Rehabilitation After Acquired Brain Injury (ABI).
4.	FREELAND, JC	Reliability and validity of the BIRT Aggression Rating Scale.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

Abstracts Presented at the International Neuropsychological Society, British Neuropsychological Society and the Division of Neuropsychology of the British Psychological Society Joint Mid-Year Meeting

July 6-9, 2005

Dublin, Ireland

WEDNESDAY AFTERNOON, JULY 6, 2005

Poster Session 1: Cognitive Functions and Neuropsychology/4:00–5:30 p.m.

D.J. MITCHELL, N. MCNAUGHTON & P. NEO SUAT HONG. Ethanol and Low Frequency Event-Related EEG Rhythms in a Working Memory Task in Humans.

At low doses, anti-anxiety drugs, including ethanol, are known to increase the frequency and power of rat hippocampal theta rhythm in working memory tasks. We investigated whether or not ethanol produces comparable changes in components of human EEG. We predicted that low ethanol doses would increase the amount of theta synchronization particularly over the temporal lobe. 19 participants received one of four ethanol doses and were tested on a Sternberg task while EEG was recorded. The task involved the presentation of a list of 5-9 letters, followed by a delay and then a target letter. Participants were asked to indicate whether the target letter was present in the list. Participants completed thirty trials at 20, 50, and 80 minutes post-ethanol ingestion. After filtering and artefact removal 0.5s epochs of EEG were subjected to FFT or averaging. EEG epochs were submitted to ANOVA to test for statistically significant differences between electrode sites, frequencies, and ethanol doses. Ethanol produced a dose-dependent increase in phase-synchronization of 7-8Hz activity at temporal sites. The spectral power of both theta and 7-8Hz was greater than alpha activity and for all three bands tended to peak at central not temporal sites. As predicted, low doses of ethanol increased temporal phase-locked synchronization. Such theta activity may be important for working memory and ethanol action in both rats and humans. Future studies need to investigate the effects of higher doses of ethanol (which should reduce phase-locked theta) and test the generality of the current results in other working memory tasks.

Correspondence: *Damon J. Mitchell, Bsc, PGDipSci, Psychology, Otago University, PO Box 56, Dunedin 9001, New Zealand. E-mail: damonjmitchell@hotmail.com*

C.L. ARMSTRONG & C.B. SEILER. Normal variants in CNS myelin effect control processes in selective attention.

The effects on cognition from damage to the white matter is due to the interruption of the propagation of information transmission down the axon. Prior studies of neural conduction rates and cognitive function in normals are limited to intelligence. We used recent imaging technology to understand how myelinated white matter may correlate with normal cognitive control processes. We investigated the relationship between MRI measurements sensitive to myelin and performance on a selective attention task with and without distractors. Healthy adults (N=16) screened for health history, cognitive and structural abnormalities were administered a test of visual selective attention requiring executive processing. Magnetization Transfer Ratios (MTR) were measured in 31 brain regions. A forward step-wise regression tested a hypothesized neural network and component regions to predict hit rate and reaction time for visual perceptual matching of novel shapes with and without a distractor, with contingency feedback for modulation of errors. The MTR for the anterior cingulate predicted accuracy in perceptual matching. The anterior and posterior cingulate, prefrontal region, and thalami comprised a model that predicted 88% of the decrement in accuracy caused by distractors. The prefrontal region predicted slower reaction time for perceptual matching in order to achieve greater accuracy. Elements of the predicted neural macronetwork using an imaging technique that is most sensitive to myelin accounted for variations in visual selective attention in normals. The cognitive components implicated by the related brain regions were error processing and response selection under two levels of response competition. The anterior cingulate and prefrontal white matter may be associated with error processing, conflict monitoring, inhibition, and response selection, and are evidence of myelin mediation of processing-driven executive operations.

Correspondence: *Carol L. Armstrong, PhD, Neurology/Oncology, The Children, 3535 Market Street, Rm. 1410, Philadelphia, PA 19104. E-mail: armstrongc@email.chop.edu*

L.L. LAPOINTE, J.A. STIERWALT, G.R. HEALD & B.E. KEMPER. Mobile Phone Cognitive Distraction: Relative Degradation of Choice Reaction Time, Working Memory, Lexical Decision-making and Form Discrimination .

Recent studies have suggested that drivers who use the mobile phone quadruple their risk for a crash (Goodman, et al, 1997; Hahn, et al, 2000).. Cognitive resource allocation theory would suggest that the increased task demands of generating and producing discourse during driving would impact attention, working memory and a variety of discriminative and perceptual skills. The aim of this study was to determine whether skills that are mostly associated with the language, form discrimination, and working memory demands of driving are degraded more than measures of choice reaction time. Forty-two young adult volunteers participated in this study. Each was administered computerized measures of lexical decision-making, form discrimination, 1-back working memory, and choice reaction time. Participants were engaged in a mobile phone scripted conversation while simultaneously operating the space bar across the computerized cognitive-linguistic measures. Each participant was tested in a quiet condition as well as during simultaneous mobile phone conversation. Conditions were counterbalanced. Statistically significant degradations in reaction time and accuracy were found for all subtests across the conditions of quiet and

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

simultaneous mobile phone conversation. Lexical decision-making, form discrimination, and working memory tasks were degraded to a significantly greater extent than was choice reaction time. (Repeated measures ANOVA with pairwise comparisons and Bonferroni adjustment, $p<.05$) Linguistic, form discrimination, and working memory tasks are performed slower and less accurately than choice reaction time during simultaneous mobile phone conversation; and all are significantly degraded when compared to a quiet condition of no mobile phone use.
Correspondence: *Leonard L. LaPointe, PhD, Communication Disorders, Florida State University, Dept. of Comm Disorders, Florida State University, Tallahassee, FL 32306-1200. E-mail: llapoint@mailer.fsu.edu*

J.D. BAYLESS, L.J. BEGLINGER, K. DUFF, J.S. PAULSEN & J.E. MEYERS. Neuropsychological Correlates of Dichotic Word Listening Test Performance.
The Dichotic Word Listening Test (DWLT) is a standardized task in which 30 standard English words are presented to one auditory channel while a different, syllable-matched word is presented simultaneously to the other ear. The task was developed for routine clinical use in determining relative suppression/extinctions of auditory functioning based on the degradation/dysfunction of interhemispheric pathways. Dichotic listening abnormalities have been noted in a variety of pathologies, including localized lesions, demyelinating disease, traumatic brain injury, and Huntington's disease. The present study examined the specific relationship of dichotic listening performance to other neurocognitive domains. Meyers (2004) has developed a short neuropsychological battery with a six-factor solution. The current study correlates dichotic listening performance (left, right, and both-ear indices) to these neurocognitive factors in a series of 1565 clinic patients. Left-and both-ear indices correlated most strongly with the mental flexibility/speed domain (.49 and .52, respectively). The right ear index correlated most strongly with verbal reasoning (.42). Nevertheless, there were significant, but relatively modest correlations in all possible combinations of the three DWLT indices and the six neurocognitive factors. Overall results suggest that DWLT performance should be considered a generalized measure of cerebral integrity rather than characterizing a specific neuropsychological domain.
Correspondence: *John D. Bayless, Ph.D., Department of Psychiatry, University of Iowa, 200 Hawkins Dr., Iowa City, ME 52246. E-mail: johnbayless@uiowa.edu*

J. COCKBURN, J. BOYD & C. HARLEY. Effects of Cognitive Task Output Condition on Postural Control in Older Adults.
To use dual-task methodology to explore the premise that the motor component of speech output may be responsible for apparent effects of attentional demand from cognitive tasks on postural control in older adults. 11 healthy older adult volunteers, mean age 71.5 years, range 60-79 years, with no self-reported impairments of postural control. Baseline condition: silent sitting, no cognitive task Basic cognitive task: listen to oral presentation of clock times. Response conditions: cognitively demanding oral output (same, different); cognitively demanding non-oral output (key press same,different); non-demanding oral output (repetition). Postural control measures: sway area and sway path about seated centre of pressure. Order of presentation of task conditions was randomised. Sitting balance was measured on a modified Balance Performance Monitor™ and recorded to a computer. Oral responses were recorded to a second computer. Data are currently available from 11 participants. ANOVA has been used to calculate differences in postural control between single-task sitting and each of the other 3 conditions. Paired comparison has been used to examine differences between the three conditions in decrement from single-task sitting. Results demonstrate small, nonsignificant differences from postural control in silent sitting of spoken repetition of stimuli and of cognitively demanding non-oral output. Cognitively demanding oral output shows a strong trend to greater disruption of postural control, albeit nonsignificant in this small group. Vocalisation associated with rapid decision-making may make more demand on overall processing resources than a non-vocal motor response. However, this cannot be attributed solely to the motor component of speech output, which in this study has little independent effect on postural measures.
Correspondence: *Janet Cockburn, PhD, School of Psychology, University of Reading, Earley Gate, READING RG6 6AL, United Kingdom. E-mail: j.m.cockburn@reading.ac.uk*

X. CALDU, D. BARTRES-FAZ, I. CLEMENTE, M. JURADO, J. SERRA-GRABULOSA & P. VENDRELL. DAT 40 bp VNTR Polymorphism Influences CPT Performance in Normal Subjects. .
Dopamine transporter (DAT) reuptakes dopamine from the synapses and has been associated to several disorders such as attention deficit hyperactivity disorder and schizophrenia. A 40 base-pairs variable number of tandem repeats (VNTR) in the 3′-untranslated region has been found for the DAT gene, being the variants of 9 and 10 repeats the most common ones. The number of repeats has been related to the final DAT gene expression and thus to the dopamine presence in the synapses. This suggests that the DAT gene may be involved in the efficiency in cognitive tasks related to the dopaminergic activity. Our objective is to examine the relationship between variants 9 and 10 of the DAT gene and the performance of the Continuous Performance Test (CPT). The genotype for the DAT was determined in 90 volunteers (44 men and 46 women) aged 18 to 35 years (Mean = 20.40; SD = 3.43). The Conners′ CPT II was administered to all subjects and detectability (d′), reaction time, omission and commission error variables were registered. The group 9/9 was found to be the one with slower reaction times and lower number of commission errors, while the group 10/10 showed faster reaction times and higher number of commission errors ($F = 3.479$, $p = 0.035$ for reaction time; $F = 3.667$, $p = 0.030$ for commission errors). The genotype for the DAT modulates the performance of the CPT. These results are in agreement with the role of DA deficits in attentional disorders related to prefrontal functions.
Correspondence: *Xavier Caldu, MSc, Psiquiatria i Psicobiologia Clínica, University of Barcelona, Casanova, 143, Barcelona 08036, Spain. E-mail: xcaldu@ub.edu*

J.H. BULTITUDE & A. AIMOLA DAVIES. Putting Attention on the Line: Investigating the Activation-Orientation Hypothesis of Line-Bisection Bias.
Patients with unilateral neglect misbisect horizontal lines to the right of centre. Neurologically normal participants systematically bisect lines to the left, a phenomenon termed pseudoneglect. According to the activation-orientation hypothesis, these biases are caused by an uneven distribution of attention resulting from activation asymmetries, due to either right-hemisphere damage or right-hemisphere dominance for visuospatial tasks. This study tests a basic assumption of this hypothesis, that the more attended half of the line is perceived as longer compared with the unattended half. Thirty-nine normal participants were tested using a Landmark test in which they indicated if lines were pretransected left or right of centre. The location of the transector was varied according to a staircase method. A Posner-type paradigm directed attention prior to line appearance. In the valid-cue condition the line appeared centred around the cued location, and in the invalid-cue condition one end of the line fell on the cued location. A repeated-measures ANOVA indicated, first, that invalid-cue lines were associated with reaction-time costs, confirming that attention was successfully attracted to the cued location, and therefore biased to the cued end of invalid-cued lines. Second, the analysis demonstrated that this bias was accompanied by a shift in perceived midpoint toward the cued end, indi-

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

cating that the more attended half of the line was perceived as longer than the unattended half. By empirically demonstrating for the first time, both reaction-time costs and shifts in perceived midpoint as a result of manipulating attention, this study supports the activation-orientation hypothesis of line-bisection bias.
Correspondence: *Anne Aimola Davies, PhD, Psychology, Australian National University, Bldg 39 Psychology, ANU, Canberra, ACT 0200, Australia. E-mail: anne.aimola@anu.edu.au*

L.K. LEJBAK, M. CROSSLEY & M. VRBANCIC . A male advantage for object and location but not verbal working memory 'n back' tasks .

Speck et al. (2000) found a female advantage for verbal working memory using verbal versions of the 'n back' task, as females were faster and more accurate than males across conditions. The present study investigated sex-related differences in verbal, object, and location working memory using the 2-back version of the n-back task. Eighteen male and 18 female undergraduates completed all 3 versions of the n-back task (object, location, and verbal) on the computer. A mixed ANOVA was performed, with sex as the between subjects factor, and condition (letters, objects, and locations) as the within-subjects repeated measure. Contrary to the hypothesis, males were more accurate than females across tasks ($F(1, 34) = 7.14$, $p = .01$), however, a significant Sex x Condition interaction, ($F(1, 34) = 5.18$, $p = .01$), revealed that males were more accurate on the object and location conditions, whereas there were no sex-related differences in accuracy on the verbal condition. The findings from the present study are inconsistent with past research showing a female advantage on verbal n-back tasks. Task difficulty resulted in scores below chance in 5 females and 1 male who were consequently screened out of the analyses. Future studies will investigate whether the male advantage for object and location working memory occurs using less difficult versions of the n-back task, and whether the female advantage for verbal working memory found by Speck and colleagues can be replicated using these less difficult conditions.
Correspondence: *Lisa K. Lejbak, Doctoral Candidate, Psychology, University of Saskatchewan, 9 Campus Drive, Saskatoon, SK S7H 5S5, Canada. E-mail: lisa.lejbak@usask.ca*

A.C. WHEATLEY, D. CAINE & J. MORRIS. Visual Processing in the Visual Variant of Alzheimer's disease, Parkinson's disease and typical Alzheimer's disease.

Visual processing, from elementary to higher order visual cognition, object recognition and visual attention, was compared in patients with visual variant Alzheimers disease, Parkinsons disease, typical Alzheimers disease and age-matched controls. In contrast with previous studies, the visuospatial tasks placed minimal demands on executive, motor or memory function. The vvAD group was expected to be impaired in all visuospatial tasks (occipito-parietal, dorsal stream) and to exhibit an apperceptive but not an associative visual agnosia. The PD patients were also expected to exhibit deficits in visuospatial tasks that implicitly involved motor networks, because of parieto-striatal connectivity, but not other visuospatial tasks. The tAD group were expected to exhibit significant visuoperceptual (occipito-temporal, ventral stream) but not visuospatial compromise. Participants recruited from three major Sydney metropolitan hospitals. Sample included the vvAD patients ($n = 6$), PD($n = 15$), tAD ($n = 10$) and age-matched controls. Individual assessments were conducted in the participants' homes. The extensive battery included subtests from the WAIS-III, WMS-III, the Visual Object and Space Perception battery, Birmingham Object Recognition Battery, the Behavioural Inattention Test, Rey Complex Figure, the MMSE and experimental protocol of mental rotation. Results indicate pervasive, elementary and higher-order, visuospatial impairment in vvAD, in contrast to both tAD and PD. vvAD and PD patients both performed at chance on a test of mental rotation. This was independent of stage of disease in PD. The results suggest that when executive, motor and memory demands are at a minimum vvAD patients continue to exhibit profound visual processing disturbance, but PD were only compromised on a task of mental rotation indicating the relevance of implicit motor processing in this task, but tentativley challenging the claim of widespread visuospatial disturbance in PD.
Correspondence: *Anna C. Wheatley, Doctorate of Clinical Psychology, School of Psychology, University of Sydney, Mungo Macallum Building, University of Sydney, Sydney, NSW 2006, Australia. E-mail: annaw@psych.usyd.edu.au*

M.G. EDWARDS & G.W. HUMPHREYS. Pointing and Grasping to Two-Dimensional and Three-Dimensional Targets with Optic Ataxia .

Data show that damage to the posterior parietal areas can cause localisation errors in actions either conducted with the contralesional limb or to contralesional space. The objective of the study reported here was to determine the pointing and grasping responses shown by a left posterior parietal (unilateral) Optic Ataxia patient. In the experiments reported, the Optic Ataxic patient MH either pointed to or grasped two-dimensional or three-dimensional left versus right targets with his left versus right hand under central versus peripheral vision conditions. His movements were recorded using a motion analysis tracker. The results to the experiments showed that he made right hand pointing localisation errors to right side peripheral targets. We show that pointing error reduces when pointing to left space or with his left hand and that he made the least error when pointing with central vision. In the talk, we will demonstrate how the dimension of the target affected MH's pointing and grasping responses. We will present that MH's grasp responses show no localisation errors and furthermore, show that localisation errors were reduced when he pointed to three-dimensional objects compared to two-dimensional objects. Together, these manipulations question recent suggestions that optic ataxia is a deficit in the visual guidance of action.
Correspondence: *Martin G. Edwards, PhD, School of Sport and Exercise Sciences, The University of Birmingham, Edgbaston, Birmingham B15 2TT, United Kingdom. E-mail: M.Edwards.1@bham.ac.uk*

A.K. BURRACK, M. HEPP-REYMOND & P. BRUGGER. Visual Capture of Touch in a Patient without Touch.

"Visual capture of touch" describes the finding that in the presence of conflicting visual and haptic information the visual system often dominates the haptic system, in other words, humans are more likely to believe their eyes than their haptic sensations (e.g. Rock & Victor, 1964, Science, Vol. 143). We set out to investigate visual capture of touch in a patient who has lost her sense of touch. Two identical sets of five smooth wooden forms ranging from a circle (6cm in diameter) to an ellipse (long axis: 10 cm, short axis: 2.2cm) had to be explored manually and jugded as "same" or "different" in 4 conditions of varying visual interference (1) "blind", 2) "observation of palpating right hand", 3) "observation of palpating right hand in a mirror", 4) "blind" (as 1)). Additionally, reaction times were recorded. Subject: GL, who, due to extensive sensory polyneuropathy has lost her touch, vibration, pressure and kinesthetic senses. Pain and temperature sensations are still present; her motor fibres are intact (see http://deafferented.apinc.org). Although GL was uncertain on many trials if she had actually touched the forms, there was clear evidence of learning across the four conditions with correct responses rising from 47% in Condition 1 to 82% in Condition 4. The effect of visual interference was evident in the reaction times which increased markedly in Conditions 2 and 3. We were able to demonstrate visual capture of touch in a patient without touch, implying unconscious haptic perception.
Correspondence: *Anna K. Burrack, Unit of Neuropsychology, University Hospital Zurich, Frauenklinikstrasse 26, Zürich 8091, Switzerland. E-mail: anna.burrack@usz.ch*

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

S.C. MUELLER, R.W. SKELTON & S.P. ROSS. Dissociating Gender Differences in Spatial Abilities using Virtual Environments.

Although many gender differences in spatial abilities have been reported, most derive from paper-and-pencil tests. In contrast, we used 2 desktop virtual environments (VE) to provide a more interactive, ecologically valid, 3-dimensional context to examine gender differences in 2 spatial tasks. VE1 was a computerized Morris water maze, which animal research uses as the de facto standard for testing (allocentric) spatial cognition. VE2 was an exact copy of our university's quadrangle, including surrounding buildings. By working from the crossing points of two diagonal pathways, we created an asymmetrical 4-arm radial maze (with a 5th arm entrance) and used it to test object-location learning. Each of the 4 arms had 3 covered pictures of fruit and one of 3 distances from the hub. Participants (35 undergraduates; 19 females, 16 males) were required to learn the locations of 4 objects (one in each arm). Participants were tested all tested in VE1 first to assess spatial gender difference, and then in both real and virtual radial mazes, in counter-balanced order, to assess transfer of spatial knowledge from real to virtual and virtual to real environments. Males were significantly better in the spatial learning task, but not in either virtual or real object-location learning. Transfer between the real and the virtual space in both directions was nearly perfect. Performance in VE1 and VE2 correlated with performance on the Mental Rotation Task. These results indicate that knowledge in VEs transfers to the real world and that gender difference depends of the type of "spatial" task used and not on whether it is in real or virtual space.

Correspondence: *Sven C. Mueller, Psychology, University of Nottingham, University Park, Nottingham NG7 2RD, United Kingdom. E-mail: scm@psychology.nottingham.ac.uk*

L.K. LEJBAK, M. VRBANCIC, M. CROSSLEY & C. GUTWIN. The female advantage for an object-location working memory task occurs regardless of verbalizability of the objects .

A female advantage for working memory tasks has been documented (e.g., Duff & Hampson, 2001; Speck et al., 2000). For example, Duff and Hampson found that females make fewer working memory errors and are faster than males on a manual working memory task that requires working memory for objects (colours or shapes) in various locations. The present study investigated whether the female advantage for working memory exists in conditions that are difficult to verbalize, as females typically have an advantage over males for verbal ability, and whether the female advantage exists on computerized version of the task. Twenty female and 20 male undergraduate students were required to perform the working memory task both manually and on the computer using 1) objects that were easy to verbalize, 2) novel shapes that were difficult to verbalize, and 3) basic geometric shapes that were similar to Duff and Hampson. A mixed ANOVA was performed with sex as a between-subjects factor, and version (manual or computer) and stimuli (objects, shapes and novel shapes) as within-subjects repeated measures. Overall, females made significantly fewer working memory errors compared to males ($F(1, 38) = 6.36$, $p = .02$) and there was a significant Sex x Version interaction for time to completion ($F(1, 38) = 4.03$, $p = .05$), as females were faster on the manual version and males were faster on the computerized version. The Version x Sex and Stimuli x Sex interactions did not reach significance for working memory errors. The findings from this study are consistent with previous research and demonstrate that the female advantage for the object-location working memory task is robust regardless of verbalizability of the objects or manual vs computer presentation of the tasks.

Correspondence: *Lisa K. Lejbak, Doctoral Candidate, Psychology, University of Saskatchewan, 9 Campus Drive, Saskatoon, SK S7H 5S5, Canada. E-mail: lisa.lejbak@usask.ca*

T. LOETSCHER, M. REGARD & P. BRUGGER. Misoplegia Without Hemiplegia. .

Misoplegia, a term coined by Critchley, designates hatred for hemiplegia, is a consequence of mostly right parietal lesions and described in alternation with anosognosia. We report the observation of a patient with a right hemispheric tumor and misoplegia, but without hemiplegia, however, with a shortened left leg due to childhood poliomyelitis. A 79 yr. old ambidextrous women was admitted because of gait problems and mood changes. Examinations revealed a glioma occupying large cortical and limbic areas of the right hemisphere. Misoplegic behavior as well as personification of limb began 3 months prior to hospitalization. The patient cursed her left leg (calling it names) and was beating it. Although her left leg was handicapped from poliomyelitis acquired as a child, she had never displayed a similar behavior before. After the operation of the tumor, initial status revealed a temporary motor hemisyndrome, more dominant in the upper extremity. Neuropsychological status was dominated by persisting misoplegic behavior, left hemispatial neglect, diminished impulse control and anosodiaphoria. In accordance with Critchley, we interprete misoplegia as a manifestation of a distorted corporeal awareness due to a right parietal lesion. The interesting feature of our observation is the presence of misoplegia in the absence of left-sided hemiparesis. We argue that the peripheral damage of the left lower extremity contributed to the genesis of this unusual behavior.

Correspondence: *Tobias Loetscher, Neuropsychology Unit, University Hospital, USZ, Zuerich CH-8091, Switzerland. E-mail: tobias.loetscher@usz.ch*

R. HUITEMA, T. MULDER, A. HOF, K. POSTEMA, R. DEKKER & W. BROUWER. Walking Trajectory in Neglect Patients.

A lateral deviation of the walking trajectory is often observed in stroke patients with unilateral spatial neglect. However, existing research appears to be contradicting regarding the direction of this deviation. The aim of the present study was, therefore, to gain more insight into the walking trajectory of neglect patients. Twelve right hemisphere stroke patients, 8 left hemisphere stroke patients and 10 healthy control subjects were instructed to walk towards a target while their walking trajectory was recorded. Based on a model on egocentric heading control and Karnath's theory explaining neglect by a systematic shift of the subjective body-midline to the ipsilesional side, we expected neglect patients to show a lateral deviation to the contralesional side. Neglect patients with good walking ability indeed showed a deviation to the contralesional side. Neglect patients with impaired walking ability, however, showed a deviation to the ipsilesional side. Within the neglect group we found no relation between the severity of neglect and lateral deviation. We argue that impaired walking ability will cause a lower task priority of heading control compared to walking, resulting in a change of heading control strategy. Instead of actively monitoring and controlling their heading, these patients will adopt a "walking straight ahead" strategy, causing the change in walking trajectory deviation. An additional clinical message may be that neglect therapies specifically aimed at restoring the subjective body-midline in neglect patients, such as a prism-adaptation therapy, may improve the lateral deviation of neglect patients' walking trajectory.

Correspondence: *Rients Huitema, Neuropsychology Unit, University Hospital Groningen, P.O. Box 30.001, Groningen 9700 RB, Netherlands. E-mail: r.b.huitema@ppsw.rug.nl*

M.C. CORBALLIS, P.M. CORBALLIS, M. FABRI, T. MANZONI & A. PAGGI. Hemineglect in a Callosotomized Patient: A Triple Dissociation?

D.D.V. is a callosotomized man previously shown to exhibit left hemineglect. This was manifest in line bisection, and in failure to respond to left-visual-field (LVF) stimuli in simple reaction time (RT) when responding on a keyboard. Hemineglect appeared not to occur when he responded by pointing to the actual stimulus locations. Our objective was to measure pointing responses more accurately, and to further explore the conditions under which D.D.V.'s hemineglect occurs. D.D.V. is a right-handed man, aged 39 at the time of testing, who underwent complete section of the corpus callosum in 1994. His RT was recorded

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

to visual stimuli flashed in the LVF, RVF, or both visual fields. He responded either on a keyboard, or by pointing to and touching locations on the screen. In some conditions the locations of the stimuli were indicated by continuously-present circular markers on the screen. D.D.V.'s LVF neglect was present when he was asked to press the left-hand key to LVF stimuli and a right-hand key to RVF stimuli. It was not present when he touched the stimulus locations, whether he used both hands, or each hand separately. LVF neglect returned when he touched the fixation cross in response to the stimuli. When markers were present, there was no LVF neglect even for spacebar responses, but RVF RTs were markedly slowed. Even when LVF neglect was present, D.D.V. typically showed redundancy gain, with shorter RTs to bilateral stimuli than to unilateral stimuli, indicating neural summation even when one of the stimuli was below detection threshold. The results suggest a triple dissociation: (1) In simple RT, with no markers, responses were controlled by the left hemisphere, resulting in LVF neglect; (2) with markers present, responses were controlled by the right hemisphere, with no neglect but slowing of RT to RVF stimuli; (3) with point-and-touch responses, responses were controlled by the dorsal visual system, with equal attention to both fields.

Correspondence: *Michael C. Corballis, PhD, Psychology, University of Auckland, Private Bag 92019, Auckland 1001, New Zealand. E-mail: m.corballis@auckland.ac.nz*

A.M. BARRETT & C. FLAHERTY-CRAIG. Motor-intentional Visual Grasp after Right Thalamic Stroke.

to learn 1) whether contralesional line bisection bias would decrease when no stimulus was visible to act upon, and 2) whether this bias was primarily motor-intentional, or perceptual-attentional. A woman, 71, had a thrombotic right thalamic/midbrain infarction. Although inattentive to left-sided stimuli, she made leftward line bisection errors. We had the patient bisect 22, 175-mm lines, and mark the center of 22 blank pages, while viewing the line/page and her hand on a video monitor. In half of trials, right and left on the monitor appeared as in the workspace (direct condition). In the remaining trials, what she saw on the monitor was horizontally video-reversed: rightward hand movement appeared leftward (indirect condition). Mean line bisection and "page bisection" errors were computed and compared using t-tests. The patient erred 28 mm (SD 22.6) LEFTward bisecting lines in the direct condition. In contrast, bisecting a blank page, she erred 22 mm (SD 17.8) RIGHTwards ($p < 0.001$). In the reversed, indirect, condition, line bisection errors were 23.5 mm (SD 17.8) LEFTward (unchanged; consistent with primarily motor-intentional bias). However, in the reversed, indirect, condition, RIGHTward "page bisection" errors (36 mm, SD 19.4) tended to be further rightward, away from the viewed position of her hand on the monitor ($p = 0.093$), than in the direct condition. With right-left video feedback reversal, a contralesional line bisection bias was unchanged, consistent with a primarily motor-intentional bias. RIGHTward errors, however, occurred when bisecting a blank page, suggesting an abnormal approach of, or failure to disengage from, the left end of the viewed line. When we right-left reversed the appearance of the workspace, the patient's blank page bisection errors tended to occur further rightward, away from her viewed hand. It is possible that an avoidance response, provoked by the image of her own hand, affected her performance of this task.

Correspondence: *Anna M. Barrett, MD, Stroke Rehabilitation Research, Kessler Medical Rehabilitation Research Corporation, 1199 Pleasant Valley Way, West Orange, NJ 07052. E-mail: abarrett@kmrrec.org*

G.A. ESKES, S. GILES, J. COOLICAN & R. RAHMAN. Wheelchair Navigation and Neglect: The Influence of Spatial Reference Frames. .

The severity and presence of visuo-spatial neglect can vary depending upon the spatial reference frame in which it is assessed (e.g., personal, reaching or far space). The purpose of this study was to examine the contribution of neglect in different spatial reference frames to wheelchair navigation ability. Individuals with right hemisphere stroke (n=15) and age-matched normal controls (NC; n=15) were assessed with a neuropsychological battery including matched visual scanning tasks for neglect in personal, reaching and far space. Wheelchair navigation ability was measured in a 61m wheelchair obstacle course. Stroke patients were classified as having neglect (NEG; n=10) or no neglect (n=5) in 1,2 or 3 spatial reference frames based on NC cut-offs. Wheelchair performance was measured by the number of direct frontal hits (DH) or sideswipes (SS) of obstacles on the left or right side of the wheelchair. Three individuals showed neglect in all 3 spaces; one showed neglect in both personal and far space, while six had neglect in only personal (n=2), reaching (n=2) or far (n=2) space. Overall, the NEG group made more left-sided DH and SS wheelchair errors compared to NC ($p<.05$), and right-sided errors were infrequent. Left DH were associated with performance in personal ($r=-.61$, $p<.001$) and far ($r=-.62$, $p<.001$) space; in contrast, left SS were correlated with personal ($r=-.42$, $p<.02$) and reaching ($r=-.39$, $p<.03$) space scores. Wheelchair navigation ability relies on multiple spatial reference frames that can be dissociated across patients. Assessment and treatment of neglect in all reference frames may be important in improving independence and safety in mobility. Further investigation of the involvement of different spatial reference frames with other functional abilities would be of both theoretical and clinical interest.

Correspondence: *Gail A. Eskes, Ph.D., Psychiatry, Dalhousie University, 5909 Veterans Memorial Lane, Room 4080, AJL Bldg, QEII, Halifax, NS B3H 2E2, Canada. E-mail: Gail.Eskes@Dal.Ca*

H. OTA, T. FUJII, K. SUZUKI & A. YAMADORI. Functional and Anatomical Dissociation of Body-centered and Stimulus-centered Frames in Spatial Neglect.

Left spatial neglect can be subdivided into two types: body-centered left neglect (BCLN) and stimulus-centered left neglect (SCLN). It is unknown, however, which areas of the brain represent each frame of reference. The aim of this study is to find brain areas which are responsible for BCLN and SCLN. Subjects were 13 patients with left spatial neglect. To evaluate BCLN and SCLN simultaneously, a figure discrimination task, which we designed previously, was applied. On a sheet of white paper (29.7 x 42 cm), there were three kinds of circles: complete circles and circles with a missing portion on its left or right side. The subjects were required to circle every complete figure and to cross out every figure with a missing portion. More omission on the left side of the sheet was defined as BCLN. Circling the figures with left side missing was defined as SCLN. Based on the results of the task, the subjects were divided into three groups: four patients with BCLN, four patients with SCLN, and five patients with mixed left neglect (MLN). Although common brain lesions of each group included the right inferior parietal lobule, the overlapped lesions of BCLN patients were located more medially and anteriorly than that of SCLN patients. The overlapped lesions of MLN patients included those of BCLN and SCLN. The results of this study showed that body-centered and stimulus-centered frames of reference for processing external space not only function independently, but also have different anatomical correlates in the human brain.

Correspondence: *HISAAKI OTA, PhD, OCCUPATIONAL THERAPY, NAKAMURA MEMORIAL HOSPITAL, S1W14, CHUO-KU, SAPPORO 060-8570, Japan. E-mail: hisohlyon@hotmail.com*

K. YOSHIZAKI, R. NISHIMURA & K. KATO. The Effect of the Mental Rotation on the Unilateral and Bilateral Hemispheric Processing.

The purpose of the present study is investigate whether the BHA depends upon the task demand imposed to the unilateral hemisphere or upon one imposed to both hemispheres, using a mental rotation task.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

In the present experiment, we manipulated the rotation-angle of an alphabet letter to change the task demand. The total amount of the rotated angles for two letters was 90 degrees, and three conditions were set up: the pairs of 5-85 degrees, 25-65 degrees, and 45-45 degrees. A pair of the letters consisted of a standard-image-letter and a mirror-image-letter, and the letters were rotated with the same direction. The pair of the letters was tachistoscopically presented in the left, right or bilateral visual fields. Twenty-four right-handed students were asked to judge whether or not the two letters were both standard-image. The results showed that the size of BHA as well as the total RTs monotonically increased as the angle of more rotated letter of the pair increased. The resulys suggested that the BHA would depend upon the task demand imposed on the unilateral hemisphere.
Correspondence: *Kazuhito Yoshizaki, Ph. D., Psychology and Communication, Aichi Shukutoku University, 9, Katahira-Nagakute,, Nagkutecho, Aichi 480-1197, Japan. E-mail: yoshizak@asu.aasa.ac.jp*

M. BRAMAO, A. MENDONCA, L.M. FAISCA, K. PETERSSON & A.I. REIS. Schooling and Hemispheric Specialization: A Dichotic Listening Study.

The current understanding of hemispheric specialization and interactions between the two hemispheres is still limited. In addition it has been suggested that acquiring reading and writing skills modulates the functional hemispheric specialization for verbal language. To further understand this issue we investigated two dichotic listening tasks controlled for the attentional process and phonological similarity between pairs of items. Nine illiterates (mean age 70) and 8 literates (mean age 67, mean schooling 3.9) performed the task under the focused condition (attend to one ear separately); 14 illiterate (mean age 71) and 14 literate participants (mean age 68, mean schooling 4.0) performed the task under the free condition (to repeat both words of a pair). In the focused condition, within group comparisons showed that illiterates were significantly more accurate when attention was focused on the right ear ($P = 0.03$) while literates did not show any ear advantage ($P = 0.24$). Between group comparisons revealed that both groups performed similarly for the right ear ($P = 0.5$), while literates outperformed illiterates for the left ear ($P = 0.05$). For the free condition, illiterates again revealed a right ear advantaged ($P < 0.001$) while literates did not show any ear advantage ($P = 0.19$). The performance of two groups was similar for the right ear while literates outperformed illiterates on left ear ($P = 0.04$). Independently of the attentional condition, our results suggest a greater right ear advantage for illiterates.
Correspondence: *Alexandra I. Reis, PhD, Departamento de Psicologia, Universidade do Algarve, Universidade do Algarve, Campus de Gambelas, Faro 8000-810, Portugal. E-mail: aireis@ualg.pt*

A. MENDONCA, M. BRAMAO, L.M. FAISCA, K. PETERSSON & A.I. REIS. The Effects of Literacy on Errors in a Dichotic Listening Task.

The dichotic listening paradigm has been used to study auditory lateralization processes. However, it can be used to investigate additional issues. For example, this paradigm creates a situation of competition between stimuli presented simultaneously at each ear and we might observe identification errors that consist in the combination of parts of stimuli presented. Therefore, quantitative and qualitative errors analyses might provide relevant information about the types of processing during language perception and the attentional resources involved. In this study, we analyzed the errors presented by two literacy groups (10 literates, mean age 65.1 yrs, mean schooling 3.8; 11 illiterates, 69.9 yrs) in a focused dichotic listening task using phonological similar and dissimilar disyllabic common nouns. The results showed that the only errors significantly different between groups were the global intrusions. Illiterate subjects made more global intrusion errors compared to the literate group in the left ear ($P = 0.03$) while no differences between groups were observed for the right ear ($P = 0.4$). A within group analysis reveals that illiterate subjects produced more errors in the left ear compared to the right ($P = 0.03$) whereas the literates did not show any difference ($P = 0.43$). The present results suggest that formal schooling has little influence on the overall error rates and the specific errors analyzed. The only significant observation was a higher incidence of global intrusions for the left ear in the illiterate group. This suggests that attentional rather than language factors are relevant for the performance on the focused dichotic listening task.
Correspondence: *Alexandra I. Reis, PhD, Departamento de Psicologia, Universidade do Algarve, Universidade do Algarve, Campus de Gambelas, Faro 8000-810, Portugal. E-mail: aireis@ualg.pt*

A.I. REIS, M. INGVAR, C. ALEXANDRE & K. PETERSSON. Literacy: A Cultural Influence on the Hemispheric Balance in the Inferior Parietal Region.

The current understanding of functional hemispheric specialization and the interactions between the two hemispheres is limited. Hemispheric specialization is likely to depend on both genetic as well as environmental factors. In the present PET study we investigated the importance of one factor, literacy, on the functional hemispheric lateralization of the inferior parietal region in two independent samples of literate and illiterate participants. The results show that, in terms of task-related activation levels in the inferior parietal region (BA 39/40), the literate group is relatively more left lateralized in two simple auditory-verbal language tasks compared to the illiterate group. In addition, as a test on the specificity of the results, we investigated the laterality of the superior temporal gyrus (BA 22/41/42). The results showed that both literacy groups were similarly left lateralized in this region, indicating that early speech related regions do not depend on the acquisition of reading or writing skills. These results provide evidence that literacy influences the hemispheric balance in the inferior parietal region. Recent experimental findings indicate that the parts of corpus callosum which interconnect the parieto-temporal regions undergoes extensive myelination during the years of reading acquisition and that this region is thicker in literate compared to illiterate subjects. Thus there might be a causal connection between the acquisition reading and writing skills, the development of the corpus callosum, and the functional hemispheric differences reported here.
Correspondence: *Alexandra I. Reis, PhD, Departamento de Psicologia, Universidade do Algarve, Universidade do Algarve, Campus de Gambelas, Faro 8000-810, Portugal. E-mail: aireis@ualg.pt*

T.J. COOPER, V. FYFE, M. HARVEY & S.R. SCHWEINBERGER. Hemispheric Differences in Face Recognition: ERP and Behavioural Evidence from a Face Priming Task.

Studies of repetition priming have revealed a processing advantage for form-specific priming in the left visual field (LVF)/right hemisphere, and for abstractive priming in the right visual field (RVF)/left hemisphere (Marsolek, 1995). The aim of the present study was to record ERP modulations associated with image-specific versus abstractive priming (Pickering & Schweinberger, 2003), and to investigate hemispheric asymmetry in an immediate face repetition priming task. Sixteen young (age 18-25) participants classified foveally presented target faces as famous or unfamiliar. Prime stimuli were either same-image or different-image representations of the target individuals, or images of different faces. Primes were presented for 150 ms either to the left or right visual field and the targets were presented for 4000 ms. Speeded familiarity decisions were made on target faces while ERPs were recorded from 32 channels. Reaction time analysis suggested strong and image-specific priming from LVF/right hemisphere primes, and weaker and abstractive priming from RVF/left hemisphere primes. ERPs revealed both N250r and N400 priming modulations that have previously been related to perceptual identification and semantic processing, respectively. The present electrophysiological evidence for hemispheric differences in priming provides further information with respect to the time course

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

and neural correlates of this phenomenon. Priming has also been used to investigate implicit processing in patients with visual neglect, and the present paradigm is currently being conducted in a sample of these patients in order to delineate the degree of preserved processing of neglected stimuli.
Correspondence: *Tracy J. Cooper, PhD, Psychology, University of Glasgow, 58 Hillhead Street, Glasgow G12 8QB, United Kingdom. E-mail: tracyc@psy.gla.ac.uk*

F.M. O'KEEFFE, P. DOCKREE, P. MOLONEY, S. CARTON & I. ROBERTSON. Awareness Deficits and Neuropsychological Impairment after Traumatic Brain Injury .
A common difficulty following Traumatic Brain Injury (TBI) is lack of ability to accurately assess physical, cognitive and behavioural deficits. Self-awareness and realistic self-appraisal have been recognised as significant factors in rehabilitation and long-term outcomes for TBI patients (Hart et al, 2004; Prigatano, 1999; Ben-Yishay et al, 1985). This study examines awareness of deficits and error-monitoring abilities in and their link to neuropsychological abilities a clinical group of TBI patients and controls. 30 high-functioning TBI patients and 30 neurologically-healthy matched controls participated in this study. Methods of assessing insight included an awareness interview, discrepancy scores between self and other rated questionnaires of everyday functioning, error detection on a go/no-go sustained attention task, a dual action task and a naturalistic actions task and accuracy of participants' predictions on a number of neuropsychological tests. Electrodermal activity was also recorded. Results indicate that the TBI patients were indeed significantly impaired in accurate self-monitoring compared to controls across a number of these measures. Error awareness measures also correlated significantly with impairment on neuropsychological tasks of executive function. These results are discussed with reference to aspects of assessment of insight, the theoretical links between neuropsychological functions and self-awareness and to potential implications for rehabilitation of such deficits in TBI patients.
Correspondence: *Fiadhnait M. O'Keeffe, Psychology, Trinity College Dublin, Trinity College Dublin, Dublin 2 Dublin 2, Ireland. E-mail: okeeffef@tcfd.ie*

THURSDAY MORNING, JULY 7, 2005

Poster Session 2: Memory, Frontal Systems, Executive Functions/11:15 a.m.–12:45 p.m.

K. JODZIO. Verbal Working Memory and Language Restitution in Stroke-induced Aphasia: Evidence for Common Underlying Processes.
Aphasia is often accompanied by memory deficits that are not always simply a consequence of the speech difficulties. The present study investigated the linguistic determinants of verbal working memory (WM) disorder and its recovery in aphasia, with particular attention to the phonological loop which stores and rehearses information. Thirty aphasic individuals who had incurred left hemisphere stroke were examined. There were three control groups that included non-aphasic left brain-damaged patients, individuals with right hemisphere damage, and healthy subjects. Patients with aphasia were studied longitudinally with six-months interval, while control subjects once. Language functions were assessed using the BDAE. Digit span was measured with a series of span tests, that differed in complexity of stimuli. Two comparable versions of the immediate visual memory task for pictures were used to determine the effect of articulatory suppression (AS). Disorders of verbal WM were found to be more pronounced in patients with aphasia than in those with brain damage, but spared verbal functions. Within-subjects comparisons were conducted in order to see whether the different encoding conditions of the two WM tasks for nameable pictures affected recognition performance. It was found that aphasic patients performance did not vary for the two task at the first examination only, whereas control subjects did significantly worse on recognition under the AS. This suggests that aphasics typically showed no evidence of phonological coding in visual WM tasks. Nevertheless, both language and memory impairments showed substantial recovery. There is strong evidence that aphasia and forgetting that follow left hemisphere damage can be due to a common underlying mechanism.
Correspondence: *Krzysztof Jodzio, Department of Psychology, University of Gdansk, University of Gdansk, Department of Psychology, Pomorska 68, 80-343 Gdansk, Poland, Gdansk 80-343, Poland. E-mail: psykj@univ.gda.pl*

N. MOTOMURA & H. MIZUTA. Memory function in cases with Heubner's recurring artery occulusion.
The caudate nuclei are part of the basal ganglia and are nourished by Heubner's recurrent artery. However, to our knowledge, the neuropsychological assessment of the patients with circumscribed lesions of caudate nucleus is very rare and no one conducted a detailed procedural memory tasks in patients with caudate nucleus damage. Subjects were five patients with lesions due to the rupture and repair of an aneurysm of the anterior communicating artery. Out of these patients, three patients had left-sided lesions (Group L) and other two patients had right-sided lesions (Group R). Furthermore, three patients with ruptured aneurysm without vasospasm were served as control (Group C). Mini-Mental State Examination (MMSE), Raven's Colored Matrix Test (RCPM), Wechsler Adult Intelligence Scale-Revised (WAIS-R), Token test, naming test, Wechsler Memory Scale and digit span were assessed for these subjects. Furthermore,we conducted auditory verbal learning test(AVLT) for declarative memory test and reading skill test and drawing skill test for procedural memory task. The results of MMSE, RCPM and WAIS-R demonstrated that general intellectual level was well preserved in any of the groups. Token test, which measures the level of verbal comprehension and the severity of aphasia, was normal range in any patients. Naming was almost perfect in any patients. And the score of the general memory, which was assessed by Wechsler Memory Scale and Digit span was also well preserved in any of the patients.On AVLT the patients with Heubner's recurrent artery occlusion exhibited impairment in recall of the word lists but not in the recognition test.Drawing skill was disturbed in left group, although reading skill was preserved. Patients with Heubner's recurring artery occlusion demonstrated lower scores both on declarative and on motor procedural memory tasks. These results indicate that the caudate nucleus is related both with declarative memory and with procedural memory.
Correspondence: *Naoyasu Motomura, PhD, National Mental Support Center, Osaka Kyoiku University, 1-2-10, Midorigaoka,, Ikeda, Osaka 563-0026, Japan. E-mail: motomura@cc.osaka-kyoiku.ac.jp*

A. NARBERHAUS, D. SEGARRA, C. JUNQUE & F. BOTET. Memory impairment in adolescents with antecedents of prematurity and perinatal asphyxia (PA) or intraventricular hemorrhage (IVH).
Long-term study of memory in adolescents with antecedents of prematurity and PA or IVH. Forty-one adolescents < or = 32 weeks gestational age, 26 with PA and 15 with IVH, are compared with a control group of 31 subjects matched by age and gender. All subjects underwent a neuropsychological testing, which included measurements of intelligence, memory, visuospatial skills, and some frontal functions. We found significant differences between the IVH group and the controls in: verbal learning, long term verbal memory, recognition, visual memory and

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

everyday memory. Performance was worse in the IVH group. We also found significant differences between the IVH group and the PA group in verbal learning and long term verbal memory, being worse the performance of the IVH group. We did not find differences between the PA group and controls. We observe alteration on several aspects of memory in adolescents with antecedents of prematurity and IVH. This affectation could be related to neuronal necrosis of hippocampus, produced by hypoxic-isquemic lesion that accompany IVH, but not PA, which is of low intensity in our sample.

Correspondence: *Ana Narberhaus, Psychitry and Clinical Psychobiology, University of Barcelona, Pg. Vall d'Hebron 171, Barcelona 08035, Spain. E-mail: anarberhaus@yahoo.es*

A. MACKAY, J. PERRY & D. WHITE. Executive Contributions to List Recall Among Older Adults.

The objective was to determine the contributions of executive function and processing speed to recall in older adults. The sample included 62 community volunteers ranging in age from 60 to 88 years (M = 74.3, SD = 7.4). Word list recall at three retention intervals (fifth learning trial, following a short delay and interference list, following a 20-minute long delay) was measured. In addition to semantic clustering during word list recall, executive function was measured using Stroop and Trail Making tasks. A simple reaction time task measured processing speed. Hierarchical regression analyses were used to predict number of words recalled at each retention interval. Incremental R squares are reported. Recall on the fifth learning trial correlated with Trail Making and semantic clustering ($\triangle R^2$=.18 and .30 respectively, p<.01). Recall following a short delay and interference list correlated with Trail Making, Stroop, and semantic clustering (for Trail Making and Stroop $\triangle R^2$=.17 and for semantic clustering $\triangle R^2$=.38, p<.01 for both). Entering simple reaction time into the analyses attenuated the relationships among the executive measures and recall ($\triangle R^2$=.07, p<.05) but did not change the pattern of results. After a long delay, recall was correlated only with semantic clustering ($\triangle R^2$=.36, p<.001). Executive function plays a significant role in the recall of older adults. Semantic clustering played the clearest role across three retention intervals, but other aspects of executive function measured by Trail Making and Stroop made contributions to immediate recall and short delay recall with interference. Processing speed makes a small contribution to recall.

Correspondence: *Anna MacKay, Psychology, Washington University in St Louis, One Brookings Drive, MB 1125, St Louis, MO 63130. E-mail: ajmackay@artsci.wustl.edu*

D.C. GILLESPIE, A. BOWEN & J.K. FOSTER. The Longitudinal Impact of Right Hemisphere Stroke (RHS) on Memory Functioning.

Memory impairment is a common consequence of stroke, but the memory problems experienced by RHS patients are poorly characterized. We sought to determine the early impact of RHS on memory (for nonverbal and verbal information), and whether any identified impairments improved over time. A consecutive sample of RHS patients (n=62) completed standardized tests of nonverbal and verbal memory - in recall and recognition formats - from the Doors and People Memory Test. Assessments took place 4- and 16-weeks post-stroke. Each patient was carefully matched to a non-stroke control (NSC) on the basis of age and premorbid verbal intelligence. Four weeks after stroke, patients were impaired on both recall and recognition subtests in the nonverbal modality, but on only the recognition subtest in the verbal modality. Contrary to theories of hemispheric specialization, however, patients' nonverbal impairment was no greater than their verbal impairment when memory for the two types of material was directly compared (t= 1.37, p= 0.18). On the second occasion of testing, although nonverbal memory deficits were still present, verbal deficits were not. In contrast to the 4-week data, patients did now experience significantly poorer nonverbal than verbal memory at 16-weeks post-stroke (t= 3.13, p= 0.003). Patients have equal difficulty remembering nonverbal and verbal information four weeks after RHS. Whereas nonverbal memory deficits persist after RHS, verbal memory deficits do not. Clinicians often contrast performance on nonverbal and verbal memory tests, because compensatory strategies can capitalize on areas of relatively preserved function. The current research suggests that if memory assessments are undertaken too soon after RHS, significant nonverbal-verbal discrepancies might be missed.

Correspondence: *David C. Gillespie, ClinPsyD, Human Communication and Deafness Group, University of Manchester, School of Psychological Sciences, University of Manchester, Manchester M13 9PL, United Kingdom. E-mail: david.c.gillespie@student.manchester.ac.uk*

J. CHUNG, D. MAN & S. TAM. Memory Performance of Hong Kong Chinese older people with Mild Cognitive Impairments (MCI) .

This study investigates memory functioning of Hong Kong Chinese older people with MCI in aspects of basic memory processes of encoding and recall, working memory, everyday memory, and metamemory. Using convenience sampling, two groups of subjects (MCI and healthy) were recruited from community centres. MCI subjects had a Clinical Dementia Rating (CDR) score of 0.5 and subjective memory complaints, and healthy subjects received a MMSE score greater than adjusted cut-off scores and a CDR score of 0. Subjects were excluded if they presented depressive symptoms or took psychotropic drugs. All subjects were assessed by Fuld Object Memory Evaluation (FOME), digit span, Rivermead Behavioural Memory Test (RBMT), and Metamemory Questionnaire (MMQ). Data collection is still in progress. Preliminary data analysis of 22 MCI subjects and 50 healthy subjects obtained the following results. The MCI group was significantly older (mean age=78) and less educated (mean years of 2.4). When these two factors were adjusted in ANOVA tests, the MCI group showed significantly poorer performance than the healthy group in RBMT that evaluates everyday memory (F=39.68, p<0.001) and MMQ strategy (F=8.023, p=0.006). Mann-Whitney tests showed that the MCI group had a significantly lower capacity of storage, retrieval and delayed recall as evaluated by FOME, and significantly poorer performance in digit span forward sequence, backward sequence and span. No significant correlation was found between metamemory and objective memory tests for the MCI group except for RBMT and MMQ strategy (r=0.60, p=0.004). The preliminary findings corroborate many mainstream findings that MCI subjects experience memory difficulty and highlight that Chinese MCI subjects use few memory strategies that are associated with their performance in everyday tasks. Simple memory strategies are suggested to be incorporated in memory enhancement program for MCI. Results of the full study will be presented and discussed.

Correspondence: *Jenny C. Chung, PhD, The Hong Kong Polytechnic University, Department of Rehabilitation Sciences, The Hong Kong Polytechnic University, Kowloon NA, Hong Kong. E-mail: rsjchung@polyu.edu.hk*

C. BASTIN, M. VAN DER LINDEN, A. CHARNALLET, C. DENBY, D. MONTALDI, N. ROBERTS & A.R. MAYES. Dissociation between recall and recognition memory in amnesia: The case of a patient with hippocampal damage following carbon monoxide poisoning.

There is currently a debate regarding the status of recall and recognition memory in amnesic patients with focal hippocampal damage. Proportionate deficits of recall and recognition memory have been observed in some patients with selective hippocampal damage. In addition, these patients showed an impairment of both the recollection and familiarity aspects of recognition memory. In contrast, other amnesic patients with selective hippocampal lesions demonstrated relatively preserved recognition memory, despite severely impaired recall abilities. In some of them, familiarity processes were found to be intact. The resolution of this controversy has important implications for theories of episodic memory. In the present study, we examined the recall and recognition performance of an amnesic patient, MR, who suffered from bilateral hippocampal

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

damage and temporoparietal cortical atrophy following carbon monoxide poisoning. Verbal and nonverbal recall and recognition memory were measured by tasks matched for difficulty. On these tasks, MR's recall performance was more severely impaired than his recognition memory. In addition, MR's recognition performance was normal on most of the tasks. In order to determine on which processes MR based his recognition decisions, we administered to the patient and to matched controls the process dissociation procedure. This evaluates the contribution of recollection and familiarity within a recognition task. The results indicated that, in this patient, familiarity was preserved, but recollection was impaired. This study thus supports the idea that amnesic patients with hippocampal damage can show preserved familiarity-based recognition memory, despite poor recall and recollection.

Correspondence: *Christine Bastin, PhD, Cognitives Sciences, University of Liège, Boulevard du Rectorat, B33, Liège 4000, Belgium. E-mail: Christine.Bastin@ulg.ac.be*

L. ALBUQUERQUE, C. LOUREIRO, M. LAUTERBACH & I. PAVAO MARTINS. CVLT in patients with frontal or temporal lesions: primacy effects.

Despite reported differences between frontal and temporal verbal memory, we are not aware of any CVLT direct comparative study of well-defined focal lesions consecutive patients with unilateral focal frontal (n=15) and temporal (n=15) lesions were compared on the CVLT. Aphasic patients were excluded. Sub-scores of primacy (sum of correct recalls of the first 4 of List A items, on the 5 immediate recall trials) and recency (same measure concerning the last 4 items) recall were computed. The two groups were identical in age, sex, literacy, lesion side, post-surgery time, anticonvulsant intake and seizures. Frontal patients (FL) had significantly lower scores then temporal patients (TL) in List A recall 5 (standard scores 96.21 + 3.34 vs 98.94 + 2.53, p=0.02) and total recall (standard scores = 84,91+10,91 vs 93,21+9,74, p=0.03). TL disclosed higher primacy score (15,13 + 2,09 vs 10,60 + 4.08, p=0.00), and higher % of primacy (CVLT Manual). There were no differences in recency and middle items. These results support that long-term memory may be relatively intact, but learning/recall strategies disproportionately disrupted in FL. Primacy effect relates to long-term, and recency to short-term storage, but this cannot be assumed for repeated presentations. In normal subjects, successful long-term encoding and retrieval rely more in semantic or subjective clustering, than in position effects. FL findings suggest a systematic interference of middle and last items over the first ones (perseveration?) while learning, rather than attention or primary memory deficits. This effect, that seems evident in the immediate organization of information, may actually contribute to clustering inabilities of FL, as previously described. We think therefore that this study brings some contribution to the characterization of CVLT performances in FL vs TL, and mechanisms of impairment in FL.

Correspondence: *Luisa Albuquerque, neurology, neurology, Faculdade Medicina Lisboa, Av. Prof. Egas Moniz, Lisboa 1699-028, Portugal. E-mail: labling@fm.ul.pt*

S. LAATU. Semantic Memory Deficits in Alzheimer's Disease, Parkinson's Disease and Multiple Sclerosis. .

There is no commonly used standardized method for studying semantic memory functions and no commonly shared theory of what is semantic memory. Our research group has presented a theoretical framework according to which semantic memory contains general knowledge of the world, organized as concepts, their meanings and interrelations. It includes the spectrum of both verbal and non-verbal associative and hierarchical knowledge that we have about the world. The aim of the present studies was to explore semantic memory in Alzheimer's disease (AD), Parkinson's disease (PD) and multiple sclerosis (MS), which are neurodegenerative diseases known to affect memory functions. Due to the heterogeneity of the theoretical frameworks and methodologies used in previous studies, the frequency and nature of a semantic memory deficit has remained unresolved in these diseases. In the present studies, linguistic tasks measuring conscious understanding of concept meanings and visual tasks measuring object recognition were used as study methods. Patients with AD (24 subjects), PD (52 subjects) or MS (42 subjects) were first screened by traditional neuropsychological tests. The cognitively deteriorated patients served as the study groups, while healthy controls (81 subjects) and physically matched cognitively preserved PD and MS patients were used as the control groups. Semantic memory impairments emerged in all of the cognitively deteriorated patient groups measured by both linguistic and visual tasks. Semantic memory impairments are an important part of the cognitive decline related to AD, PD and MS.

Correspondence: *Sari Laatu, Masku Neurological Rehabilitation Centre, P.O. Box 15, Masku FIN-21251, Finland. E-mail: sari.laatu@msliitto.fi*

N. NAGAHARA, T. HATTA, E. ITO, H. WATANABE & K. KARASAWA. The Effects of Alcohol and Cigarettes on Memory in Middle- and Elder-Japanese.

To investigate the independent and interactive effects of drinking and smoking on memory. Five hundreds and twenty five Japanese individuals aged 39 to 87 answered the questionnaire about consumption of alcohol and cigarettes and were engaged in memory tasks. Words memory (participants were presented three words and made delayed recall) and prospective memory (at the beginning of the examination, participants were asked to put a card into a box when the examination finished) were given as the memory tasks. Memory tests were conducted individually. MANCOVA was carried out to examine the effect of intakes of alcohol and cigarettes on memory including age and years of education as covariates. The covariates have no significant effects. Drinking and smoking did not affect individually neither on words memory nor prospective memory. The interactive effect was significant on the prospective memory, but not on the words memory. Participants who drink and smoke lightly indicated low score of prospective memory in comparison with other type of ingestion. Both of drinking and smoking are not influence independently, but those have interactive effects on the prospective memory.

Correspondence: *Naoko Nagahara, Department of Psychology, Nagoya University, Furo-chou, Chikusa-ku, Nagoya 464-8601, Japan. E-mail: s020311d@mbox.nagoya-u.ac.jp*

E. RITTER, A.U. MONSCH & L. MANNING. Autobiographical and Topographical Recognition Memory in Mild Cognitive Impairment .

Amnestic mild cognitive impairment (aMCI) is characterised by episodic memory impairment. The question whether aMCI patients' autobiographical and topographical recognition memory is affected has not yet been addressed. A group of 70 community-dwelling French-speaking subjects (18m, 52w; age=64.3±7.04; range: 49-78) were administered a modified version of the Crovitz Test (modCT; Hodges & Ward, 1989) to assess autobiographical memory of specific events during life periods and the Camdem Topographical Recognition Memory Test (CTRMT; Warrington, 1996). Based on the results of the episodic verbal memory tests (logical memory-delayed recall, LM-DR; word list-delayed recall, WL-DR; cut-off -1.5 SD), subjects were divided into an aMCI group (N=49; 17m, 32w; age=63.9±6.77; MMSE=28.6±1.22) and a normal control group (NC; N=21; 1m, 20w; age=65.4±7.69; MMSE=29.1±1.12). NCs exhibited a trend to perform better than the aMCI group on the CTRMT (p=.06). Both groups were similarly impaired on the modCT. Significant correlations emerged using all individuals: CTRMT vs. CT (r=0.26, p<.05); CTRMT vs. WL-DR (r=0.36, p<.005); CTRMT vs. LM-DR (r=0.30, p<.02). None significant correlations were seen on CT vs. WL-DR and CT vs. LM-DR. Topographical recognition memory

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

(TRM) tends to be affected in aMCI. The absence of a relationship between autobiographical memory ("recollection of events from our live") and episodic memory ("recollection of events in the laboratory") is in accordance with Gilboa's (2004) claim of two different systems for these tasks. With this framework in mind, it is suggested that TRM (related real-life items in the laboratory) represents an intermediate system.
Correspondence: *Lilianne Manning, University Louis Pasteur, LN2C 12 rue Goethe, Strasbourg 67000, France. E-mail: lilianne.manning@psycho-ulp.u-strasbg.fr*

L.M. FAISCA, M. BRAMAO, A. MENDONCA, K. PETERSSON & A.I. REIS. A Dynamic Analysis of Clustering and Switching Strategies in Semantic Verbal Fluency.

Semantic fluency performance depends on strategic search and organizing retrieval in terms of semantically related words. These processes have been operationalized into two qualitative aspects: 1) clustering, the production of related words within a semantic subcategory; and 2) switching, the strategic search of subcategories through semantic memory and the cognitive flexibility to shift efficiently between semantic subcategories. Are the clustering and switching valid constructs to distinguish clinical populations and understand the strategies used by normal subjects in fluency tasks To answer this question we attempted to validate the clustering and switching constructs through a dynamic analysis. Twenty illiterate (70.8 yrs.) and 20 literate subjects (67.2 yrs., mean schooling 3.8) participated in two semantic fluency tasks. The time between subcategories of related words (switching between clusters) and the time between words within a subcategory (exemplars within clusters) was measured. The results showed that time between subcategories of related words (3.56 s) was significantly longer ($P < .001$) than the time between semantic related words within a subcategory (2.05 s), independently of literacy group and semantic criteria. The dynamic analysis of semantic fluency responses confirms that switching and clustering are two different underlying strategies to perform fluency tasks. The time between items that shared semantic attributes was shorter compared to time between items from different semantic sub-domains.
Correspondence: *Alexandra I. Reis, PhD, Departamento de Psicologia, Universidade do Algarve, Universidade do Algarve, Campus de Gambelas, Faro 8000-810, Portugal. E-mail: aireis@ualg.pt*

N.B. WALKER & A.M. FOX. Visuo-spatial Working Memory Impairments in Early-stage Problem Drinkers .

The present study examined the relative contribution of passive and active processing to visual and spatial working memory and evaluated the sensitivity of tasks tapping these visuo-spatial working memory processes to cognitive impairment in early-stage problem drinkers. Participants were recruited from a pool of undergraduate university students based on their responses to the Alcohol Use Disorder Identification Test. Problem drinkers (N=20) and controls not reporting problems associated with alcohol use (N=20) completed the study. Counterbalanced sequences of eight visual stimuli were successively presented in eight various locations on a computer monitor, and participants were required to indicate whether the current stimulus (visual task) or the location where the stimulus was presented (spatial task), either matched the previously presented item (passive condition) or was a mirror image transformation of the previously presented item (active condition). Participants made more errors during the active processing condition relative to the passive processing condition in the visual task ($F(1,38)=4.53$, $p<.05$, partial eta squared=0.11). Problem drinkers performed more poorly than controls during the active processing conditions (group x process interaction, $F(1,38)=4.03$, $p=.05$, partial eta squared=0.10). The findings provide further support for the conclusion that the processes contributing to visual and spatial working memory domains are distinct. Results indicated that visuo-spatial working memory tasks requiring the active manipulation of information are sensitive to detecting cognitive deficits associated with problem drinking, despite the relatively brief drinking histories of the sample.
Correspondence: *Natalie B. Walker, Psychology M304, University of Western Australia, 35 Stirling Hwy, Crawley, WA 6009, Australia. E-mail: natbwalker@gmail.com*

A.S. JANSARI, S. COLE, F. DARBY & R. MCCARTHY. An overworked Central Executive? Dissociations in Working Memory in a neuropsychological patient with a selective Short-Term Memory disorder. .

Single case studies of patients with selective short-term memory problems (e.g. KF, Shallice & Warrington, 1970) have isolated problems in the Phonological Store of Baddeley & Hitchs (1974) Working Memory model. We report the case of a patient, AS, who, following closed head injury suffers from a selective short-term memory problem that cannot easily be explained within such a framework. A detailed case study investigated ASs short-term memory abilities using standard working memory tasks such as digit and spatial spans and the CANTAB. Additionally, AS was tested on tasks specifically designed to investigate more complex levels of STM. A Brown-Peterson paradigm crossing visual and verbal memory with visual and verbal distractors investigated short-term forgetting. Finally a novel n-back paradigm was developed which tested ability to backtrack to both identity and location of presented material. The results showed that against a background of completely intact digit and spatial span as well as CANTAB performance, relative to matched normal controls, AS experienced significant forgetting in the Brown-Peterson task and extreme difficulties with the n-back task. This dissociation between preserved and impaired short-term memory deficits calls for the further development of models of working memory. The findings also concur with current thoughts on the role of the frontal lobes in tasks involving monitoring versus manipulation of information (e.g. Owen et al, 1999). The bearings that the findings have on further understanding of short-term memorial processes are discussed.
Correspondence: *Ashok S. Jansari, School of Psychology, University of East London, Universty of East London, Romford Rd, London E15 4LZ, United Kingdom. E-mail: a.jansari@uel.ac.uk*

M. SUZUKI, K. HIRAYAMA, R. HASHIMOTO, K. SUZUKI, E. MORI & T. FUJII. Temporal context memory disorder after orbitofrontal and basal forebrain lesions.

To investigate the nature of the temporal context memory disorder in patient with orbitofrontal and basal forebrain lesion. Patient was 55-year-old right-handed male. He suffered from a subarachnoid hemorrhage due to the rupture of an anterior communicating artery aneurysm and underwent surgical operation. Postoperative MRI showed small lesions in the left orbitofrontal cortex and basal forebrain. One month later, he was alert and cooperative. General physical and neurological examinations were unremarkable. Neuropsychologically, he showed mild temporal disorientation and mild anterograde amnesia. The results of the standard neuropsychological tests revealed that his cognitive functions were normal except for memory function. Although he could remember experienced events almost correctly, he told us as if he had experienced them long time ago. Thus, we examined his memory for content and temporal context in detail. On the 1st and 2nd days of the examination, he experienced the 16 different events (ex. coloring the line-drawings of rainbow). On the 3rd day, he was asked to retrieve the content and temporal context memory of experienced events. He answered correctly about the content of the events. However, he said that he had experienced all of the events a week ago. For the temporal order judg-

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

ment between two events, he judged correctly if he had experienced them on the same day, but misjudged if he had experienced them on different days. These results indicate that he had difficulty orientating the group of events within a specific temporal framework (one day) to a correct position of the temporal axis.
Correspondence: *Maki Suzuki, Cyclotron and Radioisotope Center, Tohoku University, Aoba, Aramaki, Aoba-ku, Sendai 980-8578, Japan. E-mail: smaki@mail.tains.tohoku.ac.jp*

C. MEIJS, P. HURKS, A. KALFF, D. SLAATS-WILLEMSE & J. JOLLES. Learning Strategies in Healthy Children Aged 6-12 Years on a Pictorial Verbal Learning Test and the Influence of Age and Sex. .
Performance on multi-trial learning tests is assumed to be influenced by the use of strategies such as clustering. Although many studies have been devoted to semantic clustering, much less is known regarding other forms of clustering. Therefore, the present study focussed on serial and subjective clustering and on the influence of age and sex. 86 Children (42 boys) frequenting a normal Dutch elementary school, were divided over three groups: (1) -low- (kindergarten and 1st grade), (2) -middle- (2nd-3rd grade), and (3) -high- (4th- 6th grade). An estimate of verbal IQ and a pictorial verbal learning test (i.e., a test that consists of a five-trial presentation of a 15-unrelated pictures list and, after 20 minutes, a delayed recall and recognition of target pictures) were administered. Older children were able to produce more pictures over 5 trials compared to younger children. In contrast to serial clustering (i.e., the amount of pictures that was recalled in the same order as presented, corrected for chance), older children also used more subjective clustering (i.e., the number of times two pictures were coupled together by any sort of meaning in one trial but also in the next, corrected for chance) compared to the youngest children. No sex differences were found. As children grow older, their ability to memorize new information improves. This age-related improvement in learning may be caused by a shift in strategy preference (i.e., more subjective clustering compared to serial clustering).
Correspondence: *Celeste Meijs, Psychology, Neuropsychology & Psychiatry, Brain & Behaviour Institute, PO Box 616, Maastricht 6200 MD, Netherlands. E-mail: c.meijs@np.unimaas.nl*

N. MICKLEY. Predictors of Working Memory in Reading Disabled and Chronologically Age-Matched Children.
Deficits in working memory (WM) performance have been frequently found in reading-disabled (RD) children. However, it remains unclear what cognitive factors contribute to the poor WM performance of RD children, and whether these factors underlie their reading failure. This study compared the performance of 39 RD and 24 chronologically age-matched (CAM) children (ages 6 to 10) on measures of verbal and visuospatial WM and short-term memory (STM), attention, fluid intelligence, and processing speed. Memory tasks included: Spatial Span and Digit Span (WISC-III-PI); the TVPS Visual-Sequential Memory subtest; the WRAML Verbal Learning subtest; the Semantic Association subtest (Swanson, 1996); and the Visual Matrix subtest (Swanson 1996). Fluid intelligence was measured with the K-BIT Visual Matrix subtest. Attention was measured with an antisaccade task (based on Hallett, 1978). Processing speed was measured with a computer program modeled after Jensens Reaction Time-Movement Time apparatus (Jensen, 1980). Although scores for the RD group were significantly lower on both WM tasks ($p < .01$), and STM tasks ($p < .05$), the two groups did not differ significantly on measures of attention, fluid intelligence or processing speed. However, for both groups WM composite scores were predicted by fluid intelligence ($p < .05$) and attention ($p < .05$), but not processing speed. It remains unclear what component(s) of working memory, if any, contribute to reading failure.
Correspondence: *Nicole Mickley, B.S., Psychology, Georgia State University, University Plaza, Atlanta, GA 30303. E-mail: nmickley@student.gsu.edu*

T. AFFENTRANGER & M. REGARD. Adaptive Behaviour in Prefrontal Lesions: Hyper- and Hypoadaptation and Side of Lesion.
Tasks used to assess frontal lobe dysfunctions commonly require an object-centered, 'veridical decision making'. However, patients often fail only when the tasks are actor-centered, non-veridical, ambivalent, and decisions are preference-based, i.e., they require 'adaptive decision making'. Therefore, we developed tasks using this latter paradigm (Goldberg & Podell, Consc Cogn,1999,8,364f). We investigated the hypothesis of bipolar behaviour, i.e., hyperadaptive behaviour (stimulus-dependent with slow decisions) and hypoadaptive behaviour (not stimulus-driven with fast decisions). Patients with left-sided lesions were expected to be more hyperadaptive and patients with right-sided lesions to be more hypoadaptive. Subjects were 21 patients with frontal lesions (12 left, 9 right) and a control group of 23 healthy right-handed men. Two PC-tasks assessing decisions under ambivalence were developed. One task, consisting of two meaningless figural arrangements that were presented simultaneously, and Ss had to indicate their preference by a key press. In the other decision task, Ss had to indicate their preference among randomly presented horizontal arrays of meaningless figures in varying number (either 1, 2, 4, 6, or 8 at a time). Decision behaviour was measured by self-timed, subject-controlled interstimulus and response latencies. Compared to healthy controls, patients with right-sided lesions had shorter and those with left-sided lesions had longer decision latencies. In the same respect, also the patient groups differed significantly. As expected, the mode of adaptive behaviour assessed by non-veridical decision making tasks depends upon the side of the prefrontal lesion. Patients with left frontal lesions tend to be hyperadaptive, i.e., stimulus-driven, and slow decision-makers, whereas patients with right frontal lesions present a fast, hypoadaptive behaviour. Our results suggest a lateralized regulation of frontal circuits in adaptive behaviour.
Correspondence: *Thomas Affentranger, Reha Rheinfelden, Salinenstrasse 98, Rheinfelden CH-4310, Switzerland. E-mail: t.affentranger@reha-rhf.ch*

D. SAMSON, I.A. APPERLY, U. KATHIRGAMANATHAN & G.W. HUMPHREYS. Dissociating Self-Perspective Inhibition and Other-Perspective Taking when Reasoning about Other People's Beliefs. .
Little is known about the functional and neural architecture of social reasoning, one major obstacle being that we crucially lack the relevant tools to test potentially different social reasoning components. In this study we designed new tasks in order to test the separability of two perspective taking components that are usually confounded in social reasoning tasks: (a) the ability to inhibit one's own perspective (self-perspective inhibition) and (b) the ability to infer someone else's perspective per se (other-perspective taking). We report a single case study of a brain-damaged patient, WBA, with right frontal and temporal lesions who showed a belief reasoning deficit. The patient was presented with two novel nonverbal video tasks that placed similar demands in other-perspective taking but varied in the degree of self-perspective inhibition demands (low versus high inhibition demands). We show that WBA was only impaired in belief reasoning when the task placed high self-perspective inhibition demands. The case of WBA, who suffered right frontal damage, together with the previously reported case of three patients with left temporo-parietal damage who showed difficulties in belief reasoning even when the demands on self-perspective inhibition were kept low

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

provides the first neuropsychological evidence showing that (a) the ability to inhibit one's own perspective and (b) the ability to infer someone else's perspective rely on distinct functional and neural mechanisms. We argue that the fractionation of social reasoning can offer valuable cues for the diagnosis and rehabilitation of social reasoning deficits in brain-damaged patients.
Correspondence: *Dana Samson, Psychology, Psychology, The University of Birmingham, Hills Building, Edgbaston, Birmingham B15 2TT, United Kingdom. E-mail: d.samson@bham.ac.uk*

R.W. PARKS, L. INGRAM, M.D. HUNTER, P.N. EGLESTON, R.D. GREEN, W.H. BROWN, S.A. SPENCE & P.W. WOODRUFF. Self-Ratings Using Frontal Systems Behavior Scale (FrSBe) in Schizophrenia.

The FrSBe is a new neurobehavioral scale that was designed to assess frontal behavioral syndromes. Construct validity of the FrSBe has been established in subjects with frontal lesions, and in subjects with bipolar and unipolar affective disorders. This type of assessment tool may be of interest to clinicians attempting to develop intervention strategies for individuals with schizophrenia. Each of the Self-Rating Forms consists of three theoretically derived subscales that measure Apathy, Disinhibition, and Executive dysfunction. We hypothesized that the above 3 scales and Total Score for patients with schizophrenia would be significantly different from healthy normal control subjects. 11 right-handed DSM-IV acute schizophrenia patients receiving conventional inpatient treatment (ten males and one female; mean age 30.1 years; mean education 11.9 years) and 12 right-handed healthy volunteers (eleven males and one female; mean age 29.4 years; mean education 13.5 years) participated. Exclusion criteria for both groups were left-handedness, neurological disorders (including head injury) and learning disabilities. There were no significant differences in age or education between the two groups. All schizophrenic T Scores were significantly different from controls ($p<.001$). All control T Scores were less than 50, while all patient T Scores were greater than 80, with the exception of the patient Disinhibition Score of 65. Preliminary findings suggest that the FrSBe highly discriminates between normals and individuals with acute schizophrenia, but may not necessarily be specific to schizophrenia. Future research may wish to investigate whether any of the three FrSBe theoretical constructs become more prominent in chronic schizophrenia.
Correspondence: *Randolph W. Parks, PhD, PsyD, Academic Department of Psychiatry, University of Sheffield, Psychiatry, Longley Centre, Norwood Grange Drive, Sheffield S5 7JT, United Kingdom. E-mail: r.parks@sheffield.ac.uk*

J.M. SPIKMAN, J. NAALT, VAN DER, W. BROUWER & M. MILDERS. Interactions Between Executive Dysfunction and Deficits in Social Cognition in TBI Patients With Frontal Lesions.

Many patients who have sustained a traumatic brain injury (TBI) suffer from a so called dysexecutive syndrome (DES), generally characterized by a lack of adequate behavioral control. More specifically, it can exist both of deficits in planning and regulation of complex, goal-directed taskbehavior as well as of deficits in regulation of complex social-interpersonal behavior. For the former nowadays adequate diagnostic methods are available. Assessment of the latter is more difficult, but recent studies suggest that tests for perception of emotional expressions and tests for the ability to form a theory of mind (ToM) may be useful indicators. The aim of our study was to administer both executive function tests as well as indicators for disturbances in social cognition to TBI patients with frontal damage, in order to find out which tests are sensitive to their problems and whether there are interrelations between both types of tests, suggesting a general underlying deficit. TBI patients with focal frontal damage were compared to healthy controls on several tests for executive funtioning, emotion perception and Theory of Mind. T-tests with adjusted significance levels and Pearson correlations were applied. Patients performed worse than healthy controls on some but not all tests in each domain: executive function, emotion perception and ToM. No significant correlations were found between the domains, nor between tests within each domain. Tests for executive function, ToM and emotion perception are sensitive to DES deficits in TBI patients, but they are independent of eachother, suggesting that it concerns different types of deficits
Correspondence: *Jacoba M. Spikman, Neurology, Academic Hospital Groningen, Hanzeplein 1, Groningen 9713 GZ, Netherlands. E-mail: j.m.spikman@neuro.azg.nl*

R. BLANCO-MENENDEZ, B. RICO-BLANCO, V. NUNEZ-NUNEZ, E. VERA-DE-LA-PUENTE & S. VILLA-MOREIRA. Double Dissociation in Logical Thought Processes.

Introduction: Logical thought processes have been fundementally attributed to frontal lobe function. Nevertheless, recent available empirical data and theoretical considerations suggest the possibility of the existence of multiple brain functional loci for these processes, especially if analogies between language and thought shown in brain damaged patients, such as aphasics, are considered. Logical and linguistic structures are (partially) isomorphical, so hypotheses that have been confirmed in aphasic patients may be applicable to other kinds of brain-damaged subjets, refering to logical structures. Subjets and methods: Two brain-damaged subjects (one affected by left posterior brain damage and another by left frontal lobe damage, none of them aphasic) were assessed in their performance on logical thought tasks and have been compared. Logical thought test include propositional, categorical and analogical processes and experimental planning task. Results: A double dissociation in logical thought has been found, depending on lesion localitation and logical structure of the taks. Results show that propositional, analogical and planing taks are affected mainly by frontal lobe lesions, but categorical thought is more affected by posterior cortex lesions. Discussion: The double dissociation found suggests that there are different functional brain areas involved in these processes. It is possible to hypothesize that frontal lobes play a major role in propositional reasoning and that post-rolandic structures are mainly involved in categorical thought (class-inclusion reasoning operations)
Correspondence: *Enrique Vera-de-la-Puente, Md., Ph.D., Asturias Central University Central, C/ julian claveria, s/n, Oviedo E. 33006, Spain. E-mail: enrique.vera@sespa.princast.es*

M.J. VAN ZANDVOORT, M. DE GOEDE, A. WESTER & R.P. KESSELS. Theory of Mind or Complexity? A study in patients with Korsakoff's Syndrome.

Disturbances in social cognition are next to the amnesia, one the key characteristics of Korsakoff's syndrome (KS). The ability to attribute mental states to others is an important aspect of social cognition. This ability is referred to as 'Theory of Mind'(ToM) and closely related to executive functioning. ToM tasks are more complex than standard reasoning tasks and therefore tap executive functioning. In this study it is hypothesized that patients with KS have problems on ToM tasks due to their problems in executive functioning and not to problems in ToM reasoning. We included 23 in-patients diagnosed with KS and 15 healthy volunteers. Patients and controls were tested with a short testbattery including reading ability, executive functioning, and working memory. Furthermore, they were administered a ToM reasoning task consisting of 21 textual stories. Each story was equal in length and followed by 2 to 4 questions resulting in 15 ToM and 15 non-ToM questions and one question per story to control for basic story comprehension. Both ToM and non-ToM questions varied equally in complexity as expressed in the number of inferences needed (2 to 4 inferences). A MANOVA with reading ability as a covariate demonstrated main effects for Group (patients vs. controls) and Complexity (2,3,4 inferences)(all $p<0.01$). However, no main effect for ToM was present. The interaction between Group and Complexity ($p<0.01$) showed that the performance of the patients compared to the controls deteriorated disproportionately with increasing

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

complexity. Furthermore, KS patients demonstrated disturbances on executive functioning which were significantly correlated to the level of Complexity (r=0.69;p<0.01). We conclude that patients with KS demonstrated problems on ToM reasoning as a consequence of executive dysfunctioning (handling complex information) and not due to ToM problems in itself.

Correspondence: *Martine J. Van Zandvoort, Ph.D., Helmholtz Instituut, Utrecht University, Van Unnikgebouw, Heidelberglaan 2, Utrecht NL-3584 SC, Netherlands. E-mail: m.vanzandvoort@fss.uu.nl*

R.F. MENESES, J.P. RIBEIRO & A.R. GIOVAGNOLI. The Effect of Time on Executive Functions.

Knowing the variables that can affect neuropsychological performance is crucial to plan assessments. The aim of the present study was to analyze the effect of time on the performance of individuals with epilepsy on the Wisconsin Card Sorting Test-Nelsons version (WCST-Nv) and Semantic Fluency (SF). A sample of N=30 individuals with Focal Epilepsy (50% female; Mage=37,23, DP=11,88, 17-61yrs; Meducation=9,27, DP=4,84, 3-18 yrs) was assessed, and reassessed, about 6 months later, with the WCST-Nv and SF (animals, fruits, and car brands in 60 sec). There was a considerable variability on performance. On the first assessment with the WCST-Nv, four individuals presented a performance that could be considered suggestive of frontal lesion (percentage of perseverative errors equal or superior to 50%); on retesting five individuals presented the same kind of performance. There were no statistically significant differences between the first and second assessments on the WCST-NV (Categories: M1=3,70, M2=4,13; Errors: M1=18,03, M2=14,93; Perseverative errors: M1=6,53, M2=4,73; Non perseverative errors: M1=11,50, M2=10,20; Percentage of perseverative errors: M1=28,37, M2=26,55) nor on the SF (word count: M1=37,53, M2=38,93). These results suggest there are no practice/learning effects on the WCST-Nv nor on the SF that can be detected about 6 months after the first assessment. These results, if replicated with larger samples, with other or no pathology, can help neuropsychologists create assessment protocols when reassessment of executive functions is necessary.

Correspondence: *Rute F. Meneses, PhD, FCHS & IBMC, FCHS - Fernando Pessoa University & IBMC - Porto University, Universidade Fernando Pessoa, Praça 9 de Abril, 349, Porto 4249-004 Porto, Portugal. E-mail: rmeneses@ufp.pt*

A.H. HABER & R.A. HANKS. Convergence and Divergence in Performance on Executive Functioning Measures in a TBI Population.

To compare the performance of individuals with Traumatic Brain Injury (TBI) across different measures of executive functioning as a means of further understanding the construct of executive functioning. Forty individuals with TBI were administered three measures of executive functioning (Wisconsin Card Sorting Test [WCST], the California Card Sorting Test [CCST], and the Brixton Test [BT]) as a part of a full neuropsychological battery. Correlation data provided further evidence of construct validity for the CCST in comparison to the WCST (r = .62), with respect to concept formation. The CCST was also correlated with performance on the BT (r = -.67); however, BT and WCST performances were not related. Classification of impairment based on these measures was least consistent between the BT and WCST, and the BT was less sensitive than the other measures at detecting executive functioning impairment. Although all three executive functioning tasks examined appear to tap into a similar skill, (i.e., the ability to detect patterns and use that information to respond appropriately), these tasks produced different patterns of performance across individuals. Although the CCST was most strongly related to the other tasks examined, its length and difficulty may preclude its administration in some settings. Moreover, given the strong relationship between the BT and CCST, the utility of administering the CCST is questionable. However, the BT appears to be less sensitive to executive functioning impairment than the other measures.

Correspondence: *Adele H. Haber, Ph.D., Rehabilitation Institute of Michigan, 261 Mack Blvd., Suite 555, Detroit, MI 48201. E-mail: ahutchin@dmc.org*

M. MOURATIDIS, M. SOFUOGLU & T.R. KOSTEN. The Classical Stroop as a Pharmacological Tool in Tiagabine Treatment of Smokers.

Studies have examined nicotine effects on executive functioning in smokers. The Stroop has been used to assess cognition in smokers requiring participants to override a dominant tendency making it a measure of response inhibition. This study examined the effects of a GABAergic medication, tiagabine, on response inhibition in overnight abstinent smokers using the Stroop. 8 male and 4 female smokers participated in a double-blind, placebo-controlled, crossover study. In each of 3 experimental sessions, subjects were treated orally with placebo, 4 mg and 8 mg of tiagabine serving as their own controls. The ANAM Stroop was administered after placebo and after each dose of tiagabine. The computerized Stroop design consisted of one 3-minute block each of congruent and incongruent stimuli. (1) Reaction time: significant main effect for treatment [F (2, 50) = 5.6; p<0.006], and Stroop [F (1, 50) = 27.7; p<0.0001]. (2) Number of trials: significant main effect for treatment [F (2, 50) = 8.7; p<0.0006], and Stroop [F (1, 50) = 43; p<0.0001]. (3) Throughput score: significant main effect for treatment [F (2, 50) = 7.1; p<0.002], session [F (2, 8) = 5.9; p=0.03] and Stroop [F (1, 50) = 25.6; p<0.0001]. Tiagabine treatment at 8 mg attenuated the craving for cigarettes and enhanced Stroop performance compared to the placebo or 4 mg tiagabine conditions. The Stroop may be a sensitive measure of pharmacological effects. GABA enhancing medications may reduce the rewarding effects of nicotine and improve cognitive performance in abstinent smokers warranting further study.

Correspondence: *Maria Mouratidis, Psy.D., Yale University, 950 Campbell Avenue, Building 35, West Haven, CT 06516. E-mail: maria.mouratidis@yale.edu*

R.K. CHOUDHRY & J. SAINT-CYR. Frontal Lobe Behavioural Syndromes in Early Parkinson's Disease: Implications for Cognitive and Functional Impairments . .

This study examined frontal lobe behavioural syndromes in medicated, early stage patients with Parkinson's disease using a self-report Frontal Systems Behavior Scale (FrSBe) developed by Grace et. al. (1999). Three frontal lobe behavioural syndromes were assessed: Apathy, Disinhibition, and Executive Dysfunction and compared to determine the individual behaviors that best descriminate PD group from the healthy controls (NC). PD patients (N=22) and neurologically intact control participants (N=22) were matched for age, IQ, and education. PD patients were medically treated and those taking anticholinergic medications were excluded. A standard battery of tests measuring: IQ, verbal memory, confrontation memory, motor speed & dexterity, verbal fluency, verbal reasoning, depression and working memory and Frontal Systems Behaviour Scale (FrSBe) was administered to all subjects.The FrSBe was also administered to caregivers for PD patients.PD patients were asked to rate themselves before and after the onset of PD. PD patients and NC groups differed on verbal reasoning, motor function, semantic fluency and on level of depression. FrSBe ratings of caregivers did not differ significantly on all syndromes compared to PD group, pre or post. On the other hand, PD patients' self-ratings showed significant differences pre/post on Apathy, and Executive Dysfunction but not the

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

Disinhibition. Overall, PD group showed significantly higher self-ratings of frontal behavioural syndromes than NC group. There was no correlation between the age of onset and the three frontal syndromes.However, depression did correlate positively with pre-post illness scores on FrSBe three scales. The results may be attributed to dopaminergic depletion from degeneration of the substantia nigra in PD and limbic circuit dysfunction.Future research directions concern the relative influence of the straitofrontal loops in cognition and personality.
Correspondence: *Ravi K. Choudhry, psychology, Whitby mental health center, 10 oakhurst drive, Thornhill, ON L4J 7T6, Canada. E-mail: ra_choudhry@hotmail.com*

A. BOEKA, L. ALEXANDER, L. SANDOVAL, A. BRANCH & K. LOKKEN. Neuropsychological Task Performance of Women with Bulimia Nervosa.

There is no universally accepted protocol for assessing eating disorder psychopathology; however, contemporary measures are based on qualitative self-report data. The use of neuropsychological tests as additional tools for identifying individuals with eating disorders has recently received considerable attention. Investigation into the neuropsychological performance of individuals with bulimia nervosa (BN) has demonstrated that bulimics often perform poorly on tasks of executive functioning in areas such as attention, cognitive flexibility, problem-solving, and impulsivity. The purpose of the present study was to administer a brief battery of executive functioning tasks that could serve to capture the primary neuropsychological features of women with BN, and thereby provide a useful method of further distinguishing women who exhibit bulimic symptomatology from control women. A discriminant function analysis was conducted using several neuropsychological tasks as predictor variables and bulimic and non-bulimic women as the grouping variable. Four executive functioning tests were able to distinguish bulimic from non-bulimic women with a 74% accuracy rate (X^2 (5) = 25.97, $p<.001$). When the Eating Disorder Examination (EDE), the gold standard for diagnosing eating disorders, was included as a predictor variable, group prediction was 96% accurate (X^2 (6) = 101.69, $p<.001$). Thus, while the neuropsychological tasks alone were no better than the EDE at distinguishing bulimic from control women, the addition of a brief battery of neuropsychological tests in the assessment of BN could serve to identify those who may have particular difficulties in such cognitive abilities, and can aid in the development of treatment interventions.
Correspondence: *Abbe Boeka, University of Alabama, 120 East 15th #8305, Tuscaloosa, AL 35401. E-mail: boeka001@bama.ua.edu*

C. NIKI, T. KUMADA, T. MARUYAMA & Y. MURAGAKI. Disorganization of Sequential Actions in Patients with Right Frontal Lobe Damage.

Action disorganization syndrome (ADS) is a neuropsychological deficit that shows failure of familiar multistep tasks such as making a cup of tea (Schwartz et al. 1991). Although the involvement of frontal lobes to ADS has been indicated, it remains unclear the mechanism of each hemisphere. In this study, we examined two patients with right frontal brain tumor on performance of familiar multistep tasks. Participants: Two patients who resected brain tumor in the right frontal lobe were participated. Methods: In Experiment 1, patients were asked to perform a target task (e.g., making a cup of tea, wrapping the gift) with only task-relevant objects being presented. In Experiment 2, objects for a task-irrelevant to a target task were presented with objects for the target task. The relationship between target and distractor tasks was relational such as drink (tea task-coffee task) or non-relational conditions (tea task- writing a personal history). Both patients showed no sequential errors and no omission of a particular step that were regarded as characteristic errors of ADS (Experiment 1). The results of Experiment 2 revealed that both patients wrongly used distractor objects in accordance with a context of the target task. These results suggest that the behavior would reflect an adaptation that consisted uncontrollable distractor objects with target context. The left frontal lobe may receive bottom-up activation from task-irrelevant objects and normal subjects usually can suppress the inappropriate activation, but the patients had difficulty in this process. As a result, it seemed that adaptive behavior would be emerged.
Correspondence: *Chiharu Niki, Ph.D., Institute for Human Science and Biomedical Engineering, National Institute of Advanced Industrial Science and Technology, Tsukuba central 6, 1-1-1, Higashi, Tsukuba, Ibaraki, Tsukuba 305-8566, Japan. E-mail: chiharu-niki@aist.go.jp*

THURSDAY AFTERNOON, JULY 7, 2005

Symposium 1/1:00–3:00 p.m.

Social and Emotional Consequences of Childhood TBI

Chair: Vicki Anderson

V.A. ANDERSON, R. DOB, V.A. ANDERSON, R. JACOBS, J. DOOLEY, G. TAYLOR, S. MCDONALD & K. YEATES. Social and emotional consequences of childhood TBI.

This symposium aims to explore the complex relationships between behaviour/emotional impairments and brain injury in childhood. While patterns of cognitive deficits in children with CNS dysfunction are now generally well established, there are only a limited number of studies that have examined behavioral and emotional profiles in any detail, and few have employed any theoretical framework to support their findings. The challenge now is to understand the interaction among these dimensions, their primary and secondary effects and their joint impact on recovery and subsequent development. The papers included in this symposium will address key factors relating to these issues, including theoretical approaches to understanding behavioural and emotional impairments which occur following cerebral insult, potential for distinguishing behavioural/emotion deficits due to brain pathology from secondary difficulties, and the nature of correlations between behavioural and cognitive impairment. Changing patterns of impairments over time since injury and across developmental stages will also be addressed.
Correspondence: *Vicki A. Anderson, Psychology, The Royal Children, 1st Floor, South East Building, Gatehouse Street, Parkville, VIC 3052, Australia. E-mail: vicki.anderson@rch.org.au*

R. DOB, V.A. ANDERSON, J. KENARDY, N.A. PACHANA, L. MCKINLAY, N. BELLAMY, E. MORRISS, S. EREN & A.C. MACLEOD. Post Traumatic Stress Disorder and Cognitive Impairment in Children with Traumatic Brain Injury.

OBJECTIVE: Anecdotal evidence suggests that children and adults may experience persisting post-traumatic stress symptoms following traumatic brain injury (TBI), including reduced attention, heightened anxiety and phobias, and nightmares regardless of injury severity. To date, no research studies have reported on the potential relationship between cognitive sequelae of TBI and post traumatic stress symptoms. This study aimed to explore the relationship between cognitive sequelae of TBI and post traumatic stress disorder in children aged six to fourteen years in the acute stages post-injury. METHOD/PARTICIPANTS: Fifty chil-

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

dren who sustained accidental traumatic brain injury, and their parents were enrolled in the study on admission, and initial data collection occurred at the time, followed by a review three months post-injury. Children were administered a number of attention and memory measures as well as a structured post traumatic stress disorder interview at three months post-injury. Parents were asked to fill in a series of psychological questionnaires, both at baseline (shortly after the accident), and at three months post-injury. RESULTS: Post traumatic stress disorder symptoms were identified and evaluated in the context of (a) presence of neuropsychological impairment, (b) premorbid child psychopathology, (c) premorbid family functioning and (d) injury factors. CONCLUSION: Post traumatic stress symptomatology must be assessed as a potential influential factor in rehabilitation of children with traumatic brain injury.

Correspondence: *Vicki A. Anderson, Psychology, The Royal Children, 1st Floor, South East Building, Gatehouse Street, Parkville, VIC 3052, Australia. E-mail: vicki.anderson@rch.org.au*

V.A. ANDERSON, S. MORSE, C. CATROPPA, F. HARITOU, T. POWER & J. ROSENFELD. Understanding predictors of functional recovery and outcome five years following early childhood head injury.

Objective: Much is now known about outcome following TBI in school-aged children, however recovery in infancy and early childhood is less well understood. The aim of this study was to examine functional outcomes following TBI during early childhood, to plot recovery over the 5 years post-injury and to identify predictors of outcome. Method: The study compared three groups of children, sustaining injuries of different severity, aged 2.0 to 6.11 years at injury, to a healthy control group. Groups were comparable with respect to pre-injury adaptive and behavioral function, psychosocial characteristics, age and gender. Using a prospective, longitudinal design adaptive abilities, behavior, educational progress and everyday memory skills were investigated acutely post-injury and again at 6,12 and 30 months and 5 years post-injury. Results: Findings suggested an association between injury severity and outcomes across all domains. Further, five year outcome was predicted by multiple factors including injury severity, family factors and pre-injury levels of function. Conclusions: children with more severe injuries and lower pre-injury adaptive abilities, and whose families are coping poorly are at greatest risk of long-term impairment in day-to-day skills, even several years post-injury.

Correspondence: *Vicki A. Anderson, Psychology, The Royal Children, 1st Floor, South East Building, Gatehouse Street, Parkville, VIC 3052, Australia. E-mail: vicki.anderson@rch.org.au*

R. JACOBS, E. COUPER, S. HARVEY, R. LEVENTER & V.A. ANDERSON. Moral reasoning and adaptive behavior following focal frontal lesions in childhood. Are these skills localized to specific prefrontal regions in children?

Children with frontal lobe damage can sometimes show remarkable recovery with few apparent signs of impairment immediately after injury. Over time, however, many develop increasing deficits in self-regulation, attention, and executive function as well as worsening socio-behavioural problems. Case studies (e.g. Grattan & Eslinger, 1992; Anderson et al., 1999) describe a small number of individuals with childhood frontal lesions who developed severe social problems, deficits in executive function and had lower than expected levels of moral reasoning. In this study, social-adaptive behaviour and moral reasoning maturity were measured in 12 children with focal frontal lesions and 12 similarly aged controls. Lesion location of children who had a level of moral maturity two or more years below expected grade level was then analyzed. Results show that children with frontal lobe lesions have poorer adaptive behaviour and lower levels of moral maturity than controls. Contrary to adult studies suggesting that medial prefrontal damage is associated with socio-behavioural problems, no specific lesion locus could be ascribed to deficits in children. Only two children, both eight years, were performing broadly within age expectations and were the youngest in the group. These results support previous research suggesting that children with frontal lobe lesions have reduced social understanding and typically experience on-going socio-behavioural problems. Further, it may be that problems are not apparent initially, but emerge some time after their injury, as skills are expected to mature, suggesting that long-term follow up of social and emotional functioning following childhood frontal lobe damage is warranted.

Correspondence: *Vicki A. Anderson, Psychology, The Royal Children, 1st Floor, South East Building, Gatehouse Street, Parkville, VIC 3052, Australia. E-mail: vicki.anderson@rch.org.au*

J. DOOLEY, J. OHAN & V.A. ANDERSON. Social information processing after closed head injury.

Objective: Cognitive and behavioural impairments are common after a closed head injury and can often lead to significant disruption to areas such as social functioning. A well-accepted theoretical model of social adjustment, the Social-Information Processing (SIP) model, allows an examination of cognitive processing during social interactions. The SIP model proposes that an individual proceeds through a series of tasks that begin with the mental representation of both internal and external cues and result in the enactment of goal-directed behaviours. SIP has been examined in various psychiatric and non-psychiatric populations. Thus far only one study has examined SIP in a head injured sample. Method: Adolescent males between 12-16 years with a history of TBI were administered a computer based task designed to assess certain stages of the model. BRAIN QUEST was administered in addition to measures that assessed levels of aggression and overall social functioning. Results: This paper will present preliminary data from a sample of male adolescents (aged 12-16 years) who have had a head injury and adolescents who are normally developing using a novel task. Results indicate that head injured adolescents display more reactively aggressive behaviours than normally developing adolescents and that these adolescents are impaired in numerous stages of the model. Conclusions: TBI often results in impairment in social information processing and an increase in aggressive behaviour. With a more accurate picture of the specific nature of cognitive impairment seen after a closed head injury, treatment plans can be tailored to address specific areas.

Correspondence: *Vicki A. Anderson, Psychology, The Royal Children, 1st Floor, South East Building, Gatehouse Street, Parkville, VIC 3052, Australia. E-mail: vicki.anderson@rch.org.au*

G.H. TAYLOR, K.O. YEATES, S. WADE, D. DROTAR, T. STANCIN & N. MINICH. Long-Term Outcomes of Pediatric Traumatic Brain Injury (TBI).

The purpose of this study was to investigate the longer-term behavior and academic consequences of TBI. Our original sample included 50 children with severe TBI, 53 with moderate TBI, and 80 with orthopedic injuries only. The children were hospitalized for their injuries between 6 and 12 years of age. Assessments were conducted soon after injury, 6 and 12 months later, and again at means of 4, 5, and 6 years post injury. Outcome measures included parent and teacher behavior ratings (CBCL and TRF), the Vineland Adaptive Behavior Scales, and subtests of the Woodcock Johnson Tests of Achievement. Changes in outcomes over time in the three groups were examined using growth modeling analysis. Environmental influences on outcomes were considered; and a rating of preinjury status obtained at the initial assessment was included as a covariate in analysis of the behavioral outcomes. Findings revealed that the severe TBI group had persistent problems in attention and other behavior problems, adaptive behavior, and achievement relative to the orthopedic injury group. Group differences in some

outcomes were found only in children from more disadvantaged families. However, the effects of severe TBI neither increased nor decreased with advancing age. Attrition was substantial but results were not altered when completion status was taken into account. We conclude that the effects of TBI on children's functioning persist over time as relatively stable deficits.
Correspondence: *Vicki A. Anderson, Psychology, The Royal Children, 1st Floor, South East Building, Gatehouse Street, Parkville, VIC 3052, Australia. E-mail: vicki.anderson@rch.org.au*

S. MCDONALD, C. SAUNDERS & V. CROKER. Loss of empathic reactions to emotionally charged information in people with TBI?
Emotion recognition disorders are increasingly reported in people with traumatic brain injury (TBI). So too, are reports of blunted affect and insensitivity to others. A link between the two has also been implicated in recent advances in neuroscience research. This has suggested a common neural system underlying recognition of emotionally charged information and initial affective reactions to emotional stimuli. In order to examine this relationship in people with TBI we examined the capacity of 24 people with severe TBI to recognise basic emotional expressions in photographs compared to 15 matched controls. The TBI sample was differentially poor at matching facial emotions, particularly negative emotions. This group was also asked to rate any changes they had experienced in emotional responsivity after the TBI. Those who subjectively reported a reduction in emotional experience were also those who were poorest at the emotion matching task. In a follow-up study we asked a group of 14 adults with severe TBI and 25 matched controls to rate their subjective feelings of arousal when viewing strongly affective material either of an extremely pleasant nature (e.g. sexually explicit) or extremely unpleasant (e.g. mutilated bodies). The TBI participants rated the positive material as both arousing and as pleasant as did controls. On the other hand, while they recognised disgusting pictures to be very unpleasant, they were significantly less aroused by these than were the controls. This combined evidence adds to a growing picture that TBI can diminish the capacity for empathic responses to emotional situations (especially negative situations) and thereby deprive the individual of important social cues.
Correspondence: *Vicki A. Anderson, Psychology, The Royal Children, 1st Floor, South East Building, Gatehouse Street, Parkville, VIC 3052, Australia. E-mail: vicki.anderson@rch.org.au*

Paper Session 1/1:00–3:00 p.m.

Memory I

Chair: Albert Postma

M. VAN ASSELEN, R.P. KESSELS, J.L. KAPPELLE, S.F. NEGGERS, C.J. FRIJNS & A. POSTMA. Neuroanatomical Correlates of spatial memory.
Spatial memory is a complex system involving different cognitive processes, such as spatial working memory and object location memory. The variety of processes suggest that multiple different neural mechanisms are involved. Although patient studies and imaging studies have given important insights in the exact neural circuitry underlying spatial memory, many controversies remain. Therefore, the current study set out to further examine the neuroanatomical correlates of spatial memory 30 stroke patients with unilateral lesions and 36 control participants were tested with an object location memory task and a spatial working memory task. For all patients the exact location of the lesion was determined by an experienced neurologist using CT or MRI scans. For all patients the extent of damage to these regions of interest was determined. Patients with a lesion in the right dorsolateral prefrontal cortex ($p < 0.05$), right posterior parietal cortex ($p < 0.01$) and both left ($p < 0.05$) and right ($p < 0.01$) hippocampal formation were found to be impaired on a spatial search task. Moreover, patients with a lesion in the right hippocampal formation ($p < 0.01$) and the right temporal cortex ($p < 0.01$) performed worse on an object-position task, while patients with a lesion in the right hippocampal formation ($p < 0.01$), the right temporal cortex ($p < 0.01$) and the right posterior parietal cortex ($p < 0.01$) were impaired on a positional memory task. By studying the relation between specific brain areas and performance on a spatial working memory and object location task, more insight is given in the neuroanatomical correlates of spatial memory. In particular, spatial working memory seems to depend on more anterior areas, while object location memory depends on more posterior areas. Moreover, the hippocampal formation seems to be involved in a wide variety of spatial memory processes, including working memory and long-term memory
Correspondence: *Marieke van Asselen, Psychonomics, Utrecht University, Heidelberglaan 2, Utrecht 3584 CS, Netherlands. E-mail: m.vanasselen@fss.uu.nl*

A. POSTMA, M. VAN ASSELEN, O. KEUPER, A.J. WESTER & R.P. KESSELS. Spatial and Temporal Order Memory in Korsakoff Patients.
Remembering events typically requires recalling the core elements of an event in their proper spatiotemporal context. The substantial episodic memory impairments in patients with Korsakoff Syndrome (KS) have been ascribed to an underlying difficulty in retrieving spatial and temporal context. However, spatial and temporal order memory performance in Korsakoff patients has not yet been directly compared, nor has it been studied how the two features are integrated in these patients. 23 KS patients (mean age 53 yrs) were compared to 20 matched controls (mean age 57 yrs). A computer task comprised 5 different conditions. In the temporal presentation + retrieval condition 6 objects were shown serially in the middle of a square frame. Subsequently their temporal order had to be reconstructed. The spatial presentation + retrieval showed all objects simultaneously at different locations in the square, followed by recall of their spatial positions. Mixed presentations/recall conditions presented objects serially at differents locations, followed by recall of spatial order, temporal order or both features together. KS patients performed worse than controls on spatial order memory ($F[1, 41] = 42.5$, $p < .001$) and temporal order memory ($F[1, 40] = 18.98$, $p < .001$). However, the interaction feature by group was not significant. Moreover, KS patients suffered a clear deficit in binding the two features together ($t[41] = 2.44$, $p = .019$). The results show that KS patients have marked problems in coding both spatial and temporal order information. Importantly, the impairments have the same extent. Moreover, KS patients are also impaired in binding different contextual attributes together in memory. These findings give further insights in the underlying neurocognitive bases of spatial and temporal order memory. Performance of the control subjects over the various conditions further bears on the question whether spatial and temporal context are automatically integrated into memory
Correspondence: *Albert Postma, PhD, Psychological Laboratory, Utrecht University, Heidelberglaan 2, Utrecht 3584 CS, Netherlands. E-mail: a.postma@fss.uu.nl*

A. FOTOPOULOU & M.A. CONWAY. Confabulation: The Construction of Motivated Memories.
The striking neuropsychological symptom of spontaneous confabulation (SC) offers a unique window of insight into the neural and cognitive mechanisms of memory. The study of SC is also informative with respect to the health care issues involved in the breakdown of fundamental memory functions. The three studies to be presented focus on the role of emotional processing and motivation in the construction of

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

false memories. While this aspect has a long history in the field, it has never been placed under experimental scrutiny. The first group study focuses on the content of SC and compares the emotional valence of false memories produced spontaneously by 14 amnesic patients with and without SC. The second experiment compares the performance of the above groups and healthy controls on an affective prose-recall test, in which self-reference of the prose material is manipulated. Finally the third study involves the application of the previous findings on the rehabilitation study of a patient with SC. The intervention programme was structured on the basis of a board-game, which included non-confrontational self-awareness tasks and self-esteem enhancement trials. The results of the above studies revealed that the content of SC is not motivationally neutral; instead it is self-serving and subject to positive emotional bias. These findings are discussed in parallel with the memory and executive deficits which contribute to the multifaceted nature of SC. Finally, the study considers the suggestion that neuropsychological rehabilitation could capitalise on the above findings.
Correspondence: *Aikaterini Fotopoulou, psychology, university of durham, science laboratories, south road, durham DH1 3LE, United Kingdom. E-mail: aikaterini.fotopoulou@durham.ac.uk*

A. SCHNIDER & J. BONVALLAT. Spontaneous confabulation due to deficient on-line filtering upcoming thoughts. A test of the theory.
Spontaneous confabulation reflects profound confusion of reality in thinking. It is based on the failure of an anterior limbic (orbitofrontal) mechanism, which normally suppresses the interference of currently irrelevant memories into thinking and action planning. Electrophysiological studies indicated that this mechanism intervenes before the content of an evoked memory is consciously recognized and re-encoded [Schnider A. Nat Rev Neurosci 2003; 4: 662-671]. Here, we test different predictions emanating from this presumptive mechanism in a severely amnesic, spontaneously confabulating patient. A 63 year old woman with a ruptured anterior communicating artery aneurysm and severe spontaneous confabulation underwent a series of experimental tasks and was compared to 4 similarly amnesic, non-confabulating patients. The patient was extremely amnesic and explicitly retained information for only 1-5 minutes. Our finding are: (1) intensive discussions about personal past events were sufficient to induce a false reality; (2) in a very easy 1- or 2-back recognition task, she failed to suppress familiarity with items of similar content but different modality (word-picture and vice versa); (3) when presented with photographs of people, she confabulated only about people whose acquaintance she had made after her brain damage, but not on famous personalities or unknown people. The non-confabulating amnesics did not have difficulty with these tasks. These findings are explained by and fully compatible with the failure of an on-line early filtering mechanism which normally adapts the cortical representation of upcoming thoughts (memories) before their content is (consciously) processed.
Correspondence: *Armin Schnider, M.D., HUG Service de Reeducation, 26 Av. de Beau-Sejour, Geneve 14 CH-1211, Switzerland. E-mail: armin.schnider@hcuge.ch*

N. AKANUMA, L. REED, P. MARSDEN, J. JAROSZ, N. ADACHI, W. HALLETT, G. ALARCON, R. MORRIS & M. KOUTROUMANIDIS. Hemispheric Differences in Recognition Memory Networks in Unilateral Temporal Lobe Epilepsy: A Study with Intracarotid Amobarbital Test and [18F]FDG-PET. .
Temporal lobe epilepsy (TLE) is recognised to be associated with impaired memory function, especially in the hemisphere bearing the epileptic focus. We hypothesised that the memory impairment associated with TLE may arise by the effect of epileptic foci upon structures crucial to memory function, including the hippocampus, entorhinal cortex and retrosplenial cortices. To test this hypotheses, we studied associations between recognition memory performance on items with words, pictures and faces assessed by the intracarotid amobarbital test (IAT or Wada test) and cerebral metabolism measured using [18F]-fluorodeoxyglucose positron emission tomography (18FDG-PET). Subjects comprised 62 patients with unilateral TLE (35 left and 27 right), grouped according to laterality of the language dominance (50 left and 12 non-left) or age at epilepsy onset (33 < 5 years of age, 29 > 5 years) using complementary voxel based statistical parametric mapping (SPM) and region of interest (ROI) methods of 18FDG-PET analysis. Considering left hemisphere function, correlation analysis using SPM analysis identified hypometabolism within a contiguous volume including the left hippocampus, inferior temporal and extra-temporal regions as being associated with lower total IAT scores. In contrast, SPM analysis showed total right IAT scores to be subserved by an entirely distinct network involving dorsolateral prefrontal and parietal cortical regions in the right hemisphere, with no involvement of medial temporal structures. These data demonstrate that memory performance on the IAT is subserved by hemispherically distinct networks, the left involving medial temporal networks, the right employing fronto-parietal networks. Considering non-left language dominant and most-early-onset epilepsy groups, the pattern of associations with total IAT scores were reversed, providing evidence of functional reorganisation of hemispheric representation of memory networks in these subjects.
Correspondence: *Nozomi Akanuma, Dept of Clinical Neurosciences, GKT School of Medicine, KCL, Dept of Clinical Neurophysiology and Epilepsies, 3rd Floor, Lambeth Wing, St Thomas Hospital, Lambeth Palace Road, London SE1 7EH, United Kingdom. E-mail: nozomi.akanuma@kcl.ac.uk*

S.S. LAH, T. LEE, S. GRAYSON & L. MILLER. Retrograde Memory in Patients with Temporal Lobe Epilepsy.
Anterograde memory impairments are known to be common amongst patients with temporal lobe epilepsy (TLE), but retrograde memory has received relatively little attention in this population. In a previous investigation (Lah et al., 2004), we found deficits in retrograde memory in patients who had undergone temporal lobectomy, but whether the deficits were caused by the excision or whether they had existed prior to surgery was unclear. This present study examined retrograde memory in patients with focal left (n=15) or right-sided (n=14) TLE and healthy control subjects (n=15). All subjects were administered tests assessing their ability to remember events and people from public and autobiographical domains across three decades. In addition, they completed neuropsychological tests measuring anterograde memory, object naming ability, verbal fluency, working memory, inhibition and mental flexibility. We found that patients with left TLE demonstrated temporally extensive retrograde memory deficits across domains, similar in extent and nature to those seen post-operatively. These deficits were related to impairments in other cognitive skills, especially language abilities. Our results, along with those of previous studies suggest that deficits in language and retrograde memory in patients with left TLE are secondary to impoverished memory stores rather than retrieval deficits. Patients with right TLE, on the other hand, showed defective retrograde recall only in the autobiographical domain and their impairment in generating autobiographical events could not be explained by deficits in other cognitive abilities. Our study showed that in temporal lobe epilepsy retrograde memory deficits preceded the surgical excision.
Correspondence: *Suncica S. Lah, PhD, Psychology, Sydney University, Mungo Mac Callum Building, Room 422, University of Sydney, Sydney, NSW NSW 2006, Australia. E-mail: sunny1@psych.usyd.edu.au*

Poster Session 3: Neuroimaging, Cognitive Neuroscience, Language, Emotion/1:00–2:30 p.m.

J. RISBERG, L. GUSTAFSON & U. PASSANT. Methodology and Clinical Applications of a New Tomographic Technique for Absolute Measurements of Gray and White Matter Blood Flow.
Most methods for measurement of the regional cerebral blood flow are unable to provide absolute blood flow values. Until now interest has been

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

focused on measurement of the gray matter blood flow, while the white matter blood flow has been rather neglected. The aim of the present project was to develop and evaluate an improved method for reliable tomographic measurements of absolute white and gray matter blood flow. The new method, modified 133-Xe-SPECT, is based on an extension of the period of 133-Xe inhalation from one to eight minutes followed by 22 instead of four minutes of breathing of ambient air. This gives a markedly enhanced signal from the white matter and better basis for correct quantification of the blood flow. The arrival and clearance of the tracer are recorded by a three head gamma camera system that provides flow maps with a spatial resolution of about one cm. The new method has been evaluated in 33 healthy younger and older (40-75 years) subjects and in 20 patients with different forms of organic dementia. The results indicate that the new method makes it possible to distinguish cases of organic dementia with primarily gray matter involvement from patients in which additional pathology of the white matter is of major clinical importance. About half of the patient group displayed a subnormal global white matter blood flow level and/or focal white matter pathology. New and clinically valuable information for early differential diagnosis of patients with organic dementia is obtained from the improved 133-Xe-SPECT method.

Correspondence: *Jarl Risberg, Ph. D., Dept. of Clinical Neurophysiology, University Hospital, Lund SE-22185, Sweden. E-mail: Jarl.Risberg@skane.se*

L.W. BRAGA. Using FMRI to Evaluate Rehabilitation Programs in TBI Throughout Different Stages of Life.

This study aims to evaluate the rehabilitation results of children and adults post-TBI using fMRI and neuropsychological probes to verify clinical outcomes and changes that occur in neuronal networks before and after treatment. Fifteen children and 15 adults with TBI were studied. Before starting rehabilitation and six months after it began, fMRI and neuropsychological evaluations (WISC, Memory and Language Battery, List of 12 Words, Signoret Recognition, Calculation Battery and Motor Assessment: SARAH Physical-functional Scale) were performed. Language and memory tests were conducted during fMRI. The AFNI program was used for fMRI analysis and the ANOVA and Pearson Correlation tests for the statistical analysis. Six months after starting the rehabilitation program, most of the participants presented statistically significant improvement in neuropsychological and physical-functional outcomes. All showed changes in the neuronal networks activated for resolving the same tasks evaluated pre-treatment. We also observed that several areas activated in the first evaluation came to have greater activation, and neuronal networks were created in both children and adults. Although each patient with TBI had different lesions, fMRI data showed common areas of activation among the different participants when performing the same task, as well as areas specific to each individual. The results show that the neuronal networks can be seen as dynamic systems that change with rehabilitation, learning within the social context, and the brain's own biological reorganization post-injury.

Correspondence: *Lucia W. Braga, PhD, Neuropsychology, SARAH Network of Hospitals, SMHS Quadra 501, Conjunto A, Terreo, Brasilia 70335901, Brazil. E-mail: luciabraga@sarah.br*

R.O. HOPKINS, D.F. TATE, L.K. WEAVER & E.D. BIGLER. Hippocampal Volume Following Carbon Monoxide Poisoning: Predictors and Neuropsychological Correlates.

Carbon monoxide (CO) poisoning may result in neuroanatomical lesions and cognitive impairments. This study prospectively assessed hippocampal volume following CO poisoning using a prospective within-subjects design. Hippocampal volumes were measured on MR scans at baseline (day1), 2 weeks and 6 months post-CO poisoning in 61 patients and compared to neuropsychological scores. Hippocampal volumes over time were compared using repeated measures linear and quadratic models. Patients whose hippocampal volumes were below the 95% confidence interval were compared to the other CO patients for gender, loss of consciousness (LOC), age, and INITIAL carboxyhemoglobin. A regression model including age, gender, LOC, carboxyhemoglobin, and baseline hippocampal volume was used to predict 6-month hippocampal volume. By 6-months hippocampal volumes decreased, but did not reach significance ($p = 0.5$). Baseline hippocampal volumes compared with 2-week and 6-month volumes showed increasing variability (2 weeks $r = 0.65$; 6 months $r = 0.46$). Nineteen patients with the greatest hippocampal atrophy at 6-months did not differ for age, gender, LOC, or carboxyhemoglobin ($p=0.13$ to 0.7) compared to the other CO patients. Age and baseline hippocampal volume predicted 6-month hippocampal volume using stepwise regression ($R2=0.28$). Six month hippocampal volume correlated with worse neuropsychological test scores: digit span, Trails A and B, block design, digit symbol, story recall, and paired associate learning ($p = 0.05$ to 0.01). The CO patients' baseline hippocampal volume and age predicted 6-month hippocampal volume. CO poisoning is associated with hippocampal atrophy and worse neuropsychological outcome.

Correspondence: *Ramona O. Hopkins, Ph.D., Psychology, Brigham Young University, 1122 SWKT, Provo, UT 84602. E-mail: mona_hopkins@byu.edu*

E. WILDE, J.V. HUNTER, Z.X. CHU, Z.J. WANG, G. HANTEN & H.S. LEVIN. Cognitive Control in Relation to DTI in Children with Severe TBI.

To assess frontal white matter integrity by fractional anisotropy (FA) using diffusion tensor imaging (DTI) in children with severe traumatic brain injury (TBI) and uninjured children. We also examined the relation between prefrontal FA and measures of cognitive control on the Flanker Task (FT) and the Sternberg Item Recognition Task (SIRT). Twelve severe TBI (age 9-16 years; 1-7 years postinjury) and 12 uninjured children matched on age, gender, race, maternal education and handedness underwent cognitive testing and DTI (Philips Intera 1.5T scanners). Philips Fiber Tracking software was used to calculate FA with manual delineation of frontal white matter in right and left hemispheres. Univariate ANOVAs showed significant or near-significant group by left frontal FA interaction effects on several FT variables including Interference errors ($F(1,20)=5.76$, $p=0.026$), Facilitation errors ($F(1,20)=8.83$, $p=0.008$), Baseline reaction time (RT) ($F(1,20)=13.75$, $p=0.001$), Facilitation RT ($F(1,20)=9.69$, $p=0.028$), difference scores in errors ($F(1,20)=10.01$, $p=0.005$) and RT ($F(1,20)=6.51$, $p=0.019$) between the Baseline and Interference conditions, and SIRT variables such as Memory Load 1 errors ($F(1,19)=9.62$, $p=0.006$), Memory Load 1 RT ($F(1,19)=3.38$, $p=0.082$) and Memory Load 4 RT ($F(1,19)=4.03$, $p=0.059$). In these interactions, higher FA was related to improved performance in uninjured children, but these variables were unrelated in the TBI group. We found that FA was lower in TBI patients and had a different relation to cognitive control relative to uninjured children. Interaction effects suggest that working memory and resistance to interference are associated with increased FA in normal development, but not after TBI.

Correspondence: *Elisabeth Wilde, PhD, Physical Medicine and Rehabilitation, Baylor College of Medicine, 6560 Fannin St., Ste 1144, Box 67, Houston, TX 77030. E-mail: ewilde@bcm.tmc.edu*

D. WIEBE, D. GANSLER, A. ALLGAIR, C. FULWILER & A. SHETH. An Exploratory Study of Brain Structures and Emotional Dysregulation in Affective Disorders.

The emotional dysregulation theory predicts that abnormalities in the limbic and connected regions in the brain are involved in affective disorders. This exploratory study used volumetric measurements of brain structures to examine the hypothesis that structural abnormalities in bipolar affective disorder would show a pattern of subcortical enlargement compared to unipolar affective disorder as well as an absence of group differences in cortical structures, reflecting a pattern of emotional

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

overactivity and/or under-regulation in bipolar disorder. The amygdala and orbitofrontal cortex (OFC) were chosen as regions of interest (ROIs). Participants were selected as a convenience sample, and the total sample size was ten. Design was between subjects single factor and was quasi-experimental. The independent variable had two levels: bipolar disorder (BD) and unipolar depression (UD). The dependent variables were right and left volumes of the OFC and amygdala. ROIs were manually traced on MRI scans using image analysis software. A detailed parcellation method for measuring the amygdala was constructed based on an established protocol. Two-tailed t-tests for independent groups were performed to test the hypotheses. Descriptive statistics for background variables were examined and potential confounds were discussed. There were no significant between group differences for any of the ROIs. There was, however, a nonsignificant pattern for the BD group to have larger bilateral orbitofrontal cortex volumes then the UD group. Possible reduction in OFC volume in depression and enlargement in bipolar disorder was discussed in the context of neurotransmitter pathways in the frontal cortex.

Correspondence: *Dana Wiebe, MA, Ph.D. candidate, Psychology; Suffolk University, 41 Temple Street, Boston, MA 02114. E-mail: dana.wiebe@suffolk.edu*

M. BALCONI. Encoding and Retrieval of Emotional Facial Expressions in Two Different Tasks.An ERP (Event-related Potentials) Analysis. .

The existence of an emotion-specific cognitive process for face comprehension was previously analysed, although the effect of emotional significance of the stimuli (type of emotion) crossed with types of task (direct or indirect task) was not exhaustively considered. Emotional face encoding and retrieval processes were explored in the current research through electroencephalographic measures (ERPs). In the Experiment 1 ERP correlates of twenty one subjects were recorded when they viewed emotional (fear, sadness and happiness) or neutral facial stimuli.In the Experiment 2 (20 subject), we explored whether encoding for emotional faces relies on a single neural system irrespective of the task (incidental or direct), or whether it is supported by multiple, task-specific systems. In the Experiment 3 (retrieval of incidentally encoded emotional stimuli) and 4 (retrieval of directly encoded stimuli) the cognitive features of the retrieval process was explored by using both the behavioral and ERP measures. An emotion-specific cortical variation was found (N2 effect). This effect was sensitive to the emotional value of faces, since it differentiated high arousal (i.e. fear) from low arousal (i.e. sadness) emotions. Moreover, a specific cortical module (posterior sites) was activated by emotional faces but not by neutral faces. We observed differences for localization (posterior for an incidental task; central and posterior for a direct task) and lateralization (right-distribution for the negative emotions in a direct task) of N2 on the scalp. In the recognition process, it was found a positivity ERP effect (attenuation of the negative wave) related to the familiarity of the repeated faces (old faces) compared with not repeated faces (new faces). The cognitive significance of these ERP variations was discussed. An emotion-specific cortical module was hypothesized and the "old/new effect" for recognition was confirmed apart from type of task.

Correspondence: *michela balconi, PhD, Psychology; Catholic University of Milan, L.go Gemelli, 1, Mlan 20123, Italy. E-mail: michela.balconi@unicatt.it*

R.C. CHAN, H.Y. RAO, E.Y. CHEN, Y.L. DING, B.B. YE & D.G. GAO. Brain activation during the performance of neurological soft sign items: a functional MRI study in healthy subjects.

Cognitive neuroscience has shown great interest in monitoring and evaluating differences in motor performance of healthy volunteers and patients showing neurological soft signs (NSS), which are minor motor or sensory deficits, accompanying, for example, schizophrenia. For testing and rating overall psychomotor coordination performance various semi-quantitative scales have been established as an effective tool. Although these tools have proven effective and sensitive to detecting NSS in clinical groups from healthy population, most of these works are limited to behavioural data and clinical observation. The purpose of this study is to clarify, using functional MRI paradigm, brain regions activated during a series of NSS involving motor coordination in healthy volunteers. Ten subjects participated in this study. We used four motor coordination soft signs tasks ranging from simple (finger tapping, pronation/supination) to more complex movement (alternate finger-thumb opposition, fist-edge-palm). We found reliable activation of bilateral sensorimotor and parietal areas and ipsilateral cerebellum in the fist-edge-palm task, but the contralateral sensorimotor activation in the other simple motor tasks. Significant signal changes increase in the left sensorimotor cortex were also found when the complexity of the task increases. The present findings suggest that successful performance of the more complex NSS motor coordination task requires the participation of more brain areas (bilaterally) than the simple tasks. These also provide the empirical data on the neural basis of NSS for further study in other clinical group like schizophrenia in the near future.

Correspondence: *Raymond C. Chan, PhD, Psychology; Sun Yat-Sen University, NA, Guangzhou 510275, China. E-mail: edschchq@zsu.edu.cn*

A.K. BURRACK, D. KNOCH & P. BRUGGER. The Incidence of *Mitempfindung* in Synaesthetes and Non-Synaesthetes.

To investigate wether the incidence of *Mitempfindung* (the referral of a tactile sensation to a location far away from the stimulation site) is higher in color-digit-synaesthetes (people who automatically and consistently attribute a certain color to a certain digit) than in non-synaesthetes. 20 color-digit-synaesthetes, 20 pair matched non-synaesthetes and 34 non-matched non-synaesthetes were questionned regarding their personal experience with *Mitempfindung*. Positive responses were followed by a request to provide qualitative and quantitative details of the experience. Incidence of *Mitempfindung* was 40% in the synaesthetes, which contrasts with a 10% incidence in the matched controls and a 9% incidence in the non-matched controls. The results render a meaningful association between color-digit synaesthesia and *Mitempfindung* plausible and support the notion of a conceptual similarity between the two phenomena. Specifically, both color-digit-synaesthesia and *Mitempfindung* may represent a functional release of normally inhibited pathways.

Correspondence: *Anna K. Burrack, Unit of Neuropsychology, University Hospital Zurich, Frauenklinikstrasse 26, Zürich 8091, Switzerland. E-mail: anna.burrack@usz.ch*

D.G. ANDREWES, J.W. KETTLE, N.B. ALLEN & C. KILPATRICK. Lateralization of the Startle Reflex Circuit in Humans: An Examination with Monaural Probes following Unilateral Temporal Lobe Resection.

Startle reflex (SR) modulation was investigated in order to investigate the laterality of the neural circuit responsible for the startle reflex and its affective modulation in humans. Patients following left temporal lobectomy (LTL;n=15), right temporal lobectomy (RTL; n=15) and a group of normal controls (n=21) were studied. All brain surgery patients had undergone complete unilateral resection of the amygdale and hippocampus. Subjects were presented pictures on VDU which were standardized to evoke a negative, positive and neutral response. During this presentation, monaural acoustic startle probes were presented to the left or right ear. Ipsilateral SR magnitude was greatest for a right probe when assessed at the right eye suggesting an ipsilateral SR circuit. SR was attenuated in the RTL and LTL groups.Differences in arousal response to the three picture types was significant for left ear probes at both eyes and for right ear probes at the left eye in non-clinical subjects. There was a significant reduction in affective modulation in LTL patients. In keeping with animal studies these findings show an ipsilateral circuit

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

for startle reflex which was found to be dominat on the right side. While affective modulation of this circuit is left dominant. The finding that this reduction was most obvious for the unpleasant pictures confirms the attributed role of the amygdala as a processor of threat related stimuli.

Correspondence: *David G. Andrewes, PhD, Psychology, University of Melbourne, Dept of Psychology, University of Melbourne, Melbourne, VIC Vic 3052, Australia. E-mail: andrewes@unimelb.edu.au*

S. MAJERUS, M. VAN DER LINDEN, V. BRESSAND & S. ELIEZ. Verbal Short-Term Memory in Children and Adults with a Chromosome 22q11.2 Deletion: A Specific Deficit for the Retention of Serial Order Information?

We explored verbal short-term memory (STM) in velocardiofacial syndrome (VCFS), a neurodevelopmental disorder linked to a chromosome 22q11.2 deletion and associated with abnormal development of selective brain areas, including parietal cortex involved in STM processing. We distinguished STM for item and order information as neuroimaging studies suggest that the parietal cortex is specifically associated with the retention of serial order. There were eleven participants with VCFS and a confirmed 22q11.2 deletion (age range: 7.7-37 years), a chronological age-matched (CA) control group (for group analyses; N=16) and four mental age-matched (MA) control groups (for single case analyses; N=12). We designed recall and recognition STM tasks maximizing either the retention of serial order or phonological item information. Relative to the CA group, the VCFS group showed preserved STM for item recall [$F(1,25)<1$, n.s.] but significantly impaired performance for order recall [$F(1,25)=8.05$, $P<.01$] and recognition [$F(1,25)=8.25$, $P<.01$]. Single case analyses showed that, relative to their respective MA control groups, nine patients showed severely impaired performance in the order STM tasks but perfectly preserved performance for all item STM tasks. Our data suggest that the cognitive profile of VCFS is characterized by a dissociation between retention capacities for item and order information. The specific deficit for serial order STM could be related to the decrease of gray matter in the parietal lobe that has been documented in VCFS. More generally, the dissociations we observed have fundamental implications for theoretical models of STM that do not distinguish separate item and serial order STM mechanisms.

Correspondence: *Steve Majerus, Department of Cognitive Sciences, University of Liege, Boulevard du Rectorat, B33, Liege 4000, Belgium. E-mail: smajerus@ulg.ac.be*

S.R. SCHWEINBERGER, J.M. KAUFMANN, S. MORATTI, A. KEIL & M. BURTON. Face-selective MEG Responses in Ventral Temporal Cortex to Repetitions of Faces .

Recent studies have identified a prominent face-selective ERP response to immediate repetitions of faces ~250 ms (N250r) which was strongly attenuated or eliminated for control stimuli (Schweinberger, Huddy, & Burton, 2004, NeuroReport, 15, 1501-1505). In the present study we used magnetoencephalography (MEG) to further explore fast brain responses (and their the potential selectivity) to faces. Fifteen participants counted rare pictures of butterflies interspersed in a series of pairs of other visually homogeneous categories (human faces, ape faces, inverted faces, and car fronts). The second stimulus of each pair could either be a repetition or a nonrepetition of the first stimulus. MEG was recorded continuously, and digitized at a rate of 250 Hz, using a 148-channel whole head neuromagnetometer. We observed prominent M100 (latency 105-118 ms) and M170 (177 -195 ms) responses as well as an M250 response (252-270 ms). Similar to what was seen in EEG, the M250 response was strongly modulated by repetition. For each of these MEG components, we will discuss in detail their sensitivity to repetition, their selectivity for faces, and their putative neural generator(s). Based on our EEG and MEG findings, we will argue that repetition-sensitive brain activity ~250 ms reflects the transient activation of facial representations for recognition in fusiform cortex.

Correspondence: *Stefan R. Schweinberger, PhD, Dipl. Psych., Psychology, University of Glasgow, 58 Hillhead Street, Glasgow G12 8QQ, United Kingdom. E-mail: s.schweinberger@psy.gla.ac.uk*

J.M. KAUFMANN, S.R. SCHWEINBERGER & . . BURTON. Neural Correlates of Learning Faces versus Learning People.

There is a striking discrepancy between our ability to process familiar and unfamiliar faces: while familiar faces are recognized effortlessly from a range of pictorial variations, the processing of unfamiliar faces is very poor if viewpoint or expression is changed. There are no satisfactory explanations for the transformation from image-specific coding to flexible representations of faces. The role of higher order semantic information for the learning of new faces also remains widely unknown, but there are recent reports of semantic information facilitating face learning. Event-related potentials (ERP) were recorded from 24 healthy participants. Faces learned together with voices providing semantic information were contrasted with faces learned only visually. In order to disentangle face from picture learning, different exemplars of portraits were used at learning and during four test sessions. Analyses of variance were performed on ERPs, reaction times and accuracy. Accuracy was higher for faces learned with semantic information. ERPs showed differences between semantic and non-semantic faces at frontal electrodes between 500-600 ms post-stimulus onset, but this effect disappeared with an increasing number of face repetitions. The results are discussed with respect to cognitive models of face perception (Burton et al., 1999). Top-down semantic information can help to establish new face representations and the frontal effect between 500-600 ms might be a correlate of access to semantic information. The assimilation of ERP effects for semantic and non-semantic faces with repeated presentations might be due to stabilized visual representations. Alternatively it might reflect participants making spontaneous semantic associations during learning.

Correspondence: *Juergen M. Kaufmann, Ph.D., Psychology, University of Glasgow, 58 Hillhead St, Glasgow G12 8QB, United Kingdom. E-mail: juergen@psy.gla.ac.uk*

A.J. VERDEJO, A. BECHARA, E.C. RECKNOR & M. PEREZ GARCIA. The Effects of Sustained Affective Context on Decision-Making Performance: Preliminary Results in Substance Dependent Individuals and Normal Controls.

Emotion processing and decision-making deficits have been described in substance dependent individuals (SDI). However, no studies have addressed the issue of how different affective states bias decision-making in SDI. The aim of this study was to examine the effects of sustained affective context on decision-making in SDI and Normal Controls (NC). We tested SDI (23) and normal controls (24) in an experimental manipulation of the Iowa Gambling Task (IGT) paradigm. This manipulation consisted of inserting a series of 20 emotionally charged images at certain points during IGT performance (trials 40, 60, and 80). The images (from the International Affective Picture System) were grouped according to their normative values in the Valence dimension (neutral vs. pleasant vs. unpleasant) and matched for their values in the Arousal dimension (all highly arousing). This way we created three emotional conditions: (NNN) neutral images were presented at trials 40, 60, and 80 of the IGT; (NPU) we presented neutral images at trial 40, pleasant images at trial 60, and unpleasant images at trial 80; (NUP) neutral images at 40, unpleasant at 60 and pleasant at 80. Factorial ANOVAs were used to examine the influence of group (SDI vs. NC), block (trials 40-60 vs. 60-80 vs. 80-100) and emotional condition (NNN vs. NPU vs. NUP) on IGT performance. Results showed a significant effect of the Block x Emotional Condition interaction, pointing to a differential effect of the induced emotional states on decision-making performance ($F=2.468$, $p<.05$). One-way ANOVAs and paired post-hoc comparisons showed this emotional modulation was higher for the Normal Control

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

group than for the SDI group. The induction of different emotional states bias decision-making as measured by the IGT paradigm. In Normal Controls, the induction of negative emotional states improved IGT performance, while the induction of positive states worsened IGT performance. These differential effects were flattened in the SDI group.
Correspondence: *Antonio J. Verdejo, Personalidad, Evaluacion y Tratamiento Psicologico, Universidad de Granada, Campus de Cartuja S/N, Granada 18071, Spain. E-mail: averdejo@ugr.es*

B.J. DANIELS, A.B. MOORE, K. WHITE, K.K. PECK, K. GOPINATH, M. GAIEFSKY, C. WIERENGA, R.B. PARKINSON, K. MCGREGOR, L.J. GONZALEZ-ROTHI, R. BRIGGS & B. CROSSON. Neural Activation in Non-Fluent Aphasics Following Language Rehabilitation: An fMRI Study. .

This study was designed to examine changes in language-related activity in non-fluent aphasics following language rehabilitation. For this study, 8 non-fluent aphasics underwent functional magnetic resonance imaging (fMRI) scanning prior to and immediately following the completion of a language rehabilitation program designed to facilitate reorganization of language functions to homologous regions in the non-dominant hemisphere. The researchers hypothesized that, among treatment responders, an increase in activity in homologous language-related lateral frontal and medial frontal right-hemisphere regions would be evident (e.g. Broca's homologue, BA's 8, 9, 24, 32, Pre-SMA, SMA). Alternatively, the authors hypothesized that a change in activity in perilesional areas of the left hemisphere would occur. FMRI data were acquired on a 3T scanner in an event-related paradigm while subjects completed an overt language task that has been empirically shown to produce activity in language-related regions in normal controls. Deconvolution based on all responses was used to provide an estimate of the impulse response function. Selective Detrending was conducted to remove artifacts due to task-correlated motion, and data underwent thresholding to meet criteria for true hemodynamic activity. Cluster reports were then run on each subjects' pre-treatment and post-treatment data to isolate and quantify areas of activity. Changes in activity from pre-treatment to post-treatment in language-related regions of interest were analyzed by multiple raters. Preliminary findings suggest that changes in neural activity are primarily influenced by lesion size and location. Findings also suggested that the left basal ganglia may play a role in how the brain reorganizes after language rehabilitation.
Correspondence: *Bradley J. Daniels, B.A., Clinical and Health Psychology, University of Florida, 4008 SW 21st Lane, Gainesville, FL 32607. E-mail: bdaniels@phhp.ufl.edu*

H.H. WRIGHT, R.A. DOWNEY, T.E. LOVE, M. NEWHOFF, R. SCHWARTZ & L.P. SHAPIRO. Measuring Working Memory in Aphasia.

The purpose of this study was two-fold: (1) to determine if mode of stimulus presentation (auditory v. visual) and response type (verbal v. pointing) affected performance of adults with aphasia on two measures of working memory (WM), and (2) to examine if a relationship existed between participants performance on the WM measures and performance on an auditory comprehension measure. Participants included 10 adults with aphasia. WM measures included an n-back task, with 0-back, 1-back, and 2-back levels; and, a span task increasing in span length from two items to five items recalled. Stimuli for the tasks included 16 familiar and imageable fruits and vegetables. In this with-in subjects design, participants completed each task in both the auditory and visual modalities and, for the span task, responded either verbally or via pointing. Comprehension performance was measured via the S.O.A.P. test (Love & Oster, 2002). Preliminary results indicate the following. For the n-back task, participants responded significantly faster when stimuli were presented visually compared to auditory presentation. Participants made significantly more errors during the 2-back compared to the 1-back; however, presentation modality did not affect accuracy. Span lengths were significantly shorter when participants responded verbally. Finally, adults with Brocas and anomic aphasia yielded a significant correlation between performance on the most complex sentences tested on the SOAP (Object Relatives) and the span tasks when responding orally. Our findings will be discussed in terms of the putative relation between working memory abilities and language comprehension.
Correspondence: *Heather H. Wright, Ph.D., Rehabilitation Sciences, University of Kentucky, 900 S. Limestone, 120 K C.T. Wethington Bldg, Lexington, KY 40536. E-mail: hhwrig2@uky.edu*

G.S. HARRINGTON, D. FARIAS, C. DAVIS & K. BAYNES. Neural Basis of Recovery for Chronic Broca's Aphasics.

After a stroke, the course of recovery varies. Language recovery has been attributed to peri-lesional and right hemispheric contributions. Neuroimaging may support or refute these findings. 6 healthy subjects and 2 Broca's aphasic patients underwent functional MRI (FMRI) . Aphasic subject 1 (EP, 61y/o, 8.5 years post stroke) and subject 2 (JS, 63 y/o, 13 years post stroke) both had severe inferior frontal damage and profound aphasia acutely after their stroke. Both, although still severely impaired were able to verbally communicate basic wants and needs at the time of scanning. The subjects performed a verb generation task that required covert verb generation to visual and auditory cues. Laterality indices (LI) were calculated for inferior frontal and temporoparietal regions of interest (ROIs) FMRI results revealed highly left lateralized activation for the healthy subjects within the inferior frontal (LI = .78 +- .12) and temporoparietal (LI = .69 +- .19) ROIs. Both aphasics produced right lateralized activation in the inferior frontal ROI (LIs: EP=-.25, JS=-.88) and left lateralized activation within the temporoparietal ROI (LIs: EP=.60, JS=.52). In contrast to the healthy subjects, the right hemisphere significantly contributed to inferior frontal activation for both aphasics. This was most evident in JS who produced primarily RH activation due to an infarct of the majority of the left inferior frontal gyrus. EP had more peri-lesional activation in the inferior frontal gyrus and subsequently the LI was less right lateralized. The left temporal gyrus was mostly spared for both subjects, which accounted for the LH temporoparietal activation. This supports previous studies that have shown there is a significant correlation between the recovery of language and the functioning of the left superior temporal cortex.
Correspondence: *Greg S. Harrington, Ph.D., Radiology, UC Davis Medical Center, 4701 X Street, Imaging Center, Sacramento, CA 95817. E-mail: gsharrington@ucdavis.edu*

M. PURDY. The relationship between executive function and communication in aphasia.

It was hypothesized that aphasic individuals need to rely on executive function abilities to use augmentative communication strategies. They must recognize when a communicative attempt has failied, and must change their approach to become successful. The purpose of this study was to determine the relationship between executive function ability and functional communication in aphasia. This information may help explain the communication deficits in aphasia and determine subjects candidacy for various communication strategies. Fifteen nonfluent aphasic adults, aged 43-76 and a mean of 40 months post onset participated in executive function testing and communication skills training. Executive functioning was determined from the Wisconsin Card Sorting Test. For the purpose of this study, the Perseveration Score was the primary variable used. A multiple baseline across behavior design was used to train communication concepts in three modalities: verbal, gestural, communication book. Subjects were then required to complete a Referential Communication task with a naive partner using any modality necessary. The number of symbols used spontaneously and the number of successful switches to a different modality when an initial communicative attempt failed were calculated. Significant correlations ($p < .05$) were found between the Perseveration Score on the WCS test and the total

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

number of symbols used on the Referential communication Task (r=-.55) as well as betwen the WCS and the percent of successful switches among modalities on the Referential Communication Task (r=-.52). Performance on various communication tasks relies somewhat on executive function ability, particularly cognitive flexibility. This is reflected by the high perseveration score on the WCS and the failure to switch modalities as needed on the referential communication task. Aphasic individuals with impaired executive functions may not do well with spontaneous use of trained communication strategies.

Correspondence: *Mary Purdy, Ph.D., Communication Disorders, Southern Connecticut State University, 501 Crescent Street, New Haven, CT 06515. E-mail: purdym1@southernct.edu*

A.M. RAYMER, F. SINGLETARY, A. RODRIGUEZ, M. CIAMPITTI, K.M. HEILMAN & L.J. GONZALEZ ROTHI. Gesture Training Effects for Noun versus Verb Retrieval in Aphasia.

Neural networks for gestures tend to be more tightly linked to those for verbs than for nouns (Druks, 2002), suggesting that the effects of gestural training for word retrieval impairments in aphasia may yield greater effects for verbs than nouns. We tested this possibility in 9 individuals with aphasia (6 nonfluent, 3 fluent) using a within subject crossover design. Gesture training was applied for nouns and verbs sequentially, and order of training was counterbalanced across participants. Effects (C statistic, effect sizes) were evaluated for accuracy of picture naming and gesture production for sets of trained and untrained nouns and verbs. Picture naming improved significantly (p<.01) with large effects sizes (>2.50) for trained nouns in 6/9 individuals and for trained verbs in 4/9 individuals. There was a tendency for gains to be greater for nouns than verbs (t=2.19, p=.06). No improvements were evident for untrained nouns and verbs. Gesture production improved significantly for trained nouns in 6/8 individuals and for trained verbs in 7/8 individuals. Gesture production improved for both untrained nouns and verbs in 3/8 individuals. Contrary to predictions, word retrieval tended to improve more during training for nouns than verbs, whereas gesture production improved for both nouns and verbs. Word retrieval findings favoring nouns over verbs may be influenced by the participant characteristics, including many individuals with nonfluent aphasia, which can be associated with greater impairments for verbs than nouns. Bilaterally represented gesture knowledge may have contributed to gesture improvements seen for both nouns and verbs.

Correspondence: *Anastasia M. Raymer, Ph.D., Dept of ESSE, Old Dominion University, 110 Child Study Center, 45th & Hampton, Norfolk, VA 23529-0136. E-mail: sraymer@odu.edu*

B. WOLL & J. ATKINSON. Therapeutic Intervention for Sign Language Dysarthria Following Cerebellar Stroke: A Case Study.

The cerebellum contributes to regulating motor control and integrating sensory and motor information. Damage may cause cerebellar ataxia, with severe disruption to control of voluntary movements, including those required for language production. Speech dysarthrias associated with ataxia are well-documented. Nothing is known about the consequences for sign languages.To date, there has been no description of ataxic dysarthria or of therapeutic intervention in a user of sign language. This study examines therapy outcome in a single case study of a 36 year old deaf man with a rare syndrome causing deafness and arteriovenous malformation. He has been ataxic for 3 years, following extensive cerebellar haemorrhaging during surgery to correct an AVM. Scan data show damage to the right and medial cerebellum and a small area of the pons. The intervention programme was designed to reduce sign language impairment by encouraging the use of a variety of psychological strategies including 'stop and think' attention focusing techniques. A small therapy effect was found which played a role in maintaining the ability to be understood against a background of general decline. Rehabilitative therapy may be beneficial to signers with ataxic dysarthria; other signers with neurological impairments might benefit from similar interventions. This has implications for service planning and equity of healthcare, as there are currently no specialist neuropsychological services available to users of sign language with neuropathology. The results of this study also demonstrate the need to move away from speech-based models of ataxic dysarthria.

Correspondence: *Bencie Woll, PhD, Language and Communication Science, City University London, Northampton Square, London EC1V 0HB, United Kingdom. E-mail: b.woll@city.ac.uk*

M.H. LAUTERBACH, I.P. MARTINS, K. WILLMES & A.M. ALEIXO. Naming Errors in Healthy Elderly: The Influence of Stimuli, Education and Gender.

Confrontation naming is frequently used in aphasia testing. Healthy subjects are supposed to perform faultlessly in this type of task. In the normative study for the Portuguese version of the Aachen Aphasia Test (PAAT) we found an unexpected high error rate of 10% for healthy subjects in the naming of line drawings. Elderly subjects had an even higher error rate. Therefore we conducted a study comparing error rates and error types in confrontation naming using both, line drawings and photographs as stimuli. 72 healthy elderly, aged 66 to 91 years, had to name 20 items chosen from the naming tasks of the PAAT. Each subject was presented both, the line drawing and the photograph version. The subjects were grouped according to years of schooling (illiterates, 1-4, 5-9, >9 years of schooling), and were balanced for gender, age and sequence of presentation. To exclude dementia the MMSE was administered. Error rate and error type (classified by an expert group into 8 different types) were analysed statistically. Significantly more errors occurred in the line drawing version of the naming task (Student t-test, p= 0.001). There was a significant correlation between error rate and education (p<0.001). The error rate between line drawings and photographs differed significantly for the illiterates (Wilcoxon-test, p=0.03) and the group with 1-4 years of schooling (Wilcoxon-test, p=0.01). 39,6% of the errors were classified as perceptual errors, 17,4% as semantically related, 15,9% as not related at all, and 11,8% as circumscriptions. Women made significantly more circumscriptions (chi-square test, p<0,001) and semantically related errors (chi-square test, p<0,001), whereas men gave significantly more non-related wrong answers (chi-square test, p=0,01). There is no ceiling-effect in confrontation naming for healthy elderly subjects. Education must be taken into account when scoring naming performance. Women and men behave differently when confronted with naming difficulties.

Correspondence: *Martin H. Lauterbach, University of Lisbon, Laboratório de Estudos de Linguagem, Centro de Estudos Egas Moniz, Hospital Santa Maria, Lisboa 1649-028, Portugal. E-mail: mlauterbach@fm.ul.pt*

E.H. DE HAAN & M. VAN ZANDVOORT. Selective Sparing of Colour Naming in an Anomic Patient.

Anomia concerns an impairment in word retrieval, commonly associated with left hemisphere damage. Pure forms have been reported in which the word-finding difficulties may occur without impaired semantics or phonology. In addition, category-specific impairments have been described, such as for naming verbs or nouns. The suggestion for a specific colour naming process was strengthened by the observation that patients with anomia may show selective sparing of colour naming. However, all reported cases suffered from semantic dementia. In this study we aim to demonstrate that colour naming may be selectively spared in anomia that cannot be explained by semantic impairments. We present a patient who, as the result of a single left temporal stroke, suffered from a chronic, severe anomia. A number of naming tasks were devised using different stimulus categories (animals, tools, colours)

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

as stimuli. The results show that (a) she was very poor at naming all stimulus categories apart from colours, and (b) that she was able to identify the items that she could not name. The demonstration of a selective sparing of colour naming in an anomic patient argues strongly for a dedicated cognitive system for colour processing.
Correspondence: *Edward H. De Haan, PhD, Psychological Laboratory, Utrecht University, Helmholtz Institute, Heidelberglaan 2, Utrecht 3485CS, Netherlands. E-mail: e.dehaan@fss.uu.nl*

B.T. SCHMIDT & L.K. OBLER. Working Memory Compensates for Poor Oral Reading in Adults.
To determine what neuropsychological abilities may underlie successful reading comprehension in dyslexics, we explored the extent to which reading comprehension is linked to reading-aloud in adults with and without histories of learning difficulty and examined the cognitive variables (IQ and working memory) that must underlie their reading comprehension. Forty-one native English speakers aged 16-36 (mean 21.26) were administered a battery of silent reading, oral reading and cognitive tasks. 11 of the 41 participants reported that they had had childhood learning difficulty. As expected, a significant correlation was obtained between reading comprehension and oral reading in words per minute (WPM) (r=.496; p=. 026). Full-scale IQ correlated with both reading comprehension and oral reading rate (.437, p=.016; .597, p= .038 respectively). Working memory did not correlate with either (Nelson Denny r= .156, p= .151; WPM r=.056, p=.184) To evaluate participants with dissociated abilities on these two tasks, we rank-ordered both the standard comprehension scores of the Nelson Denny Reading Test and the reading rates for oral reading (WPM). Two individuals, one of whom had a history of learning problems, evidenced a distinct dissociation between oral reading rate and silent reading comprehension. These two participants ranked 36 and 37 in their reading times, yet their standard score in comprehension was above the mean, placing them in 9th and 17th positions respectively. They ranked 3 and 9 on the working memory capacity measure but 24 and 40 respectively on IQ. Since working memory capacity is used in the manipulation and storage of information, we conclude that for some adults an enhanced working-memory capacity compensates for a lack of automaticity in reading.
Correspondence: *Barbara T. Schmidt, Ph.D., Communication Arts, Molloy College, 1000 Hempstead Avenue, PO Box 5002, Rockville Centre, NY 11571. E-mail: bschmidt@molloy.edu*

S. NISHIYAMA & M. MATSUI. Mechanism for Selective Impairment of Reading Following Occipital Lobe Damage.
The purpose of this study was to examine the neural mechanism of the selective impairment of reading. We evaluated 3 patients with left occipital lobe lesions in different locations. Their lesions were assessed by MRI, and we administered the Western Aphasia Battery to examine their language function. Patient1 had a lesion in the left medial occipital lobe and the splenium of the corpus callosum. He showed pure alexia without aphasia. Patient2 showed a lesion in the left medial and lateral occipital lobe. Patient 3 showed a lesion in the left lateral occipital lobe. Patient2 and Patient3 had neither pure alexia nor aphasia on assessment with the WAB. We examined the ability to read 46 kanji (single ideograms), 46 kana and 26 alphabet letters (single phonograms) to investigate whether phonograms and ideograms are dissociated in oral reading. Patient1 demonstrated a reading score for kanji that was significantly higher than that for kana ($p<.01$) or that for alphabet letters ($p<.01$). The scores for kana were not significantly different from those for alphabet letters. Moreover, there were no significant differences between the scores for high complexity kanji (>6strokes) and low complexity kanji (<6strokes). Patient2 and Patient3 were no significant differences among any tasks. This study revealed that a lesion in the left medial occipital lobe and the splenium of the corpus callosum can impair the ability to read phonograms independently of the complexity of the letters. We suggest that the process of phonogram reading is mediated by these regions.
Correspondence: *Shimako Nishiyama, Master, Graduate School Of medicine,Toyama medical and Pharmaceutical University, 2630 Sugitani, Toyama 932-0194, Japan. E-mail: albeno-jupi7@nifty.com*

M. BALCONI. Consciousness and Emotional Facial Expression decoding. Subliminal and Supraliminal Stimulation Effect on ERPs . .
In this study we aimed to analyze firstly whether facial expression recognition is marked by specific ERP correlates, and secondly whether conscious and unconscious elaboration of emotional facial stimuli are qualitatively different processes. Event-related potentials elicited by supraliminal and subliminal (10 ms) stimuli were recorded when subjects (n = 39) viewed emotional facial expressions of four emotions or neutral stimuli. Two ERP effects (N2 and P3) (temporal interval 180-300; 300-380) were analyzed in terms of their peak amplitude and latency variations. An emotional-specificity was observed for the negative deflection N2, whereas P3 was not affected by the content of the stimulus (emotional or neutral). Secondly, the unaware information processing was revealed quite similar to aware one in terms of peak morphology but not of latency. In fact, unconscious stimulation produced a more delayed peak variation than conscious. Third, a more posterior distribution of the ERP was found for N2 as a function of emotional content of the stimulus. On the contrary, cortical lateralization (right/left) was not correlated to conscious/unconscious stimulation. The psychological homogeneity of subliminal and supraliminal stimulation is a main point that requires attention, since we can infer that subliminal components are elicited by cognitive processes similar to these occurring supraliminally.
Correspondence: *michela balconi, PhD, Psychology, Catholic University of Milan, L.go Gemelli, 1, Mlan 20123, Italy. E-mail: michela.balconi@unicatt.it*

M. HARCIAREK & K. JODZIO. Secondary Mania and Depression Following Right Hemisphere Ischemic Stroke.
Although the role of the right hemisphere in emotional processes is well documented, the valence hypothesis remains controversial and continues to generate debate. The aim of this study was to determine whether secondary mania as well as depression can co-occur after the right ischemic stroke, and to characterize the lesion locations associated with these affective disturbances. The Polish standarized version of the the Hospital Anxiety and Depression Scale (HAD) (Zigmond and Snaith, 1983) as well as the Mania Inventory (Puzynski, 1979) were administered to 30 patients with right hemisphere damage (RHD; mean age = 63.8 years), and 31 demographically matched normal control subjects (NC; mean age = 63.7 years). All patients underwent MRI and/or CT scan. As hypothesized, both secondary mania and postroke depression were observed among RHD patients. Cluster analyzes revealed that the majority of patients (63,3%) developed dissociated affective symptoms following right ischemic stroke (only mania or only depression). However, we also found seven RHD subjects with depression that coexisted with symptoms of mania. Four patients had none of the above affective changes. The radiological findings showed that patients with higher scores on the Mania Inventory tended to have more right anterior lesions and those who developed severe depression had more posterior lesions of the right hemisphere. These results suggest that both secondary mania and depression can co-occur after ischemic stroke involving the right hemisphere. Our findings are also consistent with previous research findings suggesting that the severity of the specific affective symptoms may be related to the lesion location.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

Correspondence: *Michal Harciarek, M.A., Univeristy of Gdansk Institute of Psychology, Zygm. Augusta 3/3, Gdansk 80-418, Poland. E-mail: mharciarek1@wp.pl*

C. LAWSON, M. COLTHEART & R. STEVENSON. Processing Emotion in Huntington's Disease.

There have been several reports of a selective inability to recognize facial expressions of disgust in patients with Huntington's disease (HD). The selectivity of the impairment is consistent with the existence of a neural substrate dedicated to the recognition of facial expressions of disgust. A recent study however did not find evidence for a differential impairment in disgust recognition in a sample of HD patients (Milders et al, 2003). The conflicting findings have led to some uncertainty regarding the dysfunction of any mechanism dedicated to specific emotions in HD. This work investigated emotion processing in a culturally homogeneous group of 15 HD patients. Tasks administered include two tests of facial expression recognition, and several tasks concerned with the processing of disgust through other modalities. Three distinct patterns of performance were observed; 1) Patients whose recognition of facial expressions of basic emotions is relatively intact; 2) Patients who demonstrate impaired recognition of facial expressions of disgust in the presence of accompanying deficits affecting the recognition of other basic emotions; and 3) Individuals who demonstrate a deficit specific to the recognition of facial expressions of disgust. Poor recognition of the facial expression is accompanied by parallel deficits in other disgust domains, such as vocal expressions, hedonic olfactory responses, and in response to disgust inducing pictures. These results indicate that impaired emotion recognition in HD can indeed be circumscribed. The cross-modal nature of the impairment supports the idea that poor disgust recognition may reflect a central problem with this emotion in HD.

Correspondence: *Catherine Lawson, BA (psych) Hons, Macquarie Centre for Cognitive Science, Macquarie University, Macquarie Centre for Cognitive Science, Macquarie University, Sydney, NSW 2109, Australia. E-mail: clawson@maccs.mq.edu.au*

B. MONTAGNE, R.P. KESSELS, G.M. NYS, L.J. KAPPELLE, E.H. DE HAAN & M.J. VAN ZANDVOORT. The Effect of Post-stroke Depression on the Recognition of Emotional Facial Expressions .

One of the major consequences of stroke concerns post-stroke depression (PSD). Generally, depression is known to hamper the processing of emotional stimuli. Also, the stroke itself can result in deficits in affective information processing, such as the perception of emotional expressions. The current study investigated the ability to perceive facial expressions in stroke patients with PSD, compared to stroke patients without depressive symptoms and a healthy group. Furthermore, the lesion location was taken into account, that is supratentorial (left versus right) versus infratentorial lesions. Twenty-two stroke patients were included, who were divided into a depressed group (MADRS 8-33) and a non-depressed group (MADRS 0-7) and compared to 21 matched healthy non-depressed subjects. Recognition of facial expressions (anger, disgust, sadness and happiness) was measured with a sensitive emotion recognition task using morphed images of facial expressions, assessing both accuracy in recognition as well as sensitivity for increasing levels of emotional intensity (ranging from 0-100%). The PSD group performed worse on the accuracy ($p<0.05$) as well as on the sensitivity ($p<0.05$) measures on all emotions compared to the control group, whereas the stroke patients without PSD performed at control level. No effect of lesion location was found. These findings suggest that stroke patients with PSD suffer from a generalized impairment in the recognition of facial expressions. This deficit appears to be a direct consequence of the depression and is probably not caused by the physiological or metabolic changes within the brain as a consequence of the stroke.

Correspondence: *Barbara Montagne, Utrecht University, Heidelberglaan 2, Utrecht 3584 CS, Netherlands. E-mail: b.montagne@fss.uu.nl*

M. MILDERS, M. IETSWAART, J.R. CRAWFORD & D. CURRIE. Deficits underlying changes in social behaviour following head injury.

Changes in emotional and social behaviour are among the most disabling consequences of head injury but despite their serious consequences, little is known about underlying psychological deficits. Theories of social behaviour (e.g. Corrigan, 1997) proposed three stages involved in adequate social functioning: perception of social cues, retrieval of social knowledge and response selection. To test this theory in head injured patients, we investigated whether impairments in these three stages could predict post-injury social behaviour. A consecutive series of head injured patients (n=38) and matched orthopaedic control patients (n=36) were tested on emotion recognition, understanding of social situations and intention (theory of mind) and cognitive flexibility, shortly after injury and again 12 months later. Ratings of premorbid and post-injury behaviour were obtained from the patients' relatives. Compared to orthopaedic controls, the head injured group was impaired on all three abilities tested at both assessments. While the groups did not differ on premorbid behaviour, the head injured group showed significantly more behavioural problems at follow-up. Impairments in theory of mind and cognitive flexibility were not associated with changes in social behaviour. However, impairments in emotion recognition at follow-up did predict one aspect of social behaviour, namely post-injury communication difficulties. These results provide only limited support for the above theory. Out of the three abilities proposed to be involved in social behaviour only one, expression recognition, was associated with changes in social behaviour following head injury, and this association was restricted to communication behaviour.

Correspondence: *Maarten Milders, University of Aberdeen, School of Psychology, Aberdeen AB24 2UB, United Kingdom. E-mail: m.milders@abdn.ac.uk*

Symposium 2/3:30–4:50 p.m.

Unilateral Spatial Neglect: Typology to Treatment

Chair: Anjan Chatterjee

A. CHATTERJEE, K.M. HEILMAN, H. COSLETT, A. CHATTERJEE, K.M. HEILMAN & I. ROBERTSON. Unilateral Spatial Neglect: Typology to Treatment.

Unilateral spatial neglect remains a devastating neuropsychological syndrome that is an early marker for poor functional recovery in patients with acute stroke. The syndrome has been focus of intense study over the last 25 years. The behavioral manifestations are heterogenous, the methods of assessment are varied and our understanding of mechanisms underlying of the syndrome continues to evolve. In this symposium, Dr. Coslett will review the ways in which neglect can breakdown into subtypes and discuss whether these subtypes make sense. Dr. Chatterjee will review the use of signal detection analyses in extinction, and discuss how awareness emerges from a tight interaction between sensory and response variables in ways not previously considered. Dr Heilman will review mechanisms underlying neglect and discuss approach and avoidance mechanisms that are not captured adequately by attentional, intentional or representational accounts of neglect. Finally, Dr. Robertson will review how neglect rehabilitation might work. He will focus on theoretically motivated treatments and discuss the extent to which the effects of these treatments are specific or general.

Correspondence: *Anjan Chatterjee, Neurology, University of Pennsylvania, 3 West gates, 3400 Spruce St., Philadelphia, PA 19104. E-mail: anjan@mail.med.upenn.edu*

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

A. CHATTERJEE & H. COSLETT. Neglect sub-types.
Observations in animals and humans have suggested that several distinct subtypes of neglect may be identified. Although the putative subtypes have been distinguished along a number of dimensions (e.g., personal vs. extrapersonal, near vs. far), the most consistently invoked distinction posits a difference between attentional/perceptual and intentional/premotor forms of neglect. In the former condition, neglect is attributed to a failure to generate an adequate perceptual representation of the environment whereas in the latter condition, the deficit is assumed to reflect an inability to plan and execute an action into or toward the neglected region of space. A number of different tasks have been employed to operationally define attentional/perceptual and intentional/premotor forms of neglect. Although of potential significance with respect to the pathophysiology and treatment of neglect, the utility of the distinction between subtypes of the disorder is undermined by the fact that different tasks have provided inconsistent results in the same subjects. Thus, one subject with neglect may appear to have intentional/premotor neglect based on Bisiachs landmark task but attentional/perceptual neglect as assessed by Nicos epidiascope technique whereas another subject with neglect may exhibit the opposite pattern. In this talk we will review the empirical basis for the hypothesis that distinct subtypes of neglect may be identified, consider the factors that contribute to the inconsistencies reported in previous studies and suggest additional investigations that may help to resolve this important question.
Correspondence: *Anjan Chatterjee, Neurology, University of Pennsylvania, 3 West gates, 3400 Spruce St., Philadelphia, PA 19104. E-mail: anjan@mail.med.upenn.edu*

A. CHATTERJEE. In and out of awareness.
Patients with extinction are unaware of contralesional stimuli when they are presented simultaneously with competing ipsilesional stimuli. Surprisingly, even though extinction studies are essentially signal detection paradigms, signal detection methods have been largely ignored in this literature. Extinction is traditionally interpreted as resulting from an ipsilesional bias in a system with a limited capacity to process incoming stimuli. Accordingly, one would expect stimulus variables to influence sensory discriminability, d prime, and response variables to influence response criteria, c. In a series of patients, we will show that serial models of processing, with a critical bottleneck at the input of competing sensations, followed by a response that simply reflects the outcome of the previous competition is not accurate. Instead, sensory properties of ipsilesional stimuli can influence patients response criteria and changing response modalities (verbal versus motor) can change patients discriminabilty of sensations. These results will be discussed in the context of critical bottlenecks in processing and bi-directional influences of input and output variables in producing awareness of environmental stimuli.
Correspondence: *Anjan Chatterjee, Neurology, University of Pennsylvania, 3 West gates, 3400 Spruce St., Philadelphia, PA 19104. E-mail: anjan@mail.med.upenn.edu*

A. CHATTERJEE & K.M. HEILMAN. Approach-Avoidance Neglect.
When patients with right hemisphere damage are presented with the line bisection task they often make their mark to the right of the actual midline. This error was originally thought to be related to an attentional deficit (e.g., inattention to the left). By spatially dissociating feedback from action, it has been demonstrated that this right side bias might also be induced by a directional action-intentional deficit. More recently, however, some patients with right hemisphere lesions have demonstrated a leftward bias (ipsilesional neglect). It has been posited that this contralesional bias might be related to a release of an approach behavior. Most recently, we have described that avoidance behavior might also induce an ipsilesional bias. In this talk, we will discuss the means by which these aberrant behaviors might be elicited as well as discuss their possible mechanisms.
Correspondence: *Anjan Chatterjee, Neurology, University of Pennsylvania, 3 West gates, 3400 Spruce St., Philadelphia, PA 19104. E-mail: anjan@mail.med.upenn.edu*

A. CHATTERJEE & I. ROBERTSON. How might neglect rehabilitation work?
A considerable range of different treatment methods have been shown to produce positive effects on unilateral neglect, ranging from neck muscle vibration to eye-movement scanning training. This talk outlines how different treatments may have different mechanisms of action, most of them partial. Some treatments, such as prism adaptation training have - in normal analogue studies at least - rather wide-ranging effects including effects on non-spatial attention processes. Data from two studies of prism adaptation training that demonstrate this will be presented. These data, together with existing data from a number of neglect rehabilitation studies, will be considered in the context of contemporary theories of attention, focusing in particular on the role played by the temporal-parietal junction.
Correspondence: *Anjan Chatterjee, Neurology, University of Pennsylvania, 3 West gates, 3400 Spruce St., Philadelphia, PA 19104. E-mail: anjan@mail.med.upenn.edu*

Paper Session 2/3:30–4:50 p.m.

Memory II

Chair: Andrew Mayes

J.J. EVANS & N. KAPUR. You Don't Need a Hippocampus to Acquire Knowledge, But It Helps: A Study of the Aquisition of Semantic Knowledge and Autobiograhical Episodic Memory in Amnesia. .
Uncertainty remains as to how semantic information is acquired, whether episodic memory is required and what role brain areas such as the hippocampus play. Studies of patients with medial temporal lobe (MTL) damage have produced conflicting findings. Evidence is needed that compare patients who have clearly defined lesions, contrasting the effect of pathology limited to the hippocampus with more extensive MTL damage. We studied new autobiographical episodic and semantic learning in two amnesic patients, one with damage limited to the hippocampus (BW) and another with more extensive MTL damage (JN). BW and JN became amnesic following carbon monoxide poisoning and herpes simplex encephalitis respectively. They were matched on standard tests of anterograde memory. The patients, and matched controls, were compared on tests of anterograde autobiographical episodic memory (Time-Constrained Crovitz, Autobiographical EventsTest) and semantic learning (Dead or Alive test, News Event Test, New Vocabulary Test). Both patients were impaired on tests of autobiographical recall, though better on specially designed autobiographical recognition test procedures. Both showed similar impairments in recollection, evidenced by remember-know judgement performance. JN was impaired in semantic learning. BW showed greater acquisition of new semantic knowledge, demonstrating an effect of frequency of exposure to information. Hippocampal pathology does not prevent new semantic learning taking place, though

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

information is not acquired at a normal level. Extensive MTL damage impairs acquisition of semantic information. MTL structures are particularly important in the retrieval of post-illness autobiographical event memories. The hippocampus is critical to the ability to mentally replay autobiographical events.
Correspondence: *Jonathan J. Evans, PhD, University of Glasgow, Section of Psychological Medicine, Gartnavel Royal Hospital, Glasgow` G120XH, United Kingdom. E-mail: jje2k@clinmed.gla.ac.uk*

L.J. REED, P. MARSDEN, N. STANHOPE & M.D. KOPELMAN. The Neural Correlates of Retrograde Memory Impairment: An Integrated Structural, Functional and Neuropsychological Study of Memory Impaired Patients.
The functional neurobiological basis of retrograde memory impairment (RMI) remains elusive, in spite of a long history of lesion-based studies and more recent functional imaging studies. We describe the application of [18F]-FDG-PET imaging to the investigation of RMI arising from diverse cerebral pathology (excluding neurodegenerative disorder) with the aim of elucidating patterns of impairment of functional neuronal networks across aetiologically distinct groups. Cerebral FDG-PET data from patients suffering amnesia following temporal lobe pathology (12), frontal lobe pathology (n=14) or diencephalic pathology (n = 16) were compared with age-matched non-memory disordered subjects (n=10). All subjects received volumetric MRI, resting FDG-PET scans, and neuropsychological evaluation. PET data were analysed using complementary statistical parametric mapping and region of interest (ROI) methods. Metabolism within frontoparietal networks including the retrosplenial cortex could account for in excess of 50% of the variance in retrograde memory measures within the diencephalic patient group. The temporal patient group showed association of scores with metabolism within medial temporal (particularly right) and retrosplenial cortices. Lastly, the frontal pathology group showed association with anterior cingulate metabolism and retrograde memory scores. The results support the concept that multiple brain regions contribute to retrograde memory performance, with considerable overlap with those regions supporting anterograde memory performance. The fractionation of brain regional involvement in specific retrograde memory deficits remains elusive.
Correspondence: *Laurence J. Reed, Institute of Psychiatry, De Crespigny Park, London SE5 8AZ, United Kingdom. E-mail: l.reed@iop.kcl.ac.uk*

A.S. JANSARI, S. FIRMINGER, T. WARD, K. DAVIS & N. KAPUR. Anomalous findings in retrograde memory and intact anterograde recognition memory: A follow-up study of a sub-clinical epileptic patient showing Long-Term Amnesia.
Long-Term Amnesia (LTA) is characterized by a profound inability to retain memories in long-term memory despite normal performance on standard clinical tests (Kapur, 1997). We report the case of PG, a patient showing LTA, who in the retrograde domain, has shown extremely impaired autobiographical memory but intact semantic memory. In the anterograde domain using a longitudinal paradigm, we observed completely intact word and face recognition performance over a 4week period. However, he exhibited forgetting of novel information (stories) across the same period only if he was not allowed to repeatedly recall it at every testing interval (Jansari et al., 2004). Following recent diagnosis of epilepsy, PG has subsequently been placed on a regime of anticonvulsant drugs. Therefore, the effects of medication on his previous inability to retain memories for more than two weeks was investigated using a replication of the earlier longitudinal paradigm. Further, the contradictory finding of impaired autobiographical memory versus intact semantic memory was investigated using Bayley, Hopkins & Squires (2003) autobiographical procedure and McCarthy, Warrington & Kopelmans (2004) graded difficulty semantic memory paradigm. Finally, whether PGs intact recognition memory is supported by conscious recollection or simple familiarity was tested using the Remember/Know paradigm. A complex set of results showed that PGs autobiographical loss is not as severe as initially suspected and that his recognition memory is characterized by familiarity rather than conscious recollection, with other results replicating our previous findings. The implications are discussed in relation to existing theories of long-term memory formation and consolidation.
Correspondence: *Ashok S. Jansari, School of Psychology, University of East London, Universty of East London, Romford Rd, London E15 4LZ, United Kingdom. E-mail: a.jansari@uel.ac.uk*

H.J. MARKOWITSCH. Functional Brain Imaging of Stress-Related Retrograde Amnesia.
Patients with retrograde amnesia in the autobiographical domain due to major stress or psychic/psychosomatic trauma events constitute a rare group. The study was intended to obtain evidence whether in spite of absence of detectable brain damage such patients manifest brain changes when investigated with functional imaging methods. Eight patients with functional amnesia were tested with a broad range of neuropsychological tests. Furthermore, the patients' brain was investigated with structural and functional imaging methods, including functional magnetic resonance imaging (fMRI) or with 15O-positron emission tomography (PET). Furthermore, in some patients FDG-PET was done in addition, in order to investigate whether there might be evidence for a changed glucose metabolism in certain regions of brain. All patients were studied individually and further compared as a group. For all patients retrograde amnesia for autobiographical episodes was found, covering usually their whole life, but in two patients only the last 13-14 years. Semantic old memory was largely preserved or was easily reacquired. FDG-PET data revealed a reduced glucose level in frontal and temporal (or temporo-parietal) regions, affecting the right hemisphere more than the left one. Functional imaging with fMRI or 15O-PET showed a differential activation for remembered (or reacquired) as opposed to forgotten material. Our data show that environmentally induced stress situations may change brain activity and cerebral metabolism persistently and that the brain's circuitry in getting access to previously stored information is altered. Especially fronto-temporal regions of the right hemisphere may be sensitive to autobiographical old memories.
Correspondence: *Hans J. Markowitsch, Dr., Physiological Psychology, University of Bielefeld, P.O.B. 10 01 31, Bielefeld 33739, Germany. E-mail: hjmarkowitsch@uni-bielefeld.de*

Poster Session 4: Child Neuropsychology/3:30–5:00 p.m.

R.D. ANNETT, B.G. BENDER & M. GORDON. Relationship of Child Continuous Performance Test Scores to Intelligence, Memory, Academic and Behavioral Function.
Examine the developmental trajectory of child attentional capabilities and the associations between Continuous Performance Test (CPT) scores, intellectual, memory and academic functioning in children with asthma. Children ages 5-12 at the eight clinical centers of the Childhood Asthma Management Program (N = 1041) completed standardized measures of neuropsychological functioning. All children were diagnosed with mild to moderate asthma, with neuropsychological data obtained during the baseline screening. Three age groups were represented in the analyses: 5-7 years; 8-10 years; and 11-13 years. Clinically meaningful performance levels for CPT scores were created (standard scores: <85; 85 - 115; > 115) to examine associated participant function on measures of intelligence, memory, academic performance, and behavior. Correct responses on the CPT increased with age while commission errors decreased with age. CPT scores were significantly correlated with child intellectual function (r2 .11 to .32.). Low to moderate correlations were observed between children's attention and memory functioning (r2.15

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

to .26). Children with attention deficiencies (SS <85) had significantly lower levels of performance on neuropsychological measures when compared with other groups, though effect sizes were consistently small. CPT performance improves as children become older. For children with mild and moderate asthma, attention skills were associated with differences in level of intellectual function, memory, and academic functioning in the expected direction. In contrast, the results revealed that children with impairments in attentional skills exhibit a nonpathological level of functioning in the neuropsychological domains measured by this study.

Correspondence: *Robert D. Annett, PhD, Pediatrics, University of New Mexico Health Sciences Center, MSC-10-5590, 1 University of New Mexico, Albuquerque, NM 87131-0001. E-mail: rdannett@unm.edu*

R. WASSENBERG, P. HURKS, A.C. KALFF, D. SLAATS-WILLEMS & J. JOLLES. Development of higher-order receptive language and its relations to executive functioning and sex . .

The development of higher-order receptive language (i.e., the problem-solving process that integrates all aspects of abstract sentences) is little understood, despite its importance in our language-oriented society. Therefore, focus in this study was on this aspect of language and the influence of inter-individual differences (i.e., sex, development on other cognitive domains) on its development. 83 Dutch children (41 boys), frequenting one regular primary school, were divided over 3 groups: (I) kindergarten-1st grade (n= 25), (II) 2nd-3rd grade (25), and (III) 4th -6th grade (33). Higher-order receptive language was measured with the logical-grammatical structures investigation (Luria, 1966). Three other cognitive domains were included, namely working memory, concept formation and processing speed. Higher-order receptive language improved significantly over groups. Three levels of complexity were distinguished: aspects mastered at 7 years (i.e., low complex items), at 11 years (medium complex), and those not mastered at 11 years (high complex). No sex differences were found. Working memory related positively to low complex items performance, concept formation to high complex items performance. No effect of processing speed was found. Although higher-order receptive language improved significantly between 6 and 12 years, performance on aspects in which more than 2 elements had to be compared (i.e. high-complex items) was not fully developed at the end of primary school. This has implications for the presentation of new material to primary- and high-school children. A parallel was seen between the development of higher-order receptive language and certain aspects of higher order functioning, namely working memory and concept formation.

Correspondence: *Renske Wassenberg, Biological Psychology, Psychiatry and Neuropsychology, University of Maastricht, Postbus 616 (DRT), Maastricht 6200 MD, Netherlands. E-mail: r.wassenberg@NP.unimaas.nl*

E. RIVLIN, C. BANNISTER, S. D'SOUZA, A. BIANCHI & A. DICKSON. Neurodevelopmental Aspects of a Conjoined Twin:Assessment, Progress, Ethical Issues.

To monitor neurodevelopmental progess of a separated conjoined twin. To investigate the possible adverse sequelae of the following: bacterial pathogens may pass from between twins because they shared a common circulation and infection would lead to an inflammatory response. Inflammation is mediated by certain proteins called cytokines produced by activated microphages and an inflammatory response in new born infants has been linked to brain damage. Problem to be elucidated: the precise mechanism by which this cytokine mediated process is triggered and the nature of the antigen. Tumour necrosis factor-alpha (TNF-∝) recognised to be an important cytokine which enhances inflammation. Produced in excess TNF-∝ contributes to a systemic hypotensiona and intravascular coagulation damage to endothelial cells and ependymal cells and induces the production of other potentially harmful molecular mechanisms. These effects may reduce perfusion and together with the intrisic vulnerability of oligendendrocytes to proinflammatory cytokines implicate TNF-∝ in the pathogenesis of cerebral white matter lesions This study charts the progress of a separated conjoined twin of ischiopagus tetarpus type over 9 months, the clinical complications pre and post separation. Following delivery the dependence of Twin B (TB) on Twin A's (TA) circulation was evident. TB suffered severe developmental delay over 3 months of postnatal life. Following separation TA's development was monitored on the Griffiths Mental Development Scales. On the Griffiths Mental Development Scales the following results were indicated: CA (months); 3.9; 6.9; 9.5 Locomotor; 64; 85.5; 100 Personal/Social; 115; 101.4; 115.8 Hearing/Speech; 115; 115.9; 121 Eye/Hand; 115; 130; 126 Performance; 115; 130; 131 The surviving twin's progress provides unique evidence which indicates that she may not have sustained significant brain damage whilst attached to her twin.

Correspondence: *Elise Rivlin, PhD; M.Phil, BAHons, CertEd, Child/Adolescent Clinical Psychology, Central Manchester and manchester Children, The Winnicott Centre, 195-197 Hathersage Road, Manchester M13 0JE, United Kingdom. E-mail: elise.rivlin@technofriendly.com*

M.A. ROBISON, P. JOY, K. BAKKER, E. SHORES & C. WEST.Visual Processing in Children with Spina Bifida and Hydrocephalus: A Cognitive Neuropsychological Perspective.

It has been well documented that children with spina bifida and hydrocephalus (SBH) display visual processing deficits. However, much of the research has been descriptive rather than theoretically driven, and little is understood of the precise nature of the impairments. The aim of the current study was to determine whether the deficits that these children display are explicable against a cognitive model of visual processing. The study also aimed to determine whether the Birmingham Object Recognition Battery (BORB) is an appropriate test battery against this model in a clinical paediatric population. A sample of children (n=8) aged 9 to 11 years with a history of SBH were assessed using subtests of the BORB. The performance of the SBH group was compared with control data obtained from 6 and 7 year olds (n=7) in a previously published study, which found that children as young as 6 years were performing at or near to adult levels on many of the BORB tasks. The results were analysed using independent samples t-tests and indicated that the SBH group was significantly more impaired than controls on perceptual matching tasks. The results indicated that SBH children demonstrate impairment in forming an accurate initial representation of visual stimuli, which leads to subsequent difficulties with more complex visual processing. The results provide evidence to support the use of the BORB within paediatric settings and the value of using a cognitive neuropsychological framework to direct the assessment and rehabilitation of children demonstrating visual processing impairments.

Correspondence: *Michelle A. Robison, Bachelor of Psychology (Honours), Department of Psychology, Macquarie University, Department of Psychology, Macquarie University, Sydney, NSW 2109, Australia. E-mail: michellerobison@optusnet.com.au*

L. DORRIS, C. MOFFAT, I. MCARTHUR & S. ZUBERI. Childhood Narcolepsy: A Quantitative Study of Psychosocial and Cognitive Functioning.

This study is the first to use standardised and validated measures to describe the neuropsychological and psychosocial profiles of children with narcolepsy. The participants were seven children aged between seven and sixteen years (mean 10, SD 3 years), diagnosed and assessed within a multi-disciplinary regional paediatric neurosciences unit. The children were assessed using the Wechsler Intelligence Scale for Children-III uk (WISC-III uk) and the Achenbach Child Behaviour Checklist (CBCL). Despite the difficulties in maintaining vigilance and wakefulness, all participants obtained average range IQ scores (mean 100, sd 11, range 84-116). Significant individual variability was found between the VIQ/PIQ scales, with 4/7 of the participants showing >1SD difference

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

between these factors. The group obtained a mean CBCL Total Score of 66 (sd=10), falling within the clinically significant range (T-critical value=64; 92nd percentile). However, the principal finding concerned the high level of internalising symptoms (T score=65, sd=8; 93rd percentile), with clinically significant levels in Withdrawing (T-score=65, sd=9) and Somatic (T-score=66, sd=8; 94th percentile) components, and with levels of Anxiety/Depression approaching significance (T-score=58, sd 7; 81st percentile). Highly significant difficulties were also found in Thought Problems and Attention Problems sub-scales (T-scores=71, sd=13; >98th percentile), whilst the Social Problems sub-scale score also fell within the borderline clinical range (T-score=62, sd=12; 88th percentile). These findings suggest that despite having normal range IQ, children with narcolepsy typically show evidence of significant cognitive disturbance. Secondly, they adopt an internalising coping style leading to difficulties in acknowledging and communicating distressing physical and psychological symptoms to parents and others. Several narcolepsy specific concerns resulted in social withdrawal and feelings of isolation.

Correspondence: *Liam Dorris, DClinPsy BSc, Psychological Medicine, University of Glasgow, Gartnavel Royal Hospital, 1055 Great Western Road, Glasgow G11 7JE, United Kingdom. E-mail: l.dorris@clinmed.gla.ac.uk*

M. GIMENEZ, C. JUNQUE, A. NARBERHAUS, F. BOTET, N. BARGALLO & J. MERCADER. Semantic Fluency Impairment Correlates with Gray Matter Decrease of Thalamus in Adolescents with Antecedents of Prematurity.

Prematurity has been associated with global and regional volumetric brain reductions, and the thalamus is an structure that has been found clearly reduced. The aim of the study is to investigate the relationship between thalamic grey matter reductions and neuropsychological impairment in premature subjects. The sample was composed by 22 adolescents with antecedents of prematurity and 22 controls. Magnetic resonance images were acquired on a 1.5 Tesla MRI scanner (GE). For the optimized VBM technique we used the SPM99 programme (Statistical Parametric Mapping). Full Intelligent Quotient (FIQ) was obtained by WAIS-III and WISC-R. Memory functions were assessed by a modified version of the Auditory Verbal Learning Test (RAVLT). We also measured phonetic fluency and semantic fluency. Premature subjects differed from the control group in the FIQ ($t = -5.131$; $p < 0.0005$), learning ($t = -2.429$; $p = 0.020$) and recognition ($t = -3.007$; $p = 0.005$) measures of the RAVLT, and in the semantic fluency ($t = -3.384$; $p = 0.002$). Region of Interest analysis (with FWE-corrected threshold of $p < 0.05$), showed that thalamus correlated only with semantic verbal fluency in premature subjects (left hemisphere: $p = 0.007$; right hemisphere: $p = 0.022$). Whole brain analysis at uncorrected threshold of $p < 0.001$ showed a positive correlation between semantic fluency and the left dorsomedial thalamic nucleus in prematures. Left dorsolateral prefrontal cortex, angular gyrus and occipito-medial gyrus grey matter also correlated with semantic fluency. All the regions mentioned form part of the network involved in the semantic fluency.

Correspondence: *Monica Gimenez, MSc, Psyquiatry & Clinical Psychobiology, University of Barcelona, C/ Casanova 143, Barcelona 08036, Spain. E-mail: monica.gimenez@ub.edu*

K.A. ESPY, T.E. SENN, D.A. CHARAK & D. FOX. Executive Functions in Infancy? Infant Visual Expectancies Predict Later Executive Control in Preschool Children born Preterm.

Children born preterm are at risk for neurocognitive impairments that range in severity, including emerging evidence of specific deficits in executive control. The purpose here was to determine whether such deficits could be identified earlier in development, that is, in infancy. Therefore, the Visual Expectation Paradigm (VExP) was administered to a sample of 19 NICU graduates at 9 months of age. In the VExP, the infant is shown pictures that appear in certain locations on the basis of a rule (e.g., left-right-left-right), with the infant's reaction time (RT) to shift gaze to the location, variability in this reaction time, and % correct and false anticipations recorded. At 3 years of age, the preterm sample was administered executive tasks designed to assess rule-based learning in light of distraction and memory span.. .. Mean reaction times were related to performance on the rule-based ($r = .46$) and memory span ($r = -.52$) tasks, as was % correct anticipations (r's = -.45 and .71, respectively). RT variability was related to memory span performance only ($r = .59$). That is, 9-month-old infants who shifted their gaze faster and correctly anticipated the stimulus location in the VExP trials recalled more digit strings and identified the relevant hiding rule in fewer trials at age 3 years. These preliminary results suggest that early visual expectancies are related to later proficiencies in executive control in preschool children born preterm, providing a window into the early developmental ontogeny.

Correspondence: *Kimberly A. Espy, Ph.D., Family & Community Medicine, Southern Illinois University School of Medicine, MC 6503, 600 Agriculture Dr., Carbondale, IL 62901-6503. E-mail: kespy@siumed.edu*

L. DORRIS. The Spectrum of Childhood Amnestic Disorders: Aetiology, Diagnosis and Rehabilitation.

To explore the presentation of the amnestic syndromes presenting in children, and to discuss the importance of neuropsychological assessment in the identification of memory disorders. Further, to describe the implications of impaired memory processes on social and emotional development, and educational progress and attainment. The participants were nine children (aged 7-13 years) attending a Childrens Memory Clinic at the Paediatric Neuropsychology service, Royal Hospital for Sick Children in Glasgow, Scotland. All of the children presented with severe episodic memory impairment, reflecting different aetiological pathways. These included infectious disorders such as Hashimoto's encephalopathy (n=1), prematurity (n=1), suspected neonatal encephalopathy (n=4), epileptic encephalopathy (n=2), and one child with no known abnormality or significant medical history. The participants were referred by medical consultants in Paediatric Neurology, and by Child Psychologists. All participants received comprehensive neuropsychological assessment, and the majority have since received MRI imaging. Eight of the children attended normal mainstream schools. Eight of the children were found to have General Memory Index Scores on the Childrens Memory Scale less than .1 of the 1st percentile, with one child gaining a score at the 3rd percentile. In contrast, most obtained Full-Scale IQ scores on the WISC-III-Uk within the borderline to low-average range, with two children obtaining scores within the average range. Impairments in episodic and declarative memory have a different significance for the developing brain, than do the same neuropathological substrates in adults. The presentations of children with developmental amnesia enrich our understanding of learning processes and individual adaptation to disability. Experiences from the Childrens Memory Clinic suggest that these disorders have been under-recognised by paediatricians and child psychologists.

Correspondence: *Liam Dorris, DClinPsy BSc, Psychological Medicine, University of Glasgow, Gartnavel Royal Hospital, 1055 Great Western Road, Glasgow G11 7JE, United Kingdom. E-mail: l.dorris@clinmed.gla.ac.uk*

K. YEATES, H. TAYLOR, B. BANGERT, A. DIETRICH, K. NUSS, J. RUSIN & M. WRIGHT. Post-Concussive Symptoms and Post-Traumatic Stress Symptoms in Children with Mild Head Injuries: Are They One in the Same?

To examine the occurrence of post-concussive symptoms (PCS) and post-traumatic stress symptoms (PTSS) in children after mild head injuries (MHI) or orthopedic injuries (OI). Participants include 115 children with MHI and 59 children with OI, from 8-15 years of age, recruited prospectively during an ongoing longitudinal study. Parents report on

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

PCS and PTSS within 2 weeks of injury and at 3 months post-injury. They are asked to report the presence or absence of 15 PCS based on the DSM-IV research criteria for Postconcussional Disorder. They also complete the PTSD Checklist for Children-Parent Report (PCL/C-PR), on which they rate the severity of each of the 17 DSM-IV PTSD symptoms. PCS and PTSS were highly correlated in both groups at both occasions (r from .62 to .68). However, only 3 children (2 MHI, 1 OI) met the DSM-IV symptom criteria for PTSD at 3-months post-injury (i.e., parent endorses at least 1 symptom of re-experiencing, 3 symptoms of avoidance/numbing, and 2 symptoms of hyperarousal). In contrast, 65 children (50 MHI, 15 OI; group proportions differ, $p < .05$) met symptom criteria for Postconcussional Disorder (i.e., at least 3 PCS reported present). The OI and MHI groups displayed a marginally significant difference on the total score for the PCL/C-PR, but it was not significant after controlling for PCS symptoms at baseline. In contrast, the group main effect and the group X time interaction were both significant for the PCS interview, with more PCS reported in the MHI group, particularly at the baseline assessment. Both effects remained significant after controlling for baseline or 3-month PTSS. Although PCS and PTSS are highly correlated, few children with MHI display symptoms consistent with PTSD, whereas many display symptoms of Postconcussional Disorder. MHI is associated with a higher rate of PCS that cannot be accounted for by PTSS, but elevated rates of PTSS may actually reflect PCS.

Correspondence: *Keith Yeates, PhD, Psychology, The Ohio State University, Children, 700 Children, Columbus, OH 43205. E-mail: yeatesk@chi.osu.edu*

P.D. PATRICK, J.L. MABRY, M.L. BUCK, M.R. CONAWAY, M.J. GURKA & J.A. BLACKMAN. MRI Patterns in Children Following Severe Traumatic Brain Injury and Association with Prolonged Low Response States.

This study examined the relationship between MRI patterns of injury and association with children who remain in prolonged periods of low response (RLA Levels I, II and III). Seventeen children (mean age 15.0) in a low response state (LRG) > 30 days were matched with a group of 15 children (mean age 16.3) who emerged spontaneously (SPG) from a low response state to regain functional arousal, awareness and communication within 30 days. The groups were similar as to gender and severity of injury at the emergency department (GCS = 3). MRIs (range of 30-125 days post injury) were coded for 11 locations of injury. Interrater agreement was substantial (kappa=0.97) for dichotomous coding. MRI findings were analyzed using Fisher's exact test and exact logistic regression. Gender was unrelated to response state, but had a significant association to thalamus injury ($p = 0.012$). The estimated odds ratio of LRG membership is 45 times greater for children with a brain stem (BS) injury than for those without ($p < 0.0001$); 92.9% of children with a BS injury were in the LRG, compared to 7.0% in the SPG. Based on the fitted logistic model, probability of LRG membership with a BS injury alone is estimated at 0.80, and the probability with a combined BS and thalamus injury is 0.94. Currently, there are no accepted clinical decision-making tools or rules to determine which children will remain in a prolonged low response state. This study suggests that MRI patterns of injury may assist with early detection, prediction and planning for children who will remain in prolonged low response states.

Correspondence: *Peter D. Patrick, Ph.D., Pediatrics, University of Virginia, 2270, Ivy Road, Charlottesville,, VA 22901. E-mail: pdp2n@virginia.edu*

P.D. PATRICK, J.L. MABRY, M.L. BUCK, M.J. GURKA, M.R. CONAWAY & J.A. BLACKMAN. Dopamine Agonists in Low Response Children/Adolescents Following Traumatic Brain Injury.

To determine if dopamine agonists, specifically amantadine and pramipexole, will be associated with restoration of functional arousal, awareness and communication in children with prolonged states of low response (RLA I, II or III) following traumatic brain injury. This 8-week prospective protocol systematically applied the use of dopaminergic agents after two baseline examinations with ten children (mean age 16.7, range of 12-21) who remained in a prolonged response state greater than 30 days following TBI. All comorbid and iatrogenic factors had been addressed or mitigated prior to entering the protocol. The pharmacy randomized participants to either the amantadine or pramipexole group, allowing for a double blind design. During the six week medication phase, the children were followed by serial clinical measures to assess the effectiveness of medications. Additionally, clinical measures were gathered one week post medication. Clinical measure scores from the Western Neuro Sensory Profile (WNSP) and the Coma Near Coma (CNC) were analyzed using a paired t-test. On average, the rate of change of WNSP scores was 5.41 (SD = 5.84) per week greater in the medication phase than in the pre-medication phase ($p = 0.017$). Baseline CNC mean scores were 31.40 compared to a post medication mean score of 13.80 ($p = 0.001$). Consistent with an earlier retrospective study, this pilot prospective study supported an association between the use of dopamine agonists with restoration of functional arousal, awareness and communication. Further multicenter clinical trials should continue to explore the use of dopamine agonists following severe traumatic brain injury.

Correspondence: *Peter D. Patrick, Ph.D., Pediatrics, University of Virginia, 2270, Ivy Road, Charlottesville,, VA 22901. E-mail: pdp2n@virginia.edu*

K.M. O'TOOLE, K.A. BORDEN & C. MILLER. Recovery from Focal Brain Lesions Due to Pediatric Arteriovenous Malformations Viewed from a Developmental Neuropsychological Algorithm.

Due to a paucity of research on neuropsychological outcome in children and adolescents who undergo treatment for arteriovenous malformations (AVM), it is important to document long-term recovery, compensation, and focal and distal deficits. Long-term expectations in this case series were that participants would continue to show decreased functioning locally with accompanying executive difficulties due to frontal/subcortical connections. These expectations are best understood in the context of a neurodevelopmental model consisting of development, time and reserve. Seven participants (ages 7-18) who were 1-3 years post-AVM surgery were administered a comprehensive battery of neuropsychological measures within several months post-surgery and long-term. Three participants had right hemisphere lesions (frontal); three had left hemisphere (frontal, temporal or parietal), one had left cerebellar. Paired t-tests were used to measure change. Intelligence, achievement, rote verbal memory, visual scanning/ attention remained stable within the average range. One-word receptive language and confrontation naming significantly increased into the average range. Visual recognition memory improved from low to high average. Downward trends were seen in complex figure copying; complex figure memory remained low average. Participants reported significantly increased physiological aspects of anxiety. These results fit the developmental threshold model that will be described in the poster. Prospective, controlled studies need to assess the relative roles of AVM location and subcortical interconnections in neuropsychological development in children and adolescents. Postulating findings in the context of a neurodevelopmental model that takes biological, temporal and task-specific variables into consideration permits more sophisticated analyses of findings as well as guidelines for ecologically-driven treatment planning.

Correspondence: *Kathleen M. O'Toole, Ph.D., Neuropsychology, Children, 1001 Johnson Ferry Road, Atlanta, GA 30345. E-mail: kathleen.otoole@choa.org*

R.W. BUTLER, D.W. BEEBE, I. SHEN, R. UNGERLEIDER, C. DENT, J.P. SPAETH & P.B. MANNING. Neurodevelopmental Status of Infants Undergoing The Norwood Procedure for Hypoplastic Left Heart Syndrome With and Without Ventricular Assist.

Hypoplastic Left Heart Syndrome (HLHS) is a devastating congenital cardiac malformation that, without treatment, is fatal within the first month of life. Traditionally, treatment involved heart transplant. Unfortunately, the unavailability of infant hearts resulted in very poor survival, and surgical techniques to reconstruct the malformation have been developed. This intervention involves a series of staged procedures,

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

the first of which is the Norwood operation. This procedure involves cardiopulmonary bypass and deep hypothermic circulatory arrest. Preliminary evidence suggests that infants undergoing this procedure are at increased risk for neurodevelopmental delays associated with hypoxia and, perhaps, congenital brain abnormalities. As a potential protectant against CNS damage, post operative mechanical ventricular assistance (VAD) has been proposed. The current study presents the results of neurodevelopmental evaluations on children who have HLHS, and represents initial evaluations on infants who have received VAD. Ten infants were assessed with the Mullen Scales of Early Learning (MSEL) and Vineland Adaptive Behavior Scales (VABS) following VAD, and seven infants were assessed following standard Norwood procedure. There were no significant differences on the early learning composite score from the MSEL. The infants who received VAD, however, did have a significantly higher score on the Adaptive Behavior Composite score from the VABS. Infants at both treatment sites exhibited delays in motor development. Physiological measures of cerebral perfusion supported the efficacy of VAD in the postoperative period. The current results suggest that VAD may increase cardiac output in infants following the Norwood operation, and, hopefully, result in fewer neurodevelopmental delays.
Correspondence: *Robert W. Butler, Ph.D., Pediatrics (CDRCP), OHSU, 3181 S.W. Sam Jackson Park Rd., Portland, OR 97239. E-mail: butlerr@ohsu.edu*

A.M. FAGERLUND, I. AUTTI-RAMO, M. KORKMAN, E. HOYME & N. ERVALAHTI. Characteristics of a Finnish Cohort of Children and Adolescents with FASD.
Individuals with FASD (Fetal Alcohol Spectrum Disorders) have been shown to suffer from learning disabilities and marked executive dysfunction. In addition, extensive secondary social disabilities in adolescence have been reported in the US. The object of the present study was to examine a cohort of Finnish children and adolescents with FASD on cognitive, educational and societal levels. 77 children and adolescents with known heavy prenatal alcohol exposure (age range 8-20) participated. Interviews were conducted with an adult who knew the participant well. All participants were thoroughly examined by an experienced dysmorphologist and tested for IQ by a psychologist. The dysmorphological examinations showed that most of the children were severly affected by alcohol in utero (FAS and Partial FAS, 83%). The remaining children were either deferred to test for ARND (Alcohol Related Neurodevelopmental Disorder, 11 %) or an additional genetic condition was suspected (5 %). IQ scores ranged from 10-132 (mean score 69) but showed only a very mild correlation (r= .276, p<.05) with degree of dysmorphic features (ranked by the Aase score). These children often attended special classes with special curricula due to learning disabilities(63,4%) and received extra help from personal assistants (17%). A quarter of them exhibited problems in peer relations. Other problems included truancy (10%) and restlessness (28%). Biological parents were usually the legal guardians (69%) but most of the children lived in foster families (61%) or orphanages (17%). Further results concern home environment, schooling and health. In this Finnish cohort dysmorphic features did not correlate strongly with IQ. Additional information about environmental background, schooling experience and social skills are needed in order to understand and plan remedial services for the children suffering from FASD. Form of education needs to be planned individually since no consistent pattern could be observed.
Correspondence: *Ase M. Fagerlund, MA, Psychology, Abo Akademi University, Topeliusgatan 20, Helsinki 00250, Finland. E-mail: ase.fagerlund@folkhalsan.fi*

D. MABBOTT, L. PENKMAN, A. WITOL, D. STROTHER & E. BOUFFET. Attention, Processing Speed, and Working Memory in Children Treated with Surgery Alone or Surgery and Cranial Radiation for Posterior Fossa Tumors.
Cranial radiation (CRT) is consistently associated with a progressive decline in intelligence. We examined the integrity of core neuro-cognitive processes that may lead to better or worse intellectual outcome in children with posterior fossa (PF) brain tumors treated with either surgery alone, or with surgery and CRT. 60 children (30 females) treated for PF tumours were enrolled in this multi-site study: 36 treated with surgery only (1 ependymoma, 1 medulloblastoma, 34 low-grade glioma) and 24 treated with surgery and CRT (2 ependymoma, 22 medulloblastoma). Gross total resection was achieved in 75% of all patients, 50% experienced hydrocephalus, and 45% experienced post-surgical complications: No differences existed between the two treatment groups on these variables, ps > .10. The assessment battery included measures of sustained attention, processing speed, working memory, and a short form estimate of FSIQ. No significant differences were evident for mean FSIQ (surgery + CRT = 89, surgery = 95). Differences were also not evident for attention and working memory. Children treated with CRT had lower standard scores on measures of visual (Visual matching: surgery + CRT = 80, surgery = 90) (Picture cancellation: surgery + CRT = 87, surgery = 95), and auditory processing speed (Rapid naming: surgery + CRT = 82, surgery = 92), ps < .05. Slow processing speed appears to be related to treatment with CRT. This deficit may interfere with the acquisition of new skills and knowledge, resulting in the decline in intelligence often observed in children treated with CRT for PF tumors.
Correspondence: *Donald Mabbott, Hospital for Sick Children, 555 Univeristy Avenue, Toronto, ON M5G-1X8, Canada. E-mail: donald.mabbott@sickkids.ca*

FRIDAY MORNING, JULY 8, 2005

Symposium 3/9:00–11:00 a.m.

Preterm Birth. Impact on Brain Maturation and Cognitive Development

Chair: Peter Anderson

P.J. ANDERSON, L.J. WOODWARD, P.J. ANDERSON, J. EDGIN, H.G. TAYLOR, K.A. ESPY, P.J. ANDERSON & H.G. TAYLOR. Preterm birth. Impact on brain maturation and cognitive development.
The third trimester is an important period for brain development, with the size of the brain increasing at least 3-fold. During this period of brain development glial migration occurs, the processes of cell differentiation and myelination begin, and the fragile immature cerebrovascular system becomes more stable. Premature birth may alter or disrupt processes associated with brain development, and in addition, preterm children are at increased risk for brain injury due to fluctuations in cerebral blood flow and infection. Given the neural consequences associated with prematurity, it is not surprising that a significant proportion of preterm children exhibit cognitive and behavioural impairments. This symposium consists of six papers that examine the neuropathological and neuropsychological consequences of prematurity. The first paper will describe the prevalence and nature of white matter injury in very preterm infants, and examine the functional significance of this neuropathology. The second paper examines differences in regional brain volumes between very preterm and full-term children, and the relationship between regional volumes and early development. The third paper de-

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

scribes executive impairments displayed by very preterm children at 2 and 4 years of age, and examines the relationship between these impairments and white matter injury. The final three papers will examine the relationship between specific perinatal factors (periventricular brain injury, chronic lung disease, acidosis, germinal matrix/intraventricular haemorrhage) and neuropsychological deficits.
Correspondence: *Peter J. Anderson, PhD, Psychology, Royal Children, Flemington Road, Parkville, VIC 3052, Australia. E-mail: peter.anderson@mcri.edu.au*

P.J. ANDERSON, L.J. WOODWARD, K. HOWARD, M. BEAR, R. HUNT, H. WANG, M. KEAN, M. PAVLOVIC, D. THOMPSON, L.W. DOYLE & I.E. INDER. Reductions in regional brain volumes in very preterm children at term equivalent. Relationship with cognitive development at 2 years of age.

This study aimed to assess differences in regional brain volumes between very preterm and full-term infants at term equivalent, and examine the relationship between regional brain volumes and cognitive development at 2 years of age. A sample of 161 very preterm infants (<32 weeks gestation) and 19 full-term infants underwent 3D MRI at term equivalent. MRI data were analysed by post acquisition techniques to obtain quantitative measures of brain volumes including cortical grey matter (CGM), cerebrospinal fluid (CSF), basal ganglia (BG), myelinated white matter (M-WM), and unmyelinated white matter (U-WM). Regional parcellation provided volumes for 8 different brain regions in each hemisphere. At 2 years (corrected age) children underwent a neurodevelopmental assessment including the Bayley Scales of Infant Development (BSID-II). The very preterm group demonstrated a significant reduction of CGM (p=0.02) and more cerebrospinal fluid (p <0.001). There was a significant reduction of CGM volume in the dorsofrontal and orbitofrontal regions in the premature infants, which was related to the extent of immaturity. There was significant reduction in brain tissue volumes in the sensorimotor and parieto-occipital regions in premature infants who had evidence of significant white matter injury. Reductions in brain tissue in the subgenual and dorsofrontal regions correlated with MDI (r=0.25, p=0.05), while reductions in white matter volumes in the sensorimotor area was related to PDI (r=0.31, p=0.02). In summary, white matter injury appears to reduce posterior regional volumes which impact on motor performance, while immaturity appears to influence frontal and anterior temporal regions which impact on cognitive performance.
Correspondence: *Peter J. Anderson, PhD, Psychology, Royal Children, Flemington Road, Parkville, VIC 3052, Australia. E-mail: peter.anderson@mcri.edu.au*

L.J. WOODWARD, P.J. ANDERSON, N.C. AUSTIN, K. HOWARD & T.E. INDER. Neurodevelopmental outcomes of children born very preterm: Relationship with MRI abnormalities at term.

Preterm birth occurs during an important period of brain development exposing infants to increased risks of white matter injury and altered cerebral development. However, the specific relationships between these early neurological factors and clinically important neurodevelopmental outcomes are not known. Using prospective longitudinal data from 161 very preterm infants, this study examined associations between the nature and severity of cerebral abnormalities at term equivalent and children's later risks of adverse neurodevelopmental outcomes at age 2. Cerebral white and grey matter abnormalities were assessed at 40 weeks gestation using qualitative MRI methods. Neurodevelopmental outcomes were assessed at 2 years (corrected). MRI results revealed high rates of cerebral white matter injury (48% mild, 21% moderate/severe) and gyral delay within the cortical grey matter (49%). These cerebral abnormalities showed clear linear associations with later neurodevelopmental functioning, with increasing severity of abnormality being associated with increased risks of adverse neurodevelopmental outcomes at 2 years. White matter abnormalities were associated with an increased risk of serious (>2SD) cognitive delay (p>.0001), psychomotor delay (p<.00001), cerebral palsy (p<.0001) and neurosensory impairment (p=.01). Grey matter abnormalities were associated with an increased risk of cognitive delay (p=.002), psychomotor delay (p=.002) and cerebral palsy (p=.01). In particular, cystic injury, signal abnormalities, white matter loss and ventricular dilatation showed strong associations with later adverse outcomes, especially those relating to motor functioning. These findings have important clinical implications for counseling parents of preterm infants and for the use of MRI in the early identification of infants at risk of later neurodevelopmental problems.
Correspondence: *Peter J. Anderson, PhD, Psychology, Royal Children, Flemington Road, Parkville, VIC 3052, Australia. E-mail: peter.anderson@mcri.edu.au*

P.J. ANDERSON, R.L. SHERLOCK & L.W. DOYLE. The relationship between severity of germinal matrix/intraventricular haemorrhage and cognitive functioning. .

Germinal matrix / intraventricular haemorrhage (GM/IVH) occurs in approximately one-third of children born very preterm and is thought to be related to cognitive and motor impairments. Research indicates that outcome is poor following severe haemorrhages, however the specific cognitive impairments associated with the different grades (I-IV) of GM/IVH is not known. In order to aid prognostic judgements, this study examined the relationship between severity of GM/IVH and cognitive and motor functioning. The sample consisted of 298 consecutive surviving children of either birthweight <1000 g or gestational age <28 weeks born in the state of Victoria, Australia, in 1991-1992. Of the 298 survivors, 270 (91%) had at least one cranial ultrasound in the neonatal period, and 90 (33%) had a grade I-IV GM/IVH. At 8 years of age these children were administered the Movement ABC, WISC-III, WRAT3, Tower of London and Rey Complex Figure. In terms of cognitive, motor and educational outcomes, children with grade I (n=47) and grade II (n=25) GM/IVH performed similarly to children with no haemorrhage (n=180). The grade III GM/IVH group (n=12) exhibited subtle deficits in spatial-perceptual skills, processing speed and executive functioning. Few children had grade IV haemorrhages (n=6), but all displayed cerebral palsy and significant cognitive impairments. In conclusion, grade I/II GM/IVH had no impact on long-term outcome, while grade III GM/IVH had minor consequences which are probably associated with ventricular dilation. In contrast, grade IV GM/IVH, which results in damage to the white matter, is associated with extremely poor outcome.
Correspondence: *Peter J. Anderson, PhD, Psychology, Royal Children, Flemington Road, Parkville, VIC 3052, Australia. E-mail: peter.anderson@mcri.edu.au*

J. ELGIN, T.E. INDER & L.J. WOODWARD. Persistent executive deficits in very preterm children are associated with brain development at term.

Recent approaches to understanding outcome in very preterm infants have highlighted the importance of executive functions (EF) for cognitive and educational outcomes, including lower IQ scores. The goals of this study were to: 1) describe cognition and EFs in preterm infants at 2 and 4 years; 2) examine associations between EF at age 2 and IQ at age 4; and 3) to determine the relationship between executive skills and brain development at term. A representative regional cohort of 100 very preterm infants (gestation <33 weeks, 92% retention) and 100 full-term comparison children were assessed at term, 2 and 4 years (corrected). Measures included qualitative ratings of cerebral injury and development at term equivalent, and assessments of cognition and EF at 2 and 4 years. EF tasks involved learning a means-end sequence and the inhibition of a previously learned rule. Results showed that preterm infants were characterised by lower mean IQ scores and poorer EF performance at follow-up. Across both groups, executive ability at age 2 predicted IQ at age 4 even after controlling for gestation, SES, and IQ

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

at 2 years. Also, EFs at 2 and 4 years were related to severity of white matter injury at term. Children with consistently poorer EF performance had the highest levels of injury. These findings show pervasive cognitive difficulties across early childhood amongst preterm children and suggest that deficits in EF contribute to these difficulties. In addition, white matter development and injury is consistently correlated with deficits in executive function across early childhood.
Correspondence: *Peter J. Anderson, PhD, Psychology, Royal Children, Flemington Road, Parkville, VIC 3052, Australia. E-mail: peter.anderson@mcri.edu.au*

H.G. TAYLOR, N. KLEIN, N.D. DROTAR, M. SCHLUCHTER & M. HACK. Neuropsychological sequelae of <1000 g birth weight: Specificity and association with neonatal complications.
Previous research on the developmental consequences of extremely low birth weight (<1000 g, ELBW) documents pervasive effects on cognition. Relatively few studies, however, have focused on the nature and predictors of these effects. One of the aims of the present study was to determine if ELBW has specific effects on skills subserved by periventricular brain structures. A second aim was to determine if neonatal brain insult as defined by abnormality on neonatal cranial ultrasound would be better predictor of these specific deficits than chronic lung disease, as defined by oxygen requirement at 36 weeks corrected age. The sample was assessed at mean age 8 years and included 92% of a 1992-1995 birth cohort of survivors of ELBW from a single neonatal center (n=219). A control group of term-born children matched to the ELBW children in background characteristics were also assessed (n=176). Even when taking WJ-III Picture Vocabulary and background characteristics into account, the ELBW group scored more poorly than the controls on subtests of the K-ABC and NEPSY assessing executive functions, perceptual-motor skills, and memory. Within the ELBW group, vocabulary scores were related to both neonatal predictors, but only neonatal ultrasound abnormality predicted specific cognitive impairments. The findings demonstrate that importance of assessing a range of neuropsychological skills and their potential value in elucidating brain-behavior relationships in children with ELBW.
Correspondence: *Peter J. Anderson, PhD, Psychology, Royal Children, Flemington Road, Parkville, VIC 3052, Australia. E-mail: peter.anderson@mcri.edu.au*

K. ESPY, D.A. CHARAK, J. TYLER & P. KAUFMANN. Perinatal acidosis and specific outcomes at age 3 years in children born preterm.
Recent models of prematurity-related brain damage include disturbed myelination/white matter, reduced availability of neuroprotective trophic factors, and direct hypoxic, ischemic, and reperfusion insults. Even subclinical levels of perinatal anoxia, as indexed by acidosis (blood pH), in children born preterm are related to general intellectual outcome. Given the neuropathological substrates of prematurity and the emerging evidence of specific executive control and mathematic deficits in children born preterm, even in those at relatively low-risk for sequelae, the impact of perinatal acidosis on these outcomes was explored. In a sample of 23 children born preterm, blood pH values obtained within the first 3 hours of life were abstracted from review of hospital medical charts, and then related to performance on tests of general ability (vocabulary), mathematics proficiency, and executive control (motor impulsivity, controlled attention) administered at age 3 years. Consistent with findings from other laboratories, initial pH was in the normal range and was related to vocabulary (r = .52). Initial pH also was associated with mathematics achievement (r = .51) and controlled attention (r = .42) tasks at age 3 years, but not to those of motor impulsivity. Initial pH appears to be a strong predictor of specific deficits in mathematics and controlled attention, not just limited to general ability alone. As acidosis is a marker of hypoxia, these findings suggest that subclinical levels of hypoxia contribute to specific deficits in mathematics and executive skills observed in preschool children born preterm.
Correspondence: *Peter J. Anderson, PhD, Psychology, Royal Children, Flemington Road, Parkville, VIC 3052, Australia. E-mail: peter.anderson@mcri.edu.au*

Paper Session 3/9:00–11:00 a.m.

Traumatic Brain Injury

Chair: Jonathan Evans

J.F. MALEC, A.M. MOESSNER & A.W. BROWN. Predicting Long term Community Re-integration after Traumatic Brain Injury: The Role of Pre-injury Factors, Injury Severity, Early Disability, and Depression.
Prior research suggests that early disability measured after acute recovery from traumatic brain injury (TBI) predicts long term outcome better than initial injury severity. This hypothesis was tested using self- and significant other (SO) reports of disability. The effect of post-traumatic depression was also specifically investigated. Participants were 93 consecutive hospital admissions for TBI with complete data. Multiple regression analysis was used to predict independent living and work 1-2 years post-injury using measures of pre-injury factors, injury severity, early disability and depression. Best predictors of long term outcome among pre-injury factors (age, education, psychiatric and substance abuse history) were age and education. Among injury severity measures (Glasgow Coma Scale; positive head CT; Injury Severity Scale, ISS; post-traumatic amnesia, PTA), PTA and ISS were best predictors. Among early disability indicators (hospital discharge disposition, self and SO ratings on Mayo-Portland Adaptability Inventory, MPAI), SO MPAI was strongest. Among measures of depression (self and SO ratings on depression scales for NEO Personality Inventory Revised and Neurobehavioral Functioning Inventory, NFI-D), SO NFI-D was best predictor. Regression analysis of best predictors in each category found the best predictive model to be age, education, and SO MPAI (R^2=.46). Early disability ratings correlated highly (r=.59-.66) with depression scores. Early disability is a better predictor of long term independent living and work after TBI than initial injury severity. The specific role of early depression (as rated by SO or patient) in long term outcome is blurred by strong correlations with their ratings of overall disability.
Correspondence: *James F. Malec, PhD, Psychiatry and Psychology, Mayo Clinic College of Medicine, Generose ME TBI, Rochester, MN 55905. E-mail: malec.james@mayo.edu*

M.C. OBONSAWIN, S. JEFFERIS, R. LOWE, J.R. CRAWFORD, J. FERNANDES, L. HOLLAND, K. WOLDT, E. WORTHINGTON & G. BOWIE. TBI Survivors and Carers See the Same Range of Personality Changes After TBI, but See It Differently.
The aim of this study was to develop a model of personality change after traumatic brain injury (TBI) based on information provided by TBI survivors and information provided by significant others. Personality descriptors were empirically screened by interviewing TBI survivors (n=184), healthy individuals without TBI (n=87) and a significant other for each individual. Ratings on the selected personality descriptors were entered into separate factor analyses, to generate separate models of personality change according to the different sources of information (sur-

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

vivor and significant other). Descriptors that did not contribute to the optimal factor solutions were discarded. The first-order factors were then entered into second-order factor analyses. The models generated from the two sources of information were then compared. The second order factor analyses of the ratings obtained from both the TBI survivors and the significant others generated three similar factors. In addition, the interview with the significant others produced a restlessness factor, and the interview with the TBI survivors produced a factor consistent with the autistic disorders continuum. The interviews with the TBI survivors and the significant others both produced similar models of personality change after TBI. The models consist of three superordinate factors: Affective Regulation, Behavioural Regulation and Engagement. These three superordinate factors are very similar to Eysenck's three factors of personality: Neuroticism, Psychoticism and Extraversion. The concordance between the two models is not high, and interviews with the TBI survivors and the significant others provide different information.

Correspondence: *Marc C. Obonsawin, PhD, Department of Psychology, University of Strathclyde, 16 Richmond Street, Glasgow G1 1XQ, United Kingdom. E-mail: m.c.obonsawin@strath.ac.uk*

G.N. YEATES, K. HENWOOD, F. GRACEY & J.J. EVANS. The Dimension of Family Context for Awareness of Disability After Acquired Brain Injury (ABI).

This study explored the role of family contexts for emerging accounts of disability in both a) people with ABI who have been identified as lacking awareness of their difficulties, and b)their relatives. Family contexts were understood to be influential for both the availability of sense-making resources, and social processes influening family members' use of such resources. A secondary clinical aim of this paper was to establish a contextualised perspective on intervention. 6 participants - 3 with acquired brain injury (ABI) and a respective relative, were interviewed using an open-ended qualitative interviewing paradigm. The participants with ABI were identified by clinicians as lacking awareness in one or more domain of functioning. Participants commonly shared anterior damage, and time post-injury ranged from 2 to 10 years. Relatives included two cohabiting mothers and a wife. Interview transcipts were analysed using qualitative discourse analysis, focusing on content, meaning within psychosocial context, and social action. The study's main findings were that the family and wider social context influenced participants awareness of disability in three ways: i) Premorbid contextual meanings used to understand the effects of ABI limited what was then considered a meaningful account of change, ii) Differences in accounts of change within families resulted in a contestation of perspectives, further influencing the accounts, and iii) this contestation was itself situated within particular premorbid relational patterns. The study's findings highlight the complexity within, and diversity across family sense-making after ABI. Such complexity can be contrasted with the linear assumptions of both traditional awareness feedback approaches and broader family interventions. Principles of Systemic Family Therapy can be applied to inform neurorehabilitation client interventions and assist families in negotiating differences in perspectives

Correspondence: *Giles N. Yeates, ClinPsyD, C Psychol, BSc, Oliver Zangwill Centre, Princess of Wales Hospital, Lynn Road, Ely Cb6 1DN, United Kingdom. E-mail: Giles.Yeates@ozc.nhs.uk*

C. SKILBECK, M. SLATYER, M. THOMAS, T. DEAN, K. MARSDEN, T. BELL, A. ERASMUS & A. MEYER. Outcome Following Mild Traumatic Brain Injury (TBI): The Assessment Of Cognitive & Psychological Problems For The Tasmania Neurotrauma Register.

The Tasmanian Neurotrauma Register (NTR) was developed for a population study of TBI in southern Tasmania. The research aims to provide comprehensive psychological, social and medical data on outcome. The current paper describes findings for mild TBI patients in terms of neuropsychological and subjective measurement of symptoms following head injury. Neuropsychological tests administered covered executive functions (FAS, Brixton, Trails B) and working memory (PASAT, Visual Patterns Test, WAIS-III Letter-Number Sequencing and Digit Span,). All tests were administered soon after injury (usually within 7 days) and at 3 months and 6 months post-trauma. PASAT, and WAIS-III Letter-Number Sequencing and Digit Span were also given at 14 days and 28 days post-trauma. Subjective symptoms were assessed using the Rivermead Symptom Checklist at every follow-up. Analysis methods included ANOVA, t-test and correlations. Data are presented on 250 mild TBI patients, indicating that even those suffering mild injury show both cognitive and psychological difficulties. Whilst recovery in neuropsychological functions is noted, deficits in executive abilities are apparent beyond 3 months post-trauma and many participants due not show a complete cognitive recovery by the 6 months follow-up. Similarly, subjective difficulties reduce over time, though approximately 20% of mild TBI patients report poor concentration, slowed thinking, depression of mood 3 months after head injury, with more than 25% reporting being easily tired. Subjective difficulties are still apparent at the 6 months follow-up Mild TBI patients suffer persisting cognitive and psychological problems which are not usually addressed by service providers

Correspondence: *clive skilbeck, PhD, psychology, university of tasmania, sandy bay campus, sandy bay, hobart, TAS 7005, Australia. E-mail: clive.skilbeck@utas.edu.au*

Poster Session 5: Psychopathology, Neuropsychiatry, Forensic Neuropsychology/11:30 a.m.–1:00 p.m.

M. SIMARD, N. HACHEY, D. MYRAN & P. VERHOEFF. Severe Impairment of Episodic Memory in Elderly Patients with Late-Onset Depression and Low Hachinski scores.

Few data are available regarding the memory performance in elderly subjects with Late-Onset Depression (LOD) and Early-Onset Depression (EOD) with few or no vascular risk factors. The goal of this study was therefore to examine the cognitive functioning of subjects with LOD and EOD with low Hachinski scores on tasks of episodic memory. Five patients with LOD, 5 patients with EOD, and 11 controls matched according to age and level of education were assessed with the Hamilton Depression Scale (Ham-D), and tests of episodic memory, i.e. the California Verbal Learning Test (CVLT), and the immediate and delayed recall of the Rey-Osterrieth-Complex-Figure (ROCF). The 2 patient groups were matched on the total score of the Mattis Dementia Rating Scale and on the low scores of the Hachinski Scale. An ANOVA showed a significant difference between the 3 groups on the Ham-D total score ($F=116.061$, $df=2,18$, $P=0.000$), several CVLT variables, the ROCF immediate ($F=10.545$, $df=2,12$, $P=0.002$), and delayed recall ($F=5.418$, $df=2,12$, $P=0.021$). Post hoc SNK analyses with an alpha=0.05 demonstrated that LOD and EOD patients had inferior performances when compared with those of controls on most of the cognitive measures. Although the EOD were more depressed than the LOD subjects, the LOD performed more poorly than the EOD and control subjects on the CVLT-recall of the interference list, and more poorly than the controls on the ROCF-delayed recall. Despite their low Hachinski scores suggesting a minimal involvement of vascular risk factors, the patients with LOD and EOD were more cognitively impaired than controls, and the LOD patients were more impaired on episodic memory than the EOD patients. Altogether, these results suggest a greater vulnerability to cognitive impairment in subjects with LOD.

Correspondence: *Martine Simard, Ph.D., École de psychologie, Université Laval, Pavillon Félix-Antoine Savard, Université Laval, Québec, QC G1K 7P4, Canada. E-mail: Martine.Simard@psy.ulaval.ca*

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

J. EGELAND, N.I. LANDRO, K.S. SUNDET, A. ASBJORNSEN, K. HUGDAHL, A. LUND, A. RONESS, K.I. STORDAL & B.R. RUND. Only a Minority of Subjects with Depression are Cognitively Impaired.

Accumulating evidence shows that major depressive disorder is associated with cognitive abnormalities. However, group studies comparing depressed subjects and normal controls, may falsely give the impression that the typical patient with depression is cognitively impaired. The present paper sums up findings from the Bergen-Oslo-study with regard to the frequency of neuropsychological dysfunction in subjects with depression, and raises the question of what mechanisms mediate attention and memory problems. Thirdly we ask why some subjects are impaired while others perform within the normal range. Fifty subjects with recurrent major depression and 50 normal controls were examined with a comprehensive neuropsychological test battery. No test classified more than 20 percent as severely impaired. At the most, 40 percent suffered from a minor disturbance in one cognitive domain. Psychomotor retardation, impaired working memory, executive dysfunction and memory deficits were most frequently found. The findings indicate that psychomotor retardation and fatigue contribute more to attention problems in depression compared to reported findings in other clinical groups, and that memory retention is more affected than learning ability. Level of depression is related to psychomotor retardation, but not to executive and memory function. Hypercortisolism, however, correlated with executive and memory function, but not with psychomotor speed. There is a complex relationship between type of cognitive deficit and risk of impairment in depression.

Correspondence: *Jens Egeland, Ph.D., Department of research,-, Vestfold Mental Health Care Trust, P.o.box 2267, Tønsberg 3103, Norway. E-mail: jens.egeland@piv.no*

A. WITHALL, L. HARRIS & S. CUMMING. Aspects of Executive Function in Major Depressive Disorder Predict Social and Occupational Outcome.

Executive function is strongly related to long-term social and occupational outcome since it involves skills necessary to adapt to a changing environment. The aim of this study was to delineate the executive functions affected in Major Depressive Disorder and its recovery, and to examine their relationship with functional outcome. Psychiatric (HRSD-21, DASS, FrSBe, SOFAS) and neuropsychological assessments (NART-R, Reaction Time, Digit Span, CVLT, COWAT, WSCT, Stroop, Prospective memory, Six Elements Test) were administered at admission and 3-months post-discharge, to 52 patients (20-60 years and with a primary diagnosis of MDD) and 40 age, sex and IQ-matched controls. At follow-up, there were no significant differences between patients and controls on structured tests (Digits-forward, Digits-backward, COWAT, CVLT, Stroop). Significant deficits ($p<0.01$) were evident in the SET, WCST, prospective memory and CVLT delayed free recall. These tests are all relatively 'effortful', requiring patients to organise, monitor and review their performance. With respect to outcome, regression analyses indicated that no clinical measure was a better predictor of SOFAS score at follow-up than SOFAS at admission. However, with respect to neuropsychological variables, SOFAS at admission ($p<0.000$), WCST-perseverative errors ($p<0.001$) and prospective memory ($p<0.006$) were all significant predictors. Executive dysfunction may be a useful ecological predictor of outcome, and highlight those patients requiring support post-discharge.

Correspondence: *Adrienne Withall, University of Sydney, 36 Plimsoll St, Sans Souci, NSW 2219, Australia. E-mail: awithall@nextcentury.com.au*

G. LIANG, C. TSAI, M. HO, Y. YANG & C. BRADSHAW. A Test of a Multiplicative Hyperbolic Model of Impulsive Choice in Humans.

Impulsive choice often refers to the selection of small immediate gains in preference to larger delayed gains, or a predisposition to take inappropriate risks. A multiplicative hyperbolic model of inter-temporal choice has proved successful in analysing animals' choice behaviour, but has not been tested in humans. 42 healthy volunteers underwent two conditions. 1. They pressed two buttons (A and B) for monetary rewards. A produced a smaller reward after a short delay d_A, and B a larger reward after longer delays, d_B. d_A was manipulated across 5 blocks of 50 trials. Indifference delays, $d_{B(50)}$ (value of d_B yielding 50% choice of B) were estimated for each participant in each block. 2. A similar procedure was employed, except that reward size was equal for A and B, but with different probabilities (p_A=0.5; p_B=1.0). Linear functions of $d_{B(50)}$ *vs* d_A were fitted; the slopes and intercepts provided indices of sensitivity to reinforcement size, delay and probability. In both conditions, $d_{B(50)}$ increased linearly with dA (r^2s>0.9). There was a significant correlation between the intercepts (sensitivity to delay: $r_{Pearson}$=0.56; $P<0.01$) but not between the slopes in the two conditions (sensitivity to size and probability) ($r_{Pearson}$=0.17; $P>0.2$). Very few studies have had attempts to separate impulsivity per se from the other behavioural functions. These results show how inter-temporal choice theory helps to disentangle the interacting factors that determine impulsive choice.

Correspondence: *M-Y Ho, PhD, Institute of Clinical Behavioral Sciences, Chang Gung University, 259, Wen Hwa 1st Road, Kwei Shan, Tao Yuan County 333, Taiwan. E-mail: myho@mail.cgu.edu.tw*

R.K. PEACH. Acquired Dyslexia as Conversion Disorder: Identification and Management.

A psychological explanation for dyslexia attributes the disorder to a physiologic conversion reaction causing loss or distortion of reading abilities for subconscious personal gain. Case material from the literature consists of just two adolescents with developmental dyslexia who were taught successfully to read using an alternate alphabet but for whom no other data were available. The assessment and rehabilitation of an adult with acquired dyslexia is presented that offers support for conversion disorder as a cause of dyslexia. A 50 year old male with a master's degree in Chemistry developed reading problems while hospitalized for major depression. Complaints included words moving in a wavy motion and more "visual" reading problems. Neurological findings and patterns of reading performance on standardized testing were analyzed to identify the nature of these reading problems. Word-picture matching, synonym identification, and lexical decision were performed accurately but with substantial latencies that decreased from the first to the last items of these subtests. Reading for functional sentences was performed only with the assistance of a finger because of difficulty "separating" words. Symptomatic therapy increased reading rate from a baseline of 14.4 to 30 words per minute while counseling investigated the source of these deficits. The patient admitted to problems with conflict resolution at his former job and was referred for psychotherapy following discharge. This rare case relates acquired dyslexia to psychological problems. It provides evidence for an unusual form of conversion disorder.

Correspondence: *Richard K. Peach, Ph.D., Communication Disorders and Sciences, Rush University Medical Center, 1653 West Congress Parkway, Chicago, IL 60612. E-mail: richard_k_peach@rush.edu*

S. BANKS, N. JOHNSON & S. WEINTRAUB. Neuropsychiatric Symptoms in Early and Late Stage Behavioral Variant Frontotemporal Dementia and Primary Progressive Aphasia.

The frontotemporal dementias are atypical in that they present in the presenium, and primarily affect either behavior (bvFTD) or language (PPA) as opposed to memory. The quality of neuropsychiatric symptoms has been well defined in bvFTD, with disinhibition, apathy and stereotyped behaviors being among the most common. Recently, researchers have begun reporting similar symptoms in PPA. However many of these researchers have compared PPA patients at a later stage with bvFTD patients in an earlier stage. This study compares groups of patients with PPA and bvFTD either in the early stages (<5years) or in

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

the later stages (>5 years) of each disease. The NPI-Q (a caregiver questionnaire) was used to assess the number and type of neuropsychiatric symptoms exhibited in patients diagnosed with bvFTD or PPA. BvFTD patients had more symptoms overall (t=1.92, df = 55, p=0.03, one tailed), but when broken down into groups the late-stage PPA patients had a similar number of symptoms in comparison with bvFTD patients (early stage, late stage, or combined). There were many similarities in quality of symptoms between the PPA and bvFTD groups, although PPA patients symptoms appeared more suggestive of mood changes, whereas bvFTD patients were more often apathetic, agitated and disinhibited (p<.05). Overall, this research illustrates the increase in neuropsychiatric symptoms as PPA progresses, and highlights the overlap between the two disorders.

Correspondence: *Sarah Banks, Cognitive Neurology and Alzheimer's Disease Center, Northwestern University, 320 E. Superior, Searle 11-569, Chicago, IL 60613. E-mail: s-banks2@northwestern.edu*

M. JODAR, S. SUBIRA, S. ZORATTI & G. RIBERA. Dissociative Identity Disorder Like: A Case Study with Dementia.

The Dissociative Identity Disorder is a psychiatric syndrome in which two or more distinct identities or personality states take recurrently control of the patient individual's behaviour. Each personality state may be experienced as if it has a distinct personal history, self-image, and identity. It has been suggested that this disorder reflects a failure to integrate aspects of identity, memory and consciousness. There is very few literature about the cerebral mechanisms that could explain this disorder, but there are evidence of similar symptoms in epileptic patients with complex partial seizures. We reported a 88 years old woman, ambidextrous without psychiatric pathology history, who developed a progressive loss of cognitive functions that began by memory loss accompanied of visual hallucinations and frontal lack of inhibition. We explored the woman three years later of her initial symptoms and she show a moderate generalised cortical dysfunction with predominantly frontal deficits, and neurologic parkinsonian motor alterations. The clinical picture was fluctuating and she was diagnosed of probable Lewy bodies dementia.In addition to her cognitive deficits she began to present a dissociation of her personality that consisted in alternate from a baby to a angry mother, changing the facial expression and the voices in every personality. In the neuropsychological execution of some tests we observed incredible scenes of discussion between they both. The TC showed cortical and subcortical atrophy, and a frontal bilateral hygroma. The MRI confirmed this results and added a little vascular lacuna in right subcortical frontal white matter. The symptoms of Dissociative Identity Disorder can be observed in Lewy Bodies dementia, a neurologic pathology that affect the frontal lobe control of self consciousness.

Correspondence: *Merce J. Vicente, PhD, Neurology, Hospital de Sabadell, Comte Borrell, 49, 2-1, Barcelona 08015, Spain. E-mail: merce.jodar@uab.es*

G. PLUCK, D.M. MCLOUGHLIN, A. MOGG & S. ERANTI. Clinical Factors Influencing Neuropsychological Complaint in People Undergoing Electro Convulsive Therapy.

Electro convulsive therapy (ECT) is associated with a range of neuropsychological disturbances. Commonly reported are amnesia and confusion. The objective of the current research was to examine clinical issues, such as electrode placement (e.g. bilateral or unilateral) and psychiatric drug use, retrospectively, via hospital case notes. We collected details on all people who began courses of treatment at the Maudsley and Bethlam Hospitals in London from 1999 and 2001. Case notes were examined to obtain clinical details, including number of treatments, electrode placement, classes of psychiatric drug use and any mention of confusion or memory complaint. It was found that such complaints were recorded in 31 of 113 (27.4%) individual courses of treatment. This was used to define two groups, based on the presence or absence of neuropsychological complaint. There were no significant differences between the groups in terms of sex, age or psychiatric diagnoses. There were also no significant differences between these groups in terms of number of treatments received or whether they received only bilateral or unilateral ECT. However, a significant number of patients with neuropsychological complaint were switched from bilateral to unilateral ECT. It was also found that those with neuropsychological complaint were taking a significantly higher number of different classes of psychiatric drugs than the group with no neuropsychological complaint. These findings suggest other than the ECT treatment itself, factors such as electrode placement and pharmacological issues can influence the occurrence of neuropsychological side effects.

Correspondence: *Graham Pluck, Academic Clinical Psychiatry, University of Sheffield, The Longley Centre, Norwood Grange Drive, Sheffield S5 7JT, United Kingdom. E-mail: g.pluck@sheffield.ac.uk*

T. MCHUGH, R. LAFORCE, P. GALLAGHER, S. QUINN & P. DIGGLE. Utility of the Proposed DSM-IV Criteria for Postconcussional Syndrome (PCS). .

Mild traumatic brain injury (mTBI) is associated with cognitive, affective, and physical sequelae. When symptoms persist for more than three months (15-30% of cases), a consideration of Postconcussional Syndrome (PCS) may result. The DSM-IV (APA, 2000) lists PCS as a proposed diagnosis category requiring further study. To this end, the current investigation tracked symptom development in mTBI to explore the natural history of PCS. Twenty-six mTBI patients received a comprehensive neuropsychological assessment at three intervals: within one week, at four months and at seven months post concussion. Based on DSM-IV criteria, clinical judgment, and Rivermead Postconcussion Syndrome Questionnaire results, two external raters labelled five mTBI participants with PCS at four months post injury. At that time, perceived level of support from the medical community differentiated PCS participants from the 21 mTBI patients who were asymptomatic (U=1.5, p<.05). Between four and seven months, PCS participants worsened in perceived level of support from the medical community (U=0, p<.05) and in symptoms of depression as measured by the Beck Depression Inventory (U=2, p<.05), compared to participants with mTBI but without PCS. Since the identification of PCS predated the worsening of depressive symptoms, early diagnosis and intervention of PCS is warranted. Further investigation of the factors that are responsible for the development and maintenance of PCS is required to link theory with best practice.

Correspondence: *Tara McHugh, MA, University of Windsor, Chyrsler Hall South, 401 Sunset Avenue, Windsor, ON N9B 3P4, Canada. E-mail: mchugh@uwindsor.ca*

M. KEISKI, D.L. SHORE & J.M. HAMILTON. The Role of Effort in Depression-Related Deficits in Verbal Memory .

Depression-related deficits in verbal memory are sometimes attributed to lack of motivation or effort. The relative contributions of depression and effort to observed memory deficits have important implications for the evaluation of individuals with traumatic brain injury (TBI), particularly in the context of litigation. Hence, we sought to determine whether controlling for effort would abolish relationships between depression and memory performance in a TBI sample. The current study characterized the relationship between depression scores on the Personality Assessment Inventory (PAI) and verbal recall in 52 subjects who had sustained TBI, after controlling for a measure of effort (TOMM). Verbal recall was evaluated with the Logical Memory (LM) and Verbal Paired Associates (VPA) subtests of the WMS-III, and the California Verbal Learning Test-II (CVLT-II). The depressed group (DEP>70) performed more poorly than the non-depressed group (DEP<60) on the VPA delayed recall trial (p=0.021) and the Long Delay Free Recall (LDFR) trial of the CVLT-II (p=0.002), whereas LM delayed recall did not differ across the groups (p=0.365). ANCOVA analyses showed lower LDFR scores for the depressed group than for the non-depressed group, when

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

controlling for TOMM scores (p=0.028). Depression scores were negatively correlated with performance on LDFR (r2 =-0.3682, p = 0.008), but not on VPA (p=0.155) or LM (p=0.371), after controlling for TOMM scores. Additional analyses suggested the depressed subjects had difficulty semantically organizing the list to enhance their learning and recall. The findings provide support for the assertion that depression following TBI may hinder select aspects of verbal learning and memory, with deficits being observed only on particular measures of verbal memory. Moreover, the deficit in delayed recall on the CVLT-II is not likely entirely attributable to insufficient effort.

Correspondence: *Michelle A. Keiski, M.A., Psychology, University of Windsor, University of Windsor, Department of Psychology, Windsor, ON N9B 3P4, Canada. E-mail: mkeiski@cogeco.ca*

J. SANZ DE LA TORRE, M. VARGAS, J. MARIN & R. APARICIO. The Clinical Usefulness of the Repeatable Battery for Assessment of Neuropsychological Status (RBANS) in Schizophrenia Patients: A Pilot Study in Spanish Population.

Cognitive impairment is considered as a core characteristic of schizophrenia patients. Furthermore, the assessment of cognitive deficit in this disorder seems to have a prognosis value in the evolution of the disorder. However, neuropsychological tests employed in the clinical assessment are usually too time consuming and complicated. The aims of this study are: 1) To evaluate the usefulness of the RBANS as one assessment tool to detect cognitive impairment in patients with schizophrenia. 2) To investigate the concurrent validity of RBANS. 3) To research the correlates of cognitive impairment with symptoms and other clinical features of the illness. Thirty schizophrenic patients, 30 non-psychotic psychiatric patients and 20 healthy participants were assessed using the RBANS-A, a neuropsychological tests battery sensitive to the cognitive dysfunctional pattern usually found in schizophrenia patients, and the Positive and Negative Syndrome Scale (PANSS). Schizophrenia patients performed worse than the other groups in the neuropsychological measures, and the psychiatric group performed worse than the healthy controls. Good concurrent validity was found with the RBANS and the neuropsychological test battery. Negative symptoms were also correlated with cognitive impairment in cognitive tests. Therefore, RBANS seems to be a reliable, valid and easy to perform tool for the neuropsychological assessment of schizophrenia patients in clinical settings.

Correspondence: *Juan Carlos Sanz de la Torre, PhD, Universidad de Extremadura, Apartado de correos 362, Mérida 06800, Spain. E-mail: jcsanz@correo.cop.es*

R.C. CHAN, E.Y. CHEN & C.W. LAW. Neurological signs in medication naive schizophrenia.

This study attempted to examine the prevalence and type of neurological signs in medication naive schizophrenia A cross-sectional design was adopted with the use of the Cambridge Neurological Inventory (CNI). The CNI comprises 3 subscales of soft signs (motor coordination, sensory integration, disinhibition), and 4 subscales of hard signs (extrapyramidal signs, dyskinesia, catatonia and pyramidal signs). A total of 72 patients with first-episode medication na?ve schizophrenia and 59 normal controls were recruited. Patients exhibited significantly more signs than normal controls in all scaled motor coordination ($p<0.05$), sensory integration ($p<0.005$), extrapyramidal signs ($p<0.05$), scaled total soft sign subscale ($p<0.05$) and scaled total signs ($p<0.05$). Age was significantly correlated with scaled motor coordination ($r = - 0.29$, $p = 0.04$), scaled sensory integration ($r = -0.31$, $p = 0.01$), and total neurological signs ($r = -0.3$, $p = 0.04$). Scaled sensory integration was significantly associated with Global Attention of SANS ($r = 0.28$, $p = 0.02$); scaled extrapyramidal signs was correlated with Inappropriate Affect of SANS ($r = 0.35$, $p = 0.01$); total soft signs was correlated with Global Bizarre Affect of SAPS ($r = 0.34$, $p = 0.04$), total hard signs associated with Global Bizarre Behaviour ($r = 0.31$, $p = 0.05$) and Inappropriate Affect of SAPS ($r = 0.37$, $p = 0.01$); total signs was correlated with Global Bizarre Behaviour of SAPS ($r = 0.36$, $p = 0.02$). The present findings show that neurological abnormalities do exist at the first presentation of medication naive schizophrenic patients. An extended assessment battery of CNI provides even better discrimination of patients from normal controls, and soft signs are similarly associated with schizophrenia than are hard signs in the Chinese sample.

Correspondence: *Raymond C. Chan, PhD, Psychology, Sun Yat-Sen University, NA, Guangzhou 510275, China. E-mail: edschchq@zsu.edu.cn*

M.L. VARGAS, J.C. SANZ, V. MERINO, M.J. VINAS, S. LOPEZ-LORENZO & J.J. MARIN. Executive Dysfunction Evaluated with the BADS in Schizophrenia: a Cognitive Endophenotype Clinically Valid.

Working memory deficits and executive dysfunction have been proposed like cognitive endophenotypes of schizophrenia. The objective of the present work is to know: 1) if there is one association between these deficits and the dimensions of schizophrenia in stabilized patients and 2) if this association is independent of the parkinsonism induced by the antipsychotic drugs. A cross-sectional study was made on a sample of 30 stable schizophrenic outpatients and a control group of 15 healthy subjects. It was studied the association between symptoms (PANNS, parkinsonism) and neuropsychological performance on tasks of working memory (WAIS-III working memory index), and of executive functioning (Trail Making A and B, Colour Trails, Wisconsin Card Sorting Test, Stroop Test, Behavioural Assessment of the Dysexecutive Syndrome: BADS). Schizophrenia group shows the worst performance in all measures. The positive, negative and disorganized dimensions are associated with executive dysfunction and with parkinsonism. Mental flexibility and working memory are not associated with any of the three dimensions. The parkinsonism and the executive dysfunction are not correlated. By means of linear regression, it is observed that the executive dysfunction (BADS) explains 47 % of the variability of the disorganized syndrome and that the executive dysfunction put together with the parkinsonism explains 60 % of the variability on the negative syndrome. The executive dysfunction evaluated with the BADS can be considered like a cognitive endophenotype clinically valid due to its association with the main dimensions of the schizophrenia and its independence of the parkinsonism.

Correspondence: *Martin L. Vargas, Psychiatry, Complejo Asistencial de Zamora, Avda/ Hernan Cortes, 40, Zamora 49021, Spain. E-mail: martinvargas@usuarios.retecal.es*

M. MATSUI, H. YUUKI, K. KATO, A. TAKEUCHI & M. KURACHI. Characteristics of neuropsychological profile in patients with schizotypal disorder.

Neuropsychological impairments have been consistently reported in patients with schizophrenia. Little is known if subjects with schizotypal disorder exhibit neurocognitive dysfunction similar to that in schizophrenia. Therefore, we assessed the neuropsychological profile in subjects with schizotypal disorder and compared it with that in patients with schizophrenia. Participants were 16 patients with schizotypal disorder, 34 patients with schizophrenia, and 76 psychiatrically-normal volunteers. All participants were administered a Japanese neuropsychological battery assessing executive function (Wisconsin Cards Sorting Test), attention function (Digit span, Trail making A, Picture Completion), memory function (Logical memory, Japanese verbal learning test, Trail making B), Spatial ability (Block design), language ability (verbal fluency test, Vocabulary), and visuo-motor function (Digit symbol). Performance on most of the cognitive domains was impaired in patients with schizotypal disorder, but to a lesser degree compared with patients with schizophrenia. Specifically, the degree of impairment in verbal memory, category fluency and working memory in patients with schizotypal disorder was comparable to that in patients with schizophrenia, while patients with schizophrenia performed worse on the test of executive function and attention than did patients with schizotypal

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

disorder. As a whole, cognitive deficits in patients with schizotypal disorder were qualitatively similar to, but quantitatively milder than, those seen in patients with schizophrenia. Impairment in some cognitive domains, particularly verbal learning and memory suggested to be a core feature of schizotypal disorder and schizophrenia. The results suggest that cognitive abilities related to fronto-temporal lobe function are disturbed across these schizophrenia-spectrum disorders.
Correspondence: *Mie Matsui, Ph.D., Psychology, Toyama Medical & Pharmaceutical University, 2630 Sugitani, Toyama 930-0194, Japan. E-mail: mmatsui@ms.toyama-mpu.ac.jp*

Y. KANEDA, S. PARK, K. JAYATHILAKE & H. MELTZER. Determinants of Work Outcome in Schizophrenia and Schizoaffective Disorder: A Role of Cognitive Function.

There is general agreement that cognitive impairment, a core feature of schizophrenia, has a key influence on work and social function in schizophrenia. Among several domains of cognitive function, verbal memory and executive function appear to be the major determinants among the group of cognitive functions, which affect work and social function. The purpose of this study was to test a hypothesis that specific types of cognitive functions in patients with schizophrenia or schizoaffective disorder would predict work status. Work function and cognitive assessment data were collected in a sample of 152 patients with schizophrenia or schizoaffective disorder from the research clinic in Nashville. Thirty-two of 152 (21.1%) patients were employed. The age [t=2.75, df=147, p<0.01] and age of onset of illness [t=3.15, df=71, p<0.01] was significantly less in employed patients. Comparison of those employed and unemployed groups showed significantly better Continuous Performance Test (CPT) [F(1,63)=5.9, p=0.01], Consonant Trigram Test (CTT) [F(1,122)=9.2, p<0.01], Spatial Working Memory Test (SWMT) [F(1,95)=8.2, p<0.01], Brief Psychiatric Rating Scale (BPRS) Total [F(1,119)=4.9, p=0.02], and Positive [F(1,119)=6.1, p=0.01] scores in the employed group. A logistic regression analysis with a forward stepwise procedure indicated that the CTT score [chi-squared=7.64, df=1, p<0.01] was the strongest predictor of employment status. As predicated, neurocognitive performance was more important than clinical symptoms to predict employment status. Among neurocognitive functions, verbal working memory was found to be more important than other types of cognitive function for employment outcome. Treatment that enhances cognitive function, especially verbal working memory may lead to better employment outcome in patients with schizophrenia or schizoaffective disorder.
Correspondence: *Yasuhiro Kaneda, M. D., Ph.D., Psychiatry, Dept. of Psychiatry, Tokushima University Hospital, 3-18-15 Kuramoto-Cho, Tokushima 770-8503, Japan. E-mail: kaneday-tsh@umin.ac.jp*

M. TURGEON, A. GIERSCH, Y. DELEVOYE-TURRELL & A.M. WING. An investigation of timing error detection and correction in schizophrenics.

To investigate timing abilities in schizophrenics, in particular those underlying error detection and correction in the context of sensorimotor synchronization. The perceptual limits for the detection of a phase-shift perturbation (PS) in an isochronous sequence and its associated compensation function (CF; Praamstra et al., 2002) were estimated for 15 schizophrenics. Participants had to tap in synchrony with the sound sequence, compensating for any timing perturbation. Error detection and correction were done in a single- or dual-task context (i.e., detection or synchronization vs. detection plus synchronization) at slow, medium and fast tempi. Each PS detection threshold was obtained from the last five reversals of an adaptive-staircase procedure. Unlike neurologically-intact participants who exhibit a constant Weber fraction of about 8% of inter-onset interval (IOI), in schizophrenics, thresholds increased with IOI and were consistently larger than those of age-matched controls. While synchronizing to the sounds typically improves or does not influence PS detection, in schizophrenics, it tended to interfere with it. Individual CFs were evaluated from tap-tone asynchronies obtained for above-, at- and below-threshold PS. They deviated from normal ones in one or many respect(s): i. no clear baseline performance; ii. under-corrected timing errors; iii. no stable baseline re-established after the perturbation; iv. above-threshold PS neither consistently followed by over-correction, nor corrected faster than below-threshold PS. Results support the role of frontal and temporal modulators of action thought to be impaired in schizophrenics (e.g., generators of the event-related N1 component in auditory and anterior-cingulate cortices; Gallinat et al., 2002) in audio-guided rhythmic actions.
Correspondence: *Martine Turgeon, Ph.D., School of Psychology, The University of Birmingham, Brain Behaviour Science Centre, Edgbaston, Birmingham B15 2TT, United Kingdom. E-mail: M.Turgeon@Bham.ac.uk*

S.R. ROSS, S.H. PUTNAM & K.M. ADAMS. Detecting Incomplete Effort Using the Seashore Rhythm and Speech-Sounds Perception Tests in Suspected Head Injury. .

This study examined the extent to which the Seashore Rhythm Test (SRT) and the Speech-Sounds Perception Test (SSPT) were able to detect incomplete effort in a clinical sample of persons referred for neuropsychological evaluation. Forty-six participants with financially compensable (FC) mild head injury who obtained scores indicative of incomplete effort on multiple measures were compared to 49 participants who were not involved in litigation and suffered varying degrees of head injury. Receiver Operating Characteristic (ROC) curve analysis indicated that both the SRT (Area Under Curve = .84) and SSPT (Area Under Curve = .80) were significant ($p < .001$) predictors of incomplete effort. Maximizing sensitivity and specificity, the optimal cutoff for classification was 8 errors on the SRT and 18 errors on the SSPT. Further, when logistic regression was employed to examine the joint contributions of the SRT and SSPT, each uniquely added to prediction and remained significant ($p < .005$) predictors of incomplete effort. These findings confirm the utility of the SRT and SSPT in the identification of incomplete effort in the neuropsychological exam.
Correspondence: *Scott R. Ross, Ph.D., Psychology, DePauw University, 7 Larabee St, Greencastle, IN 46135. E-mail: srross@depauw.edu*

R. VILAR, M. MEERSMANS, S. ORTEGA LOZANO, C. RAMOS FONT, M. GOMEZ RIO, A. RODRIGUEZ FERNANDEZ, A. LOPEZ JIMENEZ & M. PEREZ. The Relationship between Various Malingering Tests in a Spanish Sample.

The detection of malingering is currently one of the main challenges in the field of forensic neuropsychology. Our objective was to explore the relationship between some of the most important specific malingering tests such as the b test, the Victoria Symptom Validity Tests (VSVT), and the Test of Memory Malingering (TOMM). In this preliminary study, the participants were 24 patients with mild traumatic brain injury who presented post-concussional syndrome. The evaluation consisted of a neuropsychological battery that included the malingering tests, as well as an exploration using regional cerebral blood flow tomography (rCBF-SPECT). A bivariate correlation analysis was carried out, in which the variables considered were the main scores on the different tests: e-score (b test); Trial 2 (TOMM); as well as Easy Items Correct, Difficult Items Correct and Total Items Correct (VSVT). The results showed statistically significant correlations between all the variables considered. Especially noteworthy were the correlations between the variables Easy Items Correct and e-score ($r=-0.875$; $p<0.01$) and Trial 2 ($r=-0.868$; $p<0.01$), as well as the correlation between the e-score and Trial 2 variables ($r=-0.734$; $p<0.01$). Our study showed a high correlation between the different malingering tests, which indicates convergent validity between the VSVT, TOMM, and b tests. Furthermore, the variables that appear to be the most significant coincide with those described in the literature as being the most appropriate for the detection of malingering.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

Correspondence: *RAQUEL VILAR, University of Granada, Campus Cartuja, Granada 18071, Spain. E-mail: raquelvilarlopez@hotmail.com*

E.A. PECK, A.L. HESS, S.A. MITCHELL, L.W. PECK & A.W. PECK. The Utility of the Rarely Missed Index from the WMS-III to Detect Malingering in a Combined Clinical and Forensic Sample of Patients.

Test taking motivation (TTM) is a critical factor in interpreting neuropsychological test results. Concerns have been raised about a patient's ability to selectively apply their optimal test effort on known, direct measures of TTM (TOMM, WMT, etc), and thus invalidate these measures of malingering. Therefore, indirect measures of TTM, which can be taken from routinely administered neuropsychological tests, are of interest in order to minimize a patient's ability to prepare in advance (i.e., coaching) for these tests. The Rarely Missed Index (RMI), calculated from errors on the Logical Memory Delayed Recognition subtest of the WMS-III, is an indirect measure of TTM. The current study examines the statistical sensitivity of the RMI by comparing the pass/fail rates of clinical and forensic patient groups on this Index. 116 subjects were grouped on the basis of whether or not they were involved in litigation related to their health problems. They were administered a comprehensive neuropsychological battery, including the WMS-III. The RMI was calculated for each subject and a "pass-fail" classification was assigned on the basis of the established formula. The results of a categorical analysis revealed no statistical significant differences in the "pass-failure" rate on the RMI between the two subject groups. However, there was a nonstatisticaly significant trend (Forensic Subgroup = 16.9% failure versus Clinical Subgroup = 5.9% failure). These different failure rates are consistent with other studies in the field. Further statistical analyses will be presented. These data offer preliminary support for the use of the RMI as an indirect measure of TTM. The above noted frequency of failures for each subgroup can be of value to the practicing clinician who is concerned about the possibility of less than optimal test taking effort.

Correspondence: *Edward A. Peck, PhD, NSI, Suite 127, 2010 Bremo Road, Richmond, VA 23226. E-mail: epeckphd@aol.com*

FRIDAY AFTERNOON, JULY 8, 2005

Poster Session 6: Medical Neuropsychology, HIV/AIDS, Specific Learning Difficulties, Mathematics in Children/1:00–2:30 p.m.

D.M. SPOONER, N.A. PACHANA, S.K. KHOO & S.M. O'NEILL. Performance of Postmenopausal Women on Traditional and Everyday Memory Tasks: A Comparison of HT and Non-HT Users.

The effect of hormone therapy (HT) on the memory functioning of postmenopausal women has been of much interest to researchers in recent years. However, studies in this area have generally been limited by the sole use of traditional memory tests which do necessarily mirror the practical, *everyday* type of memory tasks with which postmenopausal women commonly report difficulties. The current study took a novel approach to investigating the impact of HT on memory functioning by using an ecologically valid memory test (The Rivermead Behavioural Memory Test-Extended Version; RBMT-E) in addition to a traditional memory test (The Weschler Memory Scales-Third Edition; WMS-III). The sample consisted of more than 140 postmenopausal women who had self-selected to be a HT-user or non-user. Approximately one-third of the participants were classified as current HT-users, based on criteria of at least 12-months of continuous use. The performance of the two groups was compared across the subtests of the RBMT-E and WMS-III. When the variables of education, IQ, age, and affect had been taken into account, HT-users were found to perform significantly better on some subtests. More specifically, HT-users performed superiorly on the tasks that required verbal memory processing. These findings are supportive of past research which suggests that HT may help to preserve aspects of verbal memory functioning in postmenopausal women.

Correspondence: *Donna M. Spooner, B.Soc.Sci (Psych) (Hons), Psychology, The University of Queensland, School of Psychology, McElwain Building, The University of Queensland, St Lucia, QLD 4072, Australia. E-mail: spooner@psy.uq.edu.au*

L. EK, A. SMITS, A. PAHLSON & O. ALMKVIST. Patterns in cognitive dysfunction in a cross-sectional sample with low-grade glioma .

Analysis of cognitive dysfunction in patients with low-grade glioma. Patients (n = 24) diagnosed with low-grade glioma, a slowly growing primary brain tumor. The patients were identified with help of the Regional Cancer Register. Performance on neuropsychological tests was judged according to published and unpublished normative data. The variation of degree of dysfunction was considerable and three subgroups were seen. Severe disturbance (mean z-score - 2) was seen in 45 % of the patients. They had a global dysfunction with problems in most of the tested cognitive domains. The second group had mild dysfunction (mean z-score - 0.7), most of these patients had slow information processing speed, measured with Symbol Digit Modalities Test, and evident both in written and oral responses. In the best performing group (mean z-score + 0.07) there were only minimal selective dysfunctions with good information processing speed and with few of the other test results below normal limits. This group was 29 % of the whole sample. A second main finding was that the working patients performed better than the nonworking patients in all cognitive domains, although not significant for all. The nonworking patients had a bad verbal memory evident in working memory (trial 1), learning and 30 minutes recall. Three distinct subgroups emerged, i.e. with severe, mild and minimal selective cognitive dysfunction, in a cross-sectional sample of patients diagnosed with low-grade glioma.

Correspondence: *Lena Ek, Neurology, Örebro Universisty Hospital, Örebro Universisty Hospital, Örebro S-701 85, Sweden. E-mail: lena.ek@orebroll.se*

E. VAN DEN BERG, R.C. KESSELS, E.F. DE HAAN, L. KAPPELLE & G. BIESSELS. Mild Impairments in Cognition in Patients with Type 2 Diabetes Mellitus. .

Type 2 diabetes mellitus (DM2) is associated with impaired cognitive functioning. Moderate impairments have been reported in verbal memory, executive functioning and information processing speed, while other cognitive functions remain relatively unaffected. In addition, DM2 patients have a twofold increased risk of developing either vascular dementia (VaD) or Alzheimer's disease (AD). The current study examined the relation between DM2 and two concepts that are used to describe cognitive impairment in the transitional state between normal aging and dementia: Mild Cognitive Impairment (MCI) and Cognitive Impairment, No Dementia (CIND). MCI refers to the clinical condition in which patients have a memory deficit, without impairments in other cognitive domains. The broader concept of 'Cognitive Impairment, No Dementia' does not focus particularly on memory and is used to describe more general cognitive impairments, including deficits in attention, executive functioning and language. Both MCI and CIND are risk factors for developing AD, VaD or mixed AD/VaD. 90 DM2 patients (47 male; age 66.8±5.5) and 40 healthy controls (18 male; age 65.2±4.5) performed a neuropsychological examination addressing abstract reasoning, verbal and visual (working) memory, information processing speed, attention, executive functioning and visuoconstruction. Participants were

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

classified as having either no cognitive impairment, CIND or MCI. DM2 was associated with an increased prevalence of CIND (patients 38%, controls 20%; p<0.05), but not of MCI (patients 2%, controls 0%; p>0.05). Future prospective studies should resolve whether the concept of CIND could serve to identify DM2 patients who are at increased risk of developing dementia.
Correspondence: *Esther van den Berg, MSc, Neurology, University Medical Center, Location Stratenum, room 5.139, Universiteitsweg 100, Utrecht 3584CG, Netherlands. E-mail: e.vandenberg@fss.uu.nl*

I. BRANDS, R.P. KESSELS, G. BIESSELS, R.P. HOOGMA, J.M. HENSELMANS, J.W. VAN DER BEEK- BOTER, L.J. KAPPELLE & E.H. DE HAAN. Cognitive Functioning in Elderly Persons with Type 1 Diabetes Mellitus . .

Evidence is accumulating that diabetes mellitus (DM) is associated with gradually developing encephalopathy. Compared to results in DM2, findings of different neuropsychological studies in DM1, are less conclusive. Also, studies on DM1 are limited to young adults, whereas participants in DM2 were mostly elderly persons. Therefore the aim of this study is to assess cognitive performance in elderly DM1 patients and to correlate it to cerebral MRI findings. 33 DM1 patients (DM1: age: 54 to 73; mean DM duration: 32.8 ± 13 yrs) were compared with 33 age and education matched controls (CON). Cognition was studied by extensive neuropsychological assessment. Psychological well-being was assessed by two questionnaires. Both cortical and subcortical atrophy and periventricular and deep white-matter abnormalities were rated on MRI scans, using standardised rating scales. DM1 performed significantly worse on the domains speed of information processing (p=0.05), concept shifting (p=0.03) and learning and immediate memory (p=0.03), but not on abstract reasoning, visuoconstruction, working memory, forgetting, complex attention and fluency. No significant between-group differences were found on any of the MRI rating scales or on measures of psychological well-being. DM1 in elderly patients is associated with selective impairment in cognitive function in the same pattern and magnitude as reported in studies on young DM1 adults. No specific changes on MRI were noted. It is hypothesised that the differential neuropsychological findings in previous studies of DM1 and DM2 patients reflect differences in the pathophysiology between DM1 and DM2, rather than differences in the age of the populations involved.
Correspondence: *Ineke Brands, Msc, neuropsychology, Hofpoort hospital, Blekerijlaan 3, Woerden 3447 AC, Netherlands. E-mail: i.brands@altrecht.nl*

N. JANSEN, A. KINGMA, P.J. TELLEGEN, A. BOUMA, A.J. VEERMAN & W.A. KAMPS. Neuropsychological Effects of Chemotherapy Only in Children Treated For Acute Lymphoblastic Leukemia (ALL).

We assessed the potentially adverse neuropsychological sequelae of leukemia treatment in children diagnosed with acute lymphoblastic leukemia (ALL) treated with chemotherapy only, shortly after diagnosis and after cessation of therapy. Fifty consecutive newly diagnosed patients (60% boys, 40% girls; median age at 1st evaluation 6.6 years) were included in a nationwide sibling-controlled prospective study design. Patients were treated with intrathecal and systemic chemotherapy according to the DCOG ALL-9 study. Extensive neuropsychological assessment (measures of intelligence, learning and memory, attention, language, executive and visual-motor functioning) was performed at diagnosis (within 2 weeks after starting chemotherapy) and 2.4 years later, after cessation of treatment. Test results of patients were compared for the first and second evaluation in a repeated measurement design and for patients to 29 healthy sibling controls (38% boys, 62% girls; median age at 1st evaluation 8.2 years). At both assessments (before and after 3-6 months of treatment), patients showed average scores on general measures of cognitive abilities (WPPSI-R, WISC-R). The results revealed that the performance IQ in the patient group deteriorated marginally over time, while it improved slightly in the control group (p= .04). No significant differences were found on specific neuropsychological measures and the scores were in the standard range. No gender or age effects were detected for any measure. We only found very small negative effects of treatment on cognitive performance. The third neuropsychological evaluation, 2 years after cessation of therapy, will have to prove whether this is temporary or permanent.
Correspondence: *Nathalie Jansen, M.A., Division of Paediatric Oncology, Groningen University Hospital, P.O. Box 30.001, Groningen 9700 RB, Netherlands. E-mail: n.c.a.jansen@wkz.azu.nl*

L. MESSINIS, K. KARAIVAZOGLOU, K. ASIMAKOPOULOS, G. THEOCHARIS, C. KARATZA & S. MALEFAKI. Neuropsychological deficits in Greek patients with chronic hepatitis C virus (HCV) infection . .

Hepatitis c virus (HCV) infection has become a major public health care problem with over 170 million infections reported world wide. HCV can be detected in the brain and it has been speculated that it has neuroinvasive properties with significant effects on cognitive functioning. In the present preliminary study, we investigated specific cognitive deficits that are common among HCV patients and related these to parameters of HCV disease severity. Using a comparisons group design we assessed 20 chronically infected HCV patients (and compared them with 9 hepatitis B virus (HBV) infected patients and 6 healthy controls. All participants were administered a standardized brief neuropsychological test battery assessing attention, memory, learning, verbal fluency (semantic and phonemic), psychomotor speed, visual scanning and cognitive flexibility as well as measures of depression and premorbid intelligence. We also obtained assessments of disease severity parameters in the hepatitis groups. Results revealed that the hepatitis C group differed significantly from the controls and the HCB group on measures of memory and verbal learning, recalling fewer words than the controls on every trial (p< .05 for each comparison), with a clinical trend on trial B of the RAVLT (interference list presented only once). Attention, verbal fluency and psychomotor speed abilities also differed significantly between the HCV group and controls but not between the HCV and HCB groups. Greater HCV disease severity as indicated by liver fibrosis was associated with a greater cognitive decline. These preliminary findings suggest that chronic HCV infected patients experience cognitive deficits that may interfere with daily living and that these deficits seem to be associated primarily with HCV infection and HCV disease severity
Correspondence: *Lambros Messinis, PhD, Neurology / neuropsychology lab, University Hospital Patras, Parodos Nausikas 52, Paralia Proastiou, Patras 26442, Greece. E-mail: lambros@hellasnet.gr*

D.M. SPOONER, T.J. JONES, G. BEADLE & M.J. WRIGHT. Neuropsychological Functioning Following Adjuvant Chemotherapy for Treatment of Breast Cancer: A Longitudinal Study.

Women with a history of breast cancer represent the largest disease group in the cancer survivor community. For women with early stage breast cancer, adjuvant chemotherapy has been found to promote long-term survival, and the majority now receive chemotherapy as part of their treatment. As such, understanding the impact of this treatment on patients functioning, including effects on cognition and subsequent quality of life, has become a critical issue. However, there is a paucity of studies which have examined the neuropsychological effects of this treatment. In general, these have been limited by small samples sizes, a lack of baseline (pre-chemotherapy) data, use of insensitive cognitive tests, and failure to adequately account for practice effects across multiple testing sessions. The current study addresses these limitations in its design and methodology. Thus far, more than 50 women (age range 25 to 67) with diagnoses of early breast cancer recruited from multiple hospital sites have been assessed with a battery of neuropsychological tests.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

These cover a range of cognitive domains, including memory, attention, processing speed, and executive functioning. They are assessed at three time points: immediately prior to chemotherapy, approximately 4-weeks following cessation of chemotherapy, and again 6-months post-chemotherapy. Post-chemotherapy scores for each participant are compared to their baseline performance and analysis of results took into account potentially confounding factors including self-ratings of mood and quality of life. Results are discussed in terms of the acute and longer-term cognitive deficits associated with adjuvant chemotherapy.
Correspondence: *Donna M. Spooner, B.Soc.Sci (Psych) (Hons), Psychology, The University of Queensland, School of Psychology, McElwain Building, The University of Queensland, St Lucia, QLD 4072, Australia. E-mail: spooner@psy.uq.edu.au*

E.T. POUTIAINEN, M. MAUNU, M. TIAINEN, H. HARVE-RYTSOLA, T. SILFVAST, S. KAJASTE & R.O. ROINE. Cognitive Functioning After Resuscitation from Sudden Cardiac Arrest Is Related to Long Term Survival of the Subjects .

Sudden cardiac arrest commonly causes wide-ranged cognitive deficits but our previous results from the 15-year follow-up study indicate that long term survivors are functioning quite well. The cognitive performance of long term survivors measured one year after the cardiac arrest was compared with those who died after the one-year examination. 50 subjects with resuscitation from sudden cardiac arrest in years 1986-1988 were examined one year after the onset. 15 years later the same subjects were contacted and for the subjects who had died data were obtained from patient charts. 10 of the 11 still living subjects could be reached and their cognitive and medical status at one-year examination was compared with the subjects who had died during the past 15 years. The cognitive examination included measures of memory (WMS-Logical memory), visuoconstructional planning (WAIS-BD) and visuomotor speed (WAIS-Dsy). The Symptom Check List-90 (SCL-90-R), the Glasgow Outcome Scale (GOS), neurological examination, and data concerning the delay of basic life support (Bls), advanced life support (Als), and restoration of spontaneous circulation (Rosc) at the acute state were also used. There were no differences between the two groups in education, but the 10 surviving subjects were younger than the non-surviving ones (56 vs 64 yrs, $p<.05$, Anova). Neurological abnormalities, SCL-90-R, GOS, or delay of Bls, Als or Rosc did not differ between the two goups. However, the 10 surviving subjects had higher scores on memory ($p<.005$), cognitive speed ($p<.01$) and visuoconstructive planning ($p<.01$) when compared with the non-survivors. These cognitive differences remained after the effect of age was corrected by Ancova. These preliminary results suggest that cognitive performance after successful resuscitation from the sudden cardiac arrest may be related to long term survival.
Correspondence: *Erja Poutiainen, Ph.D., Dept of Psychology, University of Helsinki, Po.Box 9, Helsinki 00014 Univ Helsinki, Finland. E-mail: erja.poutiainen@helsinki.fi*

S. ELKADI, H. KRUM & E. STOREY. The Impact of Congestive Heart Failure (CHF) on Cognitive Function.

The aim of the present study was to examine the profile of cognitive function in patients with Congestive Heart Failure as compared with age and education matched controls. Fifty CHF patients and 50 controls, matched on age and level of education, were compared on cognitive function using an extensive neuropsychological test battery. This battery incorporated measures of verbal and visuo-spatial learning and memory, verbal fluency and naming, attention and concentration, visuo-motor organisation, mental speed, cognitive flexibility, planning and behavioral regulation. Mood was also assessed using the Geriatric Depression Scale. Information regarding Left Ejection Fraction (LEF) and Brain Natriuretic Peptide (BNP) for CHF patients was also collated to provide an indication of the severity of heart failure in the patient group. Patients and controls were aged between 39 and 72 years. Comparisons of attention and concentration between CHF patients and controls revealed significant differences. CHF patients demonstrated poorer attention and vigilance during task performance as compared with matched controls. CHF patients were also significantly more impulsive in their pattern of responding. This pattern of performance suggests that CHF impacts on the information processing speed and behavioral regulation and is consistent with findings of an overall decline in cognitive function reported by previous studies of CHF patients.
Correspondence: *Shaymaa Elkadi, PhD, Neuroscience, Monash University, The Alfred Hospital, Melbourne, VIC 3004, Australia. E-mail: shaymaa.elkadi@med.monash.edu.au*

A.M. FOX, K.R. DYER, M. COLLINS & K. NEWCOMBE. Detecting Suboptimal Effort During Cognitive Screening in Substance-Dependent Clients.

Neuropsychological assessment can provide information regarding the nature of impairments manifest by clients in treatment for substance dependence. Nevertheless, the validity of results may be compromised where patients fail to perform to the best of their ability. Techniques for identifying suboptimal effort have been developed although there is a paucity of research examining these approaches in assessment following substance abuse. The present study examined the applicability of published cut-off scores for the detection of malingering to a sample of patients in treatment for substance dependence. Participants attending treatment associated with substance dependence (N=20) completed a brief cognitive screening battery. Participants whose scores exceeded the recommended cut-off scores for the identification of suboptimal effort were identified. All clients in the sample (100%) scored above published cut-off values for identifying suboptimal effort on the Trail Making Test, with a significantly smaller proportion of clients (10%) scoring above the recommended cut-off scores on each of the other tests examined ($z=13.4$, $p<.0001$). The results suggest that cut-off scores for the Trail Making Test derived from performance by control and head-injured groups does not provide a good indicator of poor effort in substance-dependent client groups, and highlight the need for multiple classification strategies in the identification of suboptimal effort. Examination of test profiles using objective markers appears warranted, although development of alternative cut-off scores will be necessary.
Correspondence: *Allison M. Fox, PhD, M Clin Neuro, Psychology M304, The University of Western Australia, 35 Stirling Highway, Crawley, Perth, WA 6009, Australia. E-mail: afox@psy.uwa.edu.au*

M. RIS, J.P. WRIGHT & K.N. DIETRICH. Neuropsychological Correlates of Adult Antisocial Behavior in an Early Lead Exposed Cohort .

Recent findings from the Cincinnati Lead Study (CLS) have linked early environmental lead exposure to risk for delinquent behavior as well as to late neuropsychological sequelae (Dietrich et al, 2001; Ris et al., 2004). In the most recent iteration of this ongoing longitudinal study, we are investigating antisocial/criminal behaviors in early adulthood and correlates with neuropsychological and neuroimaging parameters. These latest findings support a significant association between early lead exposure and frequency of police contacts that withstand covariate adjustment (Wright et al., submitted). Preliminary findings from our functional imaging (fMRI) study also suggest anomalous organization of language functions that may predispose these youth to antisocial development (Yuan et al., 2005). In this paper, we report on possible neuropsychological mediating factors for adult criminal behaviors in this cohort. Official arrest records were searched for CLS subjects in early adulthood (18-23 years) and related to neuropsychological functioning measured at age 15-16 years. The first wave of analyses of these data indicates a significant relationship between Number of Arrests and performance on measures of Memory ($r = -247$, $p<.001$, $N=184$) but not for measures of Learning/IQ, Attention, Visuoconstruction, or Fine-Mo-

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

tor Control. Multiple regression modeling in progress will further elucidate these relationships as well as possible moderating factors, such as gender, while controlling for confounds. These results promise to shed new light on the mechanisms by which early lead exposure increases risk for antisocial adjustment in adulthood.
Correspondence: *M. Douglas Ris, Ph.D., Psychology, D-4, Cincinnati Children, 3333 Burnet Ave., Cincinnati, OH OH. E-mail: douglas.ris@cchmc.org*

J. VASSILEVA, M. RAYCHEVA, S. GEORGIEV, P. PETKOVA, E. MARTIN, R. TERSIYSKY, V. VELINOV & P. MARINOV. Neuro-Cognitive Sequelae of Heroin Use and Psychopathy.

Chronic heroin use is associated with impairments in executive cognitive functioning. However, investigations of the neuro-cognitive sequelae of heroin use are hampered by two significant methodological challenges: (1) polysubstance-dependence, most notably on cocaine; and (2) co-morbid conditions, particularly Antisocial Personality Disorder (APD) and psychopathy, which are associated with similar neuro-cognitive impairments. Consequently, at present, the unique effects of heroin use on cognition are still not well understood. We addressed these methodological challenges by conducting the current study in Bulgaria, where heroin addiction has become one of the most significant public health problems. Unlike the United States and Western Europe, polysubstance dependence is still uncommon among heroin users in Bulgaria. We tested 39 male currently abstaining heroin addicts, classified into groups based on the presence or absence of psychopathy. We assessed four types of executive functions commonly impaired among substance abusers and/or psychopaths: working memory, decision-making, passive avoidance learning, and delayed reward discounting. Results reveal that relative to non-psychopathic heroin users, psychopathic heroin users were impaired on working memory and the early pre-conceptual stages of the decision-making task. They also tended to commit more passive avoidance errors and less errors of omission than non-psychopathic heroin users. There were no group differences on rates of delayed reward discounting. Preliminary results suggest that heroin use and psychopathy may have additive effects on working memory and decision-making, such that psychopathic heroin users may be more susceptible to impairments in these domains of executive functions.
Correspondence: *Jasmin Vassileva, Ph. D., Psychiatry, University of Illinois at Chicago, Psychiatric Institute (MC 912), 1601 W. Taylor Street, Chicago, IL 60612. E-mail: jvassileva@psych.uic.edu*

V. MANNING, L.J. REED, T. RADO, S. WANIGARATNE & E. MARSHALL. Trajectories of Neuropsychological Recovery in Alcohol-Dependent In-Patients Undergoing Medically Assisted Alcohol Withdrawal using CANTAB.

Alcohol dependence is known to be associated with a range of cognitive impairments which are potentially an important source of individual differences affecting treatment effectiveness, and may represent enduring deficits. The current study examined neuropsychological functioning in a sample of alcohol dependent in-patients undergoing a 28-day inpatient medically-assisted alcohol withdrawal programme.We aimed to investigate the trajectories of recovery of both memory and executive function deficits over the course of the treatment programme. Subjects were recruited within the first 5 days of admission to the ward (mean = 4 days) and then completed a battery of pencil and paper tests followed by a touch-screen computerised battery of non-verbal tests (CANTAB). This procedure was then repeated a few days prior to discharge, on average day 26. The sample (n = 30) was predominantly male (19/30), mean age was 44.0 years, mean problem drinking history = 11.7 years. Substantial improvements in memory, working memory and fluency tasks (which contribute to our measure of FSIQ) were observed by time 2. Impaired planning and impulsive performance measures were shown on CANTAB ED/ID and SOC tasks and showed little improvement. Alcohol dependence is associated with substantial of deficits in memory and executive function which may affect treatment compliance and understanding of complex treatments. Planning and impulsive responding deficits, similar to those seen after orbitomedial frontal cortical lesions, may indicate poorly reversible deficits in abstinence after alcohol withdrawal, and may predispose to relapse.
Correspondence: *Laurence J. Reed, Institute of Psychiatry, De Crespigny Park, London SE5 8AZ, United Kingdom. E-mail: l.reed@iop.kcl.ac.uk*

A. LOPEZ-JIMENEZ, M. MEERSMANS, F. AGUILAR, C. OROZCO-GIMENEZ, R. VILAR, A. VERDEJO-GARCIA & M. PEREZ-GARCIA. Influence of the use of heroin on verbal fluency performance.

Some evidence shows that substance abuse patients present an impairment in executive function. Verbal fluency, as a subcomponent of executive function, is frequently affected by drug use. One of the most frequently used methods to asess this component is the ability to generate words for a minute that begin with a certain letter (phonological fluency) or belong to the same semantic category (semantic fluency). The purpose of this study was to determine the effect, in polydrug-patients, produced by the severity of the use of cocaine, heroin and cannabis on performance on tests evaluating verbal fluency: phonological and semantic. Verbal fluency tests were administered, with the phonemic category ″FAS″ and the semantic categories ″Animals″ and ″Fruits″, within the context of a broader neuropsychological evaluation, to twenty-three polydrug-users patients who were in drug free treatment. Three multiple lineal regression analyses were performed, with the independent variable being the severity of use of cocaine, heroin and cannabis, and the dependent variables being the total scores on the ″FAS″, ″animals″ and ″fruits″ tests. The results showed that only the severity of heroin was able to predict the dependent variables ″Animals″ (β=-0,440; p=0,043) and ″Fruits″ (β=-0,408; p=0,069). Our study indicates that in a polydrug-use patients only the use of heroin predicts performance on tests that evaluate semantic verbal fluency. The consideration of the poly-use situation resolves a common criticism in this type of studies.
Correspondence: *Miguel Meersmans Sanchez-Jofre, Servicio de Neurologia, Hospital Virgen de las Nieves, C/ Pintor Lopez Mezquita, Granada 18002, Spain. E-mail: mmeersmans@fundacionhvn.org*

R.S. PARKER. "Chronic Postconcussive Complaints as Indicators of Unhealed Injuries and Physiological Dysregulation" .

The nature of the postconcussive syndrome is controversial. Its multiple expression has been attributed to emotional reactions, physiological responses, symptom exaggeration, dysfunction of information processing and mental speed, diffuse axonal injury, etc. These have been formally organized into a Taxonomy: Neurological; Cognitive; Adaptive; Personality and Intra-Personal; and, Special Problems of Children. A neglected etiology of some neurobehavioral dysfunction stems from the fact that, when an accident causes a head injury, it is usual that other parts of the body are also injured (bone, soft-tissue, peripheral nerves, somatic organs), resulting in pain, motion disorders, fatigability, health disorder, etc. The acute and chronic effects of the trauma, stimulate these physiological systems: Stress (hormonal); inflammatory (wound healing); immune (wound identification and dead tissue removal). These directly effect somatic functioning, and indirectly effect central nervous system functioning through the secretion of neuroactive substances. The latter enter the CNS through damage to the Blood-Brain-Barrier, neural transport, etc. Significant effects include illness, sickness behavior, fatigability, mood disturbance, memory loss, and hyper-arousal. Neuropsychological symptoms are elicited by dysregulation outside the nervous system, and are not reflected in neurological and neuroimaging procedures. They can be mis-attributed to symptom exaggeration or other

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

psychodynamic reasons. Consequently, the patient is not offered appropriate treatment or compensation, and, the struggle for rehabilitation is much more difficult. The three somatic systems will be described, including characteristic psychoactive substances and their effects. Recommendations for medical examination will be suggested. N/A N N/A N/A

Correspondence: *Rolland S. Parker, Ph.D., Neurology, NYU School of Medicine, (Res.) 50 West 96th St. (9C), New York, NY 10025`. E-mail: rsp2@nyu.edu*

E. LOJEK & R. BORNSTEIN. Limitations of Classification Systems Based on Severity of Deficit Criteria. The Case of Neurocognitive Impairment in HIV Infection. .

The aim of this one-year followup study was to examine the neuropsychological functioning of HIV+ men and classify their performance according to the classifications based on severity of deficit criteria. Eighty-one HIV+ men, mainly in the asymptomatic stage of infection, and 55 HIV- control subjects took part in the study. The participants were tested twice using a comprehensive neuropsychological test battery evaluating a wide spectre of disorders associated with HIV infection. At baseline and one-year followup the performance of HIV+ subjects was comparable to that of controls on all neurocognitive dimensions as well as on depression and anxiety. Despite normal neuropsychological functioning of the HIV+ subjects in comparison with the controls, their cognitive abilities had deteriorated. Comparison of both assessments in the HIV+ group revealed significant deterioration in three neurocognitive domains: memory and learning, information processing speed and attention. No single subgroup of HIV+ patients was responsible for this significant deterioration. It was difficult to reconcile the neurocognitive functioning of these subjects with classification systems based on severity of deficit criteria. It was not clear whether the participants should be classified as a group without neuropsychological changes or with subsyndromic neuropsychological impairment. There is no clearly defined cut-off point for subsyndromic neuropsychological impairment in HIV infection. There is no single, appropriate criterion against which to assess deficits in such HIV+ subjects. Different neurocognitive profiles can be identified depending on whether reference is made to HIV-controls or a self-reference HIV+ group. These findings may have important clinical, theoretical and methodological implications for research on HIV infection.

Correspondence: *Emilia Lojek, Ph.D., Faculty of Psychology, Warsaw University, Faculty of Psychology Warsaw University, Stawki 5/7, Warsaw 00-183, Poland. E-mail: emilia@engram.psych.uw.edu.pl*

D. WALDROP, R.L. OWNBY, F.L. WILKIE, A.M. KUMAR & M. KUMAR. Cortisol Response Mediates Cognitive Function in HIV Infection.

Persons infected with the human immunodeficiency virus (HIV) are at risk for cognitive impairment. According to estimates, 22 to 30% of asymptomatic patients are cognitively impaired with rates increasing to as high as 50% in those in the late stages of the disease. Although these cognitive impairments have been well characterized, the underlying causes of the impairments are not equally clear. One possible cause may be the dysregulation of the hypothalamic-pituitary-adrenal (HPA) caused by HIV infection. This dysregulation increases levels of neurotoxic glucocorticoids such as cortisol in response to stress in infected individuals. We hypothesized that cortisol response to stress would mediate the relation between HIV infection and cognitive function. Cortisol response to a common distressful challenge (cold pressor challenge) and cognitive status using the HIV Dementia Scale (HDS) were assessed in a sample of 314 men and women. This sample included 107 HIV+ injecting drug users (IDUs), 65 HIV- IDUs, and 142 HIV negative, non-IDU control participants. Using structural equation modeling and adjusting for age, gender, years of education, depression, and injecting drug use, results showed that increased levels of cortisol in response to stress mediate the relation between HIV infection and cognitive impairment ($p \angle .05$). Thus, dysregulated cortisol response may one of the mechanisms underlying HIV associated cognitive impairment. Interventions that reduce cortisol levels, including psychosocial stress reduction techniques and medications that block cortisol receptors may be useful in preventing or reducing cognitive deficits in persons infected with HIV.

Correspondence: *Drenna Waldrop, Ph.D., Psychiatry & Behavioral Sciencse, University of Miami School of Medicine, 1800 NW 10th Ave, Elliot, Room 2004, PO Box 016960 (M817), Miami, FL 33101. E-mail: dwaldrop@med.miami.edu*

L. MESSINIS, I. TSAKONA, M. KAMBANAROU & S. MALEFAKI. Neuropsychological performance among symptomatic and asymptomatic HIV infected patients in a Greek sample.

Individuals infected with the human immunodeficiecy virus(HIV)are at increased risk for developing cognitive impairments in various stages of the disease process. The present study sought to determine if symptomatic HIV-infected patients were more likely to be neuropsychologically impaired than their asymptomatic counterparts and to deteremine the nature and severity of cognitive impairments associated with the stage of illness. We assessed 11 asymptomatic HIV infected patients and compared them with 6 symptomatic HIV patients(CDC,1993)and 10 healthy controls matched for age, education, levels of depression and premorbid intelligence. All participants were screened for the presence of previous neurological illness and administered a standardized brief neuropsychological test battery assessing selective and focused attention, memory, verbal learning, verbal fluency, psychomotor speed, visual scanning, cognitive flexibility and naming. We also assessed disease severity parameters (viral load, CD4 Count) and use of antiretroviral therapy in the HIV groups. Data analysis revealed that patients with symptomatic and asymptomatic infection (CDC,1993) differed significantly from controls on measures of memory, verbal learning, attention, psychomotor speed and cognitive flexibility. Non significant clinical trends were also observed on the above measures between symptomatic and asymptomatic groups. Symptomatic patients showed a higher proportion of impairments on individual neuropsychological measures (1sd below group mean)than either the asymptomatic or control groups These preliminary findings suggest a general progression of neuropsychological deficits across groups with a greater prevalence of deficits at later stages of disease progression. The pattern of deficits also seems to vary across disease stages with memory and attention problems appearing from the asymptomatic stages and cognitive flexibility deficits becoming prominent during the symptomatic stage.

Correspondence: *Lambros Messinis, PhD, Neurology / neuropsychology lab, University Hospital Patras, Parodos Nausikas 52, Paralia Proastiou, Patras 26442, Greece. E-mail: lambros@hellasnet.gr*

F.L. WILKIE, K. GOODKIN, A. ARDILA, D.B. LEE, A. FRASCA, R. MOLINA, W. ZHENG & S. O'MELLAN. Effects of Age on Stroop Performance in HIV Infected Primary Spanish-Speaking Adults.

Disturbances in the controlled processing of selective attention have been observed in HIV infected, English-speaking, young adults using the Stroop-RT version but less widely observed using the traditional Stroop test. HIV has a greater detrimental effect on cognition in older than younger adults. We investigated the effects of age and HIV infection on traditional Stroop test performance in primary Spanish-speaking adults. The 161 subjects included young (ages 18-39 years; n=47) and older (aged 50 and over; n=41) symptomatic HIV + and young (n=39) and older (n=34) HIV - primary Spanish-speaking adults. Our Stroop test consists of three 100 item blocks of color names printed in black ink, color patches, and color names printed in incongruously color ink. Testing was in Spanish. Time (in seconds) for each trial was examined for age, HIV disease category [HIV -, HIV + early (ESX) or late (LSX) symptomatic] and their interaction effects by GLM analyses, controlling for significant covariates. The older LSX group was significantly

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

slower on the incongruent interference measure than the remaining groups which were similar. The groups did not differ significantly in color naming, word reading, or errors. The older HIV + adults in the late symptomatic (AIDS) stage of infection had greater disturbances in effortful, selective attention than their age peers at an earlier stage of infection and their younger HIV + counterparts who were not different from their non-HIV-infected age peers. The more automatic processes of color naming and word reading were not significantly affected by HIV infection.

Correspondence: *Frances L. Wilkie, PhD, Psychiatry, University of Miami, Dominion Towers,803, 1400 NW 10th Ave, Miami, FL 33136. E-mail: FWilkie@med.miami.edu*

C.W. HUTCHISON, G.W. YELLAND, A. MIJCH, E. WRIGHT, T. GIBBIE & S.R. ROBINSON . A Novel Measure of Cognitive Function that is Highly Sensitive to HIV-Related Cognitive Impairment.

This study evaluated the efficacy of a novel automated test (the Subtle Cognitive Impairment Test; SCIT) at detecting HIV-related cognitive impairment. 59 HIV infected men with a mean age of 47 ±8 years completed a neuropsychological battery comprising the SCIT, HIV-Dementia Scale (HDS), Grooved Pegboard (GPB), and the CANTAB. The first part of this study compared performance on the SCIT to performance on the HDS, GPB, and CANTAB. The second part examined SCIT performance as a function of HDS score. All measures were sensitive to performance on the SCIT (GPB $r(59) = .427$, $p < .01$; Choice RT $r(59) = .522$, $p < .01$; Spatial Working Memory $r(59) = .482$, $p < .01$; & Attentional Shifting $r(59) = .3$, $p < .05$). However, the SCIT showed the highest correlation with the HDS ($r(59) = -.604$, $p < .01$). Interestingly, performance on the SCIT was significantly better in the group with HDS scores > 15 (i.e. unimpaired) relative to those with HDS scores between 12 and 14 (i.e. mildly impaired; $t(49) = -2.949$, $p < .01$). Similarly, participants who scored below 12 on the HDS (i.e. severely impaired) performed at a significantly lower level than the 12-14 group ($t(19) = -2.344$, $p < .05$). The findings indicate that the SCIT is a valid measure of cognitive impairment in HIV infection and that it is highly sensitive to mild decrements in performance on the HDS. These data suggest that the SCIT may be a useful clinical tool in discriminating HIV+ individuals who are at risk of progressing to HIV-related dementia.

Correspondence: *Chris W. Hutchison, Psychology, Monash University, Building 17, Clayton, Melbourne, VIC 3800, Australia. E-mail: chris.hutchison@med.monash.edu.au*

N. MARCHETTA, L. ROOIJAKKERS, P. HURKS, L. KRABBENDAM & J. JOLLES. Assessing Verbal Learning and Memory Functioning in Adults with Attention Deficit Hyperactivity Disorder (ADHD).

Despite recurring complaints about forgetfulness in adults with ADHD, emerging research on verbal memory in ADHD is still inconclusive. This is unfotunate, because determining the neurocognitive dysfunctions specific for adult ADHD would contribute to a theoretical framework and clinical practice. Therefore, the aim of this study was to investigate verbal memory in adults with ADHD. Three groups were compared, namely (a) unmedicated adults with ADHD (n= 25, 19 males), (b) unmedicated adults with a DSM-IV diagnosis other than ADHD (psychiatric controls; n=22, 11 males), and (c) healthy controls (n=33, 16 males). The Auditory Verbal Learning Task (AVLT) was administered; i.e., a five-trial presentation of a 15- unrelated word list and a delayed recall and recognition. Compared with healthy controls, ADHD adults reproduced fewer words on trial 1 (a measure of working memory) and on the total number of words recalled over five trials. Conversely, their learning curve paralleled that of healthy controls. Additionally, adults with ADHD used less subjective clustering strategies (i.e., reproduction of the same pairs in the adjacent trial). ADHD adults produced fewer words on a delayed recall; no differences were found on recognition. Interestingly, performance could not differentiate between ADHD and other psychiatric disorders. Results indicate a less optimal working memory, encoding, and delayed recall in ADHD adults, which may be caused by a less effective strategy used. Unfortunately, these findings are not specific for ADHD. Further research on the processes that contribute to these memory dysfunctions is warranted.

Correspondence: *Natalie Marchetta, University, Department of Psychiatry and Neuropsychology, Brain and Behaviour Institute, P.O. Box 616, Maastricht 6200 MD, Netherlands. E-mail: nathalie.marchetta@np.unimaas.nl*

J.A. FOLEY & A. JONES. Neuropsychological Assessments Used in Scottish Learning Disability Services: An Audit.

Neuropsychological assessments are used within a Learning Disability context for a number of reasons: differential diagnosis, research, client care and service planning. The objective of this study was to audit the use of neuropsychological assessments in Scottish Learning Disability Services A questionnaire was constructed, listing all neuropsychological assessments commonly used in the UK. The tests were divided according to neuropsychological domain they are purported to assess: language, perception, attention, memory, executive functioning, praxis or general intellectual ability. The questionnaire asked the respondent to indicate: which tests were used, with which age band (child, adult or older adult) and with what percentage of total Learning Disability caseload (0-24, 25-49, 50-74, 75-100), allowing for the addition of any other tests not listed. 29 of 74 (39.2%) questionnaires sent out to the members of the Scottish Child and Adult Learning Disability Special Interest Groups of the British Psychological Society were returned. Most respondents said that they routinely use tests of language and intelligence, but the tests commonly used to assess language measure receptive language only and some of the tests used to assess intelligence are outdated or inappropriate. Perception, attention and praxis are infrequently assessed. Memory and executive functioning are assessed using a variety of tests, some of which are very high functioning. All tests commonly used have limited normative data for Learning Disability populations. The results of this study suggest limited and often inappropriate use of neuropsychological assessments is made in Scottish Learning Disability Services, which may limit accurate diagnosis, research, client care and service planning.

Correspondence: *Jennifer A. Foley, Department of Psychiatry, The University of Edinburgh, Royal Edinburgh Hospital, Morningside Park, Edinburgh EH10 5HF, United Kingdom. E-mail: jenniferannefoley@hotmail.com*

K. NIELSEN, V.W. BERNINGER & W. RASKIND. Gender Differences in Writing of Dyslexics in a Family Genetics Study.

Given the controversy regarding incidence of gender differences in population based studies, we investigated gender differences in incidence and severity of reading and writing and related neuropsychological deficits in children with dyslexia whose families have a strong multigenerational history of dyslexia. Means for each measure in a battery of reading, writing and neuropsychological measures (phonological, orthographic, morphological, syntactic, rapid automatic naming, working memory, oral-motor, grapho-motor, executive function) were compared with ANOVA for 80 males and 42 females who met research criteria for family genetics study. Boys were more severely impaired in writing and selected neuropsychological measures than girls. For affected biological parents of (n = 200), fathers were more severely affected than mothers, who tended to compensate more than fathers, in reading, writing, and most neuropsychological processes. No gender differences were found in the child or adult dyslexics in the motor skills. Through multiple regression, a common executive function pathway was identified for both automatic letter naming and automatic letter writing (which previous research has shown is a strong causal candidate for writing problems and boys more impaired). No gender differences related to

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

incidence were found in affected siblings. Referral biases may affect incidence of gender differences, but boys with dyslexia appear to be more impaired in writing than girls. If untreated, these early writing problems may impair reading and writing across the life span. Early intervention focused on automaticity of letter writing may reduce the severity of dyslexia in both genders (especially boys).
Correspondence: *Kathleen Nielsen, Ph.D., Multidisciplinary Learning Disabilities Center, University of Washington, 402 Miller Hall, Seattle, WA 98195. E-mail: kathyhn@u.washington.edu*

V. BERNINGER, K. NIELSEN & R. ABBOTT. Contribution of Motor Planning to Functional Reading and Writing Systems.
Recent research has reported motor problems in dyslexics, but the diagnostic significance of these motor problems in individuals whose motor development falls generally in the normal range is unknown. Based on Luria's concept of the functional system, we evaluated the contribution of motor skills, along with other research-supported contributing measures, to functional reading or writing systems. Child (n =122) and adult (n=200) dyslexics in a family genetics study completed a 4-hour battery of reading, writing, and neuropsychological measures. Hierarchical structural equation modeling was used to evaluate predictor factors (based on normed tests) for word form (based on phonological, morphological, and orthographic awareness), phonological loop, executive functions, plus oral-motor planning for oral reading accuracy or rate outcomes (or plus grapho-motor planning for written expression outcomes). The 2nd order word form factor explained oral reading accuracy and rate in child and adult dyslexics, but oral-motor planning added unique variance to oral reading rate in children and oral reading accuracy in adults. For both children and adults, the 2nd order word form factor explained written expression but grapho-motor planning did not contribute significantly except as mediated through word-form. The diagnostic significance depends not only on impairment in single measures but also the validated interrelationships among measures in an assessment battery. It is important to assess motor skills in dyslexics but phonological, morphological, and orthographic skills may be of more direct relevance to the diagnosis and treatment of dyslexia, which is primarily a written language not motor disorder.
Correspondence: *Kathleen Nielsen, Ph.D., Multidisciplinary Learning Disabilities Center, University of Washington, 402 Miller Hall, Seattle, WA 98195. E-mail: kathyhn@u.washington.edu*

M. PONCELET, N. COUNET & S. MAJERUS. The Acquisition of New Orthographic Sequences in Dyslexic Children.
In developmental dyslexia, spelling deficits have been much less explored than reading deficits, although the former tend to be more persistent than the latter. The aim of this study was to explore the precision of existing orthographic knowledge and the ability to acquire new orthographic sequences in dyslexic children. Sixteen dyslexic children (chronological age: 11;1+/-0;9 years; reading age: 7;8+/-0;7 years), 16 chronological age-matched (CA) children and 16 reading age-matched (RA) children participated in the study. A written lexical decision task including pseudohomophones assessed the precision of orthographic knowledge; an incidental learning task for orthographically inconsistent pseudowords assessed the ability to acquire new orthographic sequences. Relative to the CA group, the dyslexic group showed deficits for each task. Relative to the RA group, the dyslexic group showed a similar performance for incidental orthographic learning when assessed immediately after the learning session but impaired performance when assessed one week later [$F(1,45)=14.7$, $p<.001$)]. On the written lexical decision task, performance was similar for the words but impaired for nonwords [$F(1,45)=6.4$, $p<.05$)] and pseudohomophones ([$F(1,45)=3.7$, $p=.06$)]. Our data show that dyslexic children can acquire new orthographic representations at a similar rate as reading age-matched children. However, the long-term maintenance of these new orthographic representations is clearly impaired. The high rate of acceptance for nonwords and pseudohomophones on the lexical decision task suggests that the precision of existing orthographic knowledge is also poor. We propose that a failure to consolidate orthographic representations in long-term memory might underlie the less precise orthographic lexicon of dyslexic children.
Correspondence: *Martine Poncelet, Cognitive Sciences, University of Liège, Boulevard du rectorat, 3, B33, Liège 4000, Belgium. E-mail: Martine.Poncelet@ulg.ac.be*

L. EWING-COBBS, M. BARNES, P. CIRINO, L. FUCHS & J.M. FLETCHER. Sources of Individual Differences in Mathematical Computation and Fluency in Children.
Objective: To examine indices of processing speed, working memory, inhibitory control, and inattention as predictors of individual differences of mathematical calculation and fluency. Method/Participants: Children were recruited from a cohort enrolled in 3rd or 4th grade in two urban school districts. Mathematical competence and neuropsychological performance were assessed in children categorized as low performing (< 30 %ile; n=158) or average (>40 %ile; n=159) based on standardized measures of calculation and reading. To assess sources of individual differences in math calculation and fluency, multiple regression models examined ten predictor variables in the following domains: 1) age, 2) verbal and nonverbal working memory, 3) speed of number retrieval, 4) inhibitory control, 5) math fact retrieval speed for simple addition, and 6) teacher ratings of inattention. Results: The overall model R2 values ranged from .29 to .41 across four measures of calculation, and .47 for a measure of mathematical fluency. Within the total sample, all 10 predictors were significant ($p < .10$) in one or more overall models, although the pattern varied across the dependent mathematical measures and in children with different levels of mathematical competence. Math fact retrieval speed and inattention were significant predictors ($p < .002$) in every model; age and working memory also explained unique variance in mathematical scores. Conclusion: Individual differences in mathematical calculation and fluency were predicted by each of the domains examined, with math fact retrieval speed and inattention having the strongest unique contributions. Findings are discussed in relation to models of executive and numeric processing.
Correspondence: *Kimberly A. Espy, Ph.D., Family & Community Medicine, Southern Illinois University School of Medicine, MC 6503, 600 Agriculture Dr., Carbondale, IL 62901-6503. E-mail: kespy@siumed.edu*

D. MOLFESE & V. MOLFESE. Electrophysiological Correlates of Math Processing in Children.
Ratio discrimination abilities for 20 children (mean age: 10 years 6 months; range: 9 years 3 months to 12 years 1 month) were examined by recording behavioral responses and event-related potentials (ERPs) to pictorial and numerical stimuli. Children first viewed a picture that contained images of brown bags and red marbles (e.g., three bags displayed above four marbles), followed by a fraction. Children were asked to determine whether the fraction represented by the bags and marbles matched a fraction displayed as the second stimulus. Half of the comparisons were designated as easy comparisons (i.e., numerator in the first stimulus (bags or marbles) mapped directly to the numerator in the second stimulus) and half were designated as hard comparisons (i.e., the numerator in the first stimulus mapped to the denominator in the second stimulus). Reaction time and accuracy were recorded. ERPs were recorded using a high density array of 128 Ag/AgCl electrodes embedded in soft sponges and arranged into a net (Geodesic Sensor Net, EGI Inc.). Individual ERPs were recorded to the presentation of the second (comparison) stimulus for every child, electrode site, and trial. A principal components analysis (PCA) identified 5 regions of the ERP that

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

accounted for 88.25% of the total variance. Analyses of variance for each factor identified main effects for sex, electrode area, and hemisphere, as well as higher order interactions involving difficulty and match conditions. Brain source mapping identified specific differences in cortical involvement as a function of successful performance.
Correspondence: *Kimberly A. Espy, Ph.D., Family & Community Medicine, Southern Illinois University School of Medicine, MC 6503, 600 Agriculture Dr., Carbondale, IL 62901-6503. E-mail: kespy@siumed.edu*

M. BARNES, B. SMITH-CHANT, S. LANDRY, M. DENNIS & J.M. FLETCHER. Mathematical Processing in Spina Bifida: Implications for Math Disability Models.
Spina Bifida Myelomeningocele (SBM) is a neurodevelopmental disorder associated with a high incidence of math disability (MD), including a particularly high rate of specific math disability (MD), that is, MD without co-occurring reading disability (RD). Such characteristics make SBM of interest to models of math disability and mathematical development. We report recent research that combines cognitive developmental and neuropsychological approaches to investigate mathematical processing in preschoolers and school-age children with SBM. The integrity of basic arithmetic processes was studied by comparing 98 school aged children with SBM to 94 typically developing children on cognitive addition tasks. Deficits in accuracy, speed, and strategy use in single digit addition characterized math disabled groups regardless of reading status. Fine motor skills, but not visual spatial skills were related to performance on arithmetic problems. In our longitudinal studies of infants and preschoolers with SBM and their typically developing controls, the relation of visual spatial skill and fine motor skill to informal math varied as a function of the type of mathematical skill that was assessed. The results are discussed with reference to models of math disability, the role of visual-spatial and phonological abilities in mathematical computation, the relation of math fact mastery to mathematical skill, and the multi-dimensional nature of mathematical skill development.
Correspondence: *Kimberly A. Espy, Ph.D., Family & Community Medicine, Southern Illinois University School of Medicine, MC 6503, 600 Agriculture Dr., Carbondale, IL 62901-6503. E-mail: kespy@siumed.edu*

R. BULL, S. WIEBE & K.A. ESPY. Executive Functioning as a Longitudinal Predictor of Mathematics Ability.
The aim of this longitudinal study was to determine the utility of executive function skills as predictors of later mathematics ability, and as a predictor of rates of change in mathematical skill over time. In their preschool year, 140 children were tested on a battery of measures to assess executive functions (inhibition, switching, and working memory updating). On entry to primary school (age 5), all children completed PIPS assessments (Performance Indicators in Primary School) for mathematics and reading. This assessment was repeated at the end of Primary 1 (age 6) and the end of Primary 3 (8 years). Growth curve analysis revealed that performance on the Tower of London task was significantly related to the rate of change (linear growth and acceleration) in mathematical ability, whilst measures of phonological and visual spatial short-term memory (digit and corsi span), and a measure of inhibition (Shape School) were related to actual mathematics ability at 8 years of age. These results suggest that certain aspects of executive function skill, even measured in children as young as 4 years of age, are useful predictors of later mathematics ability. When used in conjunction with an assessment of basic numerical knowledge, executive measures may help to identify at an early age those children who later have difficulties learning mathematics.
Correspondence: *Kimberly A. Espy, Ph.D., Family & Community Medicine, Southern Illinois University School of Medicine, MC 6503, 600 Agriculture Dr., Carbondale, IL 62901-6503. E-mail: kespy@siumed.edu*

M. ELLEFSON & N. CHATER. Executive Functions, Switch Costs, and Arithmetic Achievement in Early Primary School.
Numerous studies have suggested that executive functioning (EF) abilities mediate academic achievement. Here we explored how general EF abilities, and more specifically how one critical feature of EF, switching, might impact arithmetic achievement. Despite children's experience with numerous demands to switch between tasks, performances declines, or switch costs (SC), persist when switching from one task to another, even if the onset of a switch is predictable. In recent years, the study of SCs in adults has been explored in great detail, but little is known about how children switch between tasks. Thus, it may be the case that an understanding of how children switch between various tasks may provide additional insight into arithmetic achievement. Traditionally, SCs are defined as increased response times (RTs) and/or decreased accuracy after switching between two tasks compared to repeating the same task. We have found SCs to simple categorisation tasks and to arithmetic equations in young primary school children. SCs appear to be mediated by the overall difficulty of the tasks. Different SC patterns occur when children switch between more complex arithmetical equations, suggesting a link between SCs and task complexity. In addition, the results suggest a link between SCs and executive functions, confirming a recently proposed link between EF and mathematical performance and indicating that switching abilities may mediate mathematical achievement. Additional studies will explore whether these results are an effect of neurological development, experience and knowledge acquisition of arithmetic, or and interaction of these two factors.
Correspondence: *Kimberly A. Espy, Ph.D., Family & Community Medicine, Southern Illinois University School of Medicine, MC 6503, 600 Agriculture Dr., Carbondale, IL 62901-6503. E-mail: kespy@siumed.edu*

Symposium 4/1:30–3:30 p.m.

Assessment of Multitasking Behavior: From Laboratory-based Tasks to Real Life Scenarios

Chair: Raymond Chan

R.C. CHAN, V.Y. DENG, Y. WANG & M. GUO. The construct validity of three ecologically valid tests of multitasking: a preliminary study from healthy subjects.
Objective: Clinical studies indicate that damage to the frontal lobes may result in deficits in performing multitasking tests in experimental conditions and is most probably associated with subjective complaints of performing simultaneous tasks in everyday life scenarios. Most recently, some more ecologically valid tests of multitasking have been developed. As yet, very few researches have been conducted to explore the construct of these tests. The purpose of this study aimed to examine the construct validity of three multitasking tests within a group of healthy subjects. Method: A total of 61 (24 men and 37 women) healthy subjects were recruited from undergraduates of psychology department. They were implemented a set of multitasking behaviour (Six Elements Test, Hotel Test, and Greenwich Test) and another comprehensive set of neuropsychological tests. Results: Principal-component analysis showed that there were five factors loaded on the three tests of multitasking behaviour, accounting for a total 73.7% of variance. These were: Factor 1 (Six Elements Test task allocation), Factor 2 (Hotel deviation and monitoring), Factor 3 (Greenwich memory and follow), Factor 4 (Greenwich score and plan), and Factor 5 (Rule-breaking). Correlation

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

was established among the derived factors and tests of neuropsychological tests presumably capturing the same constructs, even controlling for age, education, and intellectual functioning. Conclusion: This study provides empirical evidence that the three multitasking tests are actually measuring different components of multitasking behaviour although they have been presumably capturing the same construct of multitasking behaviour.
Correspondence: *Raymond C. Chan, PhD, Psychology, Sun Yat-Sen University, NA, Guangzhou 510275, China. E-mail: edschchq@zsu.edu.cn*

R.C. CHAN, M.F. RUSHWORTH, T. MANLY, B. LEVINE, R.C. CHAN, R.J. MACKINLAY & P.W. BURGESS. Assessment of Multitasking Behaviour: From Laboratory-based tasks to Real Life Scenarios .
Multitasking and task switching behaviours are recently receiving increasing interest from neuropsychologists and related disciplines. According to some cognitive models of attentional control (e.g., Normal & Shallice, 1986; Grafman, 1995), it is an important aspect of executive control to shift between tasks or mental sets among novel and complex tasks. A failure of maintaining such switching means a breakdown of the higher cortical control on these novel and complex tasks. However, most of task switching studies have primarily been focused on healthy people with a variety of experimental paradigms. We are now getting more and more evidence showing that adult populations with neurological disorders, children populations with ADHD, as well as healthy people will also experience difficulty in performing tasks involving switching ability and handling different tasks simultaneously in everyday life. The nature and pattern of these dysfunctions has yet been examined. In this symposium we present the most recent work that addresses the expression of multitasking behaviour in both healthy and clinical cases using various paradigms ranging form pure laboratory-based tests to ecologically valid tasks simulated to everyday life activities.
Correspondence: *Raymond C. Chan, PhD, Psychology, Sun Yat-Sen University, NA, Guangzhou 510275, China. E-mail: edschchq@zsu.edu.cn*

T. MANLY, K. HAWKINS, J. EVANS, K. WOLDT & I. ROBERTSON. The clinical effects of non-informative cues on multitasking.
Objectives: Multi-tasking assessments can be sensitive to dysexecutive impairments that are not revealed on conventional 'frontal' tasks. By definition, however, tasks requiring the co-ordination of many processes can be failed for many reasons (task comprehension, memory problems, indifference to success or failure and so forth). Here, we examined the reasons for multi-tasking failures in a group of traumatically brain injured patients. Methods: Patients performed a modification of Shallice and Burgess' (1991) 6-Elements tests under two counterbalanced conditions. In the experimental condition, periodic auditory tones were presented. The patients were asked to use the tone as a reminder to "think about what you are doing". No further training on strategy was provided. Results: In both conditions, the patients were able to recall the task instructions both before and after the task. Without the cues, the patient group showed evidence of neglect for the primary goal (trying all of the tasks and trying to allocate equal time for each). In the cued condition, their performance was indistinguishable from that of the healthy IQ matched control group. Conclusions: The results suggest that, in this group, failure could not be attributed to poor comprehension, failure to remember the instructions per se or poor motivation. The role of such methods in improving the specificity of assessment and in rehabilitation are discussed.
Correspondence: *Raymond C. Chan, PhD, Psychology, Sun Yat-Sen University, NA, Guangzhou 510275, China. E-mail: edschchq@zsu.edu.cn*

B. LEVINE. More than you bargained for: Neuropsychological and neuroanatomical correlates of the R-SAT.
Objective: Strategic behavior relies on both general and specific brain cognitive and neuroanatomical brain resources. The integration of performance data across multiple populations of patients can be used to increase our understanding of these mental operations. Method: Data from approximately 150 patients and controls were collected on the Revised Strategy Application Test (R-SAT), a measure designed to mimic real-life unstructured situations that pose problems for dysexecutive patients. The patient groups included traumatic brain injury, frontotemporal lobar dementia, and focal brain lesions. Patients had high resolution MRI data with quantified measures of regional volumes of gray matter, white matter, and CSF. Patients were also administered a battery of standard neuropsychological tests assessing speeded information processing, working memory, and executive functions, as well as outcome questionnaires. Results: Although localized prefrontal damage was related to the R-SAT in systematic ways, a significant amount of the variance in performance was explained by non-frontal damage and generalized volume loss. Similarly, R-SAT performance was related to both specific tests of prefrontal and executive function, but also to measures of general cognitive resources. Similar results are noted for other executive tests with previously reported specificity of lesion-behavior relationships. Conclusions: While the prefrontal subregions are clearly involved in strategic behavior and multitasking, these processes cannot be reduced to a single process or brain region. Previous findings of specific lesion-behavior relationships are unique to the population studied. It is important to study patients with both focal and diffuse injury to best understand the neuropsychology of these tasks.
Correspondence: *Raymond C. Chan, PhD, Psychology, Sun Yat-Sen University, NA, Guangzhou 510275, China. E-mail: edschchq@zsu.edu.cn*

R.J. MACKINLAY, T. CHARMAN & A. KARMILOFF-SMITH. Multitasking in autism spectrum disorder.
Objective : Children with High Functioning Autism Spectrum Disorder (HF-ASD) often experience difficulties organising goal-directed actions in their day-to-day lives, requiring support to schedule daily activities and structure educational tasks. Multitasking is a methodology that taps into the cognitive processes necessary for successful goal-directed activities in everyday life, including planning and executive functions. The aim of this study was to investigate multitasking in children with HF-ASD. Design: A total of 14 boys with HF-ASD (mean: 11;11 years, IQ 105.6) and 16 typically developing control boys (mean: 12;0 years, IQ 109.1). A Children's Multitask Paradigm, based upon the adult Greenwich Multitask Test (Burgess et al., 2000). Our paradigm yields six key variables: 'learn' and 'remember' task parameters, 'plan' how to perform the multitask, 'perform' (fluency of switching between subtasks, strategy use and performance errors), how well participants 'follow' their plan and their 'recount' of what they had done. Results: Both groups were equally able to learn and remember task parameters. HF-ASD were impaired relative to controls in multitask planning ($p<.05$) and performance ($p<.05$). 43% HF-ASD did not switch fluently between tasks, compared to 13% controls. HF-ASD adopted poorer performance strategies ($p<.05$). There were no group differences in plan follow or recount. Conclusions: HF-ASD participants demonstrated impairments in several aspects of multitasking: planning, switching between subtasks and strategy use; concordant with literature indicating deficits in planning, cognitive flexibility and strategic thinking in this population. As plan following was not impaired, it may be possible to target interventions at the planning stage to improve overall performance.
Correspondence: *Raymond C. Chan, PhD, Psychology, Sun Yat-Sen University, NA, Guangzhou 510275, China. E-mail: edschchq@zsu.edu.cn*

H. GARAVAN. Attention Switching and Working Memory in Drug Abused Subjects. .
Most investigations of the switching involved in multitasking have focussed on switches between separate tasks. Here, we present data on a different domain of attention switching, that is, switching between thoughts. More specifically, we posit that there is an attentional limitation within working memory (WM) such that attention can only be fo-

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

cussed on one item at a time. Our tests of this capacity limitation require subjects to maintain two running counts or two visuospatial locations or one count and one location. Visually presented stimuli instruct subjects to update one of the counts or one of the locations and manipulating the order in which the stimuli are presented necessitates switches from one count to another or from one location to another. Thus, these tasks provide us with estimates of the time to switch between items in verbal WM, between items in visuospatial WM and between items held in both WM modalities. Our results have demonstrated that there is an attentional limitation of one item in WM as evidenced by longer response times when switching between items compared to when maintaining attentional focus on the same item. This limitation persists after thousands of trials of practice and is of a comparable magnitude within and between each of the WM modalities. The ability to control the focus of one's thoughts may have clinical relevance as evidenced by the perseverative thinking patterns of brain damaged individuals or those with depression or Obsessive Compulsive Disorder or drug dependent individuals. We will present fMRI data of controls and cocaine users performing these attention switching tasks. Functional brain imaging has identified widespread cortical activity associated with this switching function suggesting that switches involve the entire WM cortical network rather than a specific (frontal) locus. Users, who are worse at switching between items in WM, reveal patterns of hypoactivity in the anterior cingulate and subcortical regions.

Correspondence: *Raymond C. Chan, PhD, Psychology, Sun Yat-Sen University, NA, Guangzhou 510275, China. E-mail: edschchq@zsu.edu.cn*

Paper Session 4/1:30–3:30 p.m.

Dementia

Chair: Linda Clare

C. STOPFORD, J. SNOWDEN, J. THOMPSON & D. NEARY. Phenotypic Variations in Alzheimer's Disease.

Alzheimer's disease (AD) has traditionally been viewed in terms of a global decline in intellect. However, recent research has highlighted differences in cognitive profiles among AD patients, indicating that impairment is not global and raising the possibility of distinct subtypes. Nevertheless, findings have not been entirely uniform. Moreover, emphasis on 'atypical' forms of AD invites the question of what constitutes 'typical' forms of the disease. The present study involved a retrospective cross-sectional analysis of cognitive data collected prospectively from 75 AD patients attending a regional diagnostic clinic. Factor and cluster analyses were used to avoid presuppositions regarding tests or the existence of distinct sub-groups. Factor analysis revealed five distinct factors, reflecting the dimensions of memory, language, perceptuospatial skills, executive ability and praxis. Cluster analysis revealed 13 patient clusters, reflecting differing patterns of cognitive performance. In nine, mild dissociations were demonstrated between cognitive domains, whereas in four there were strikingly disproportionate impairments within a single cognitive domain. Clusters did not differ in terms of age or disease duration and differences could not be accounted for by disease severity. The results confirm that cognitive impairment in AD is not global, and constitutes a constellation of discrete deficits. Furthermore, they illustrate phenotypic variation in AD with 'focal' presentations representing extremes of this variation.

Correspondence: *Cheryl Stopford, BSc (Hons) Psychology, Cerebral Function Unit, Greater Manchester Neurosciences Centre, Hope Hospital, Stott Lane, Salford M6 8HD, United Kingdom. E-mail: cheryl.stopford@man.ac.uk*

C. RAMSDEN, G. KINSELLA & B. ONG. Everyday Action Performances in Alzheimers Disease: The Role of Working Memory in Everyday Action Task Performances.

Everyday actions frequently require considerable cognitive planning and resources, and errors in their performance are not uncommon. Research has begun to link impaired executive attention and everyday action disorder in various neurological disorders. Mild Alzheimers disease is characterised by impaired memory and executive function. The present study aimed to evaluate whether disordered everyday action performance is associated with mild Alzheimers disease and to determine the contribution of executive function to the performance of everyday actions. Patients with mild Alzheimers disease (n = 15) were compared with healthy older adults (n = 15). Participants performed everyday action tasks in single and dual formats, and a neuropsychological battery of tests examining executive function. The current study found that increased attentional demands and task complexity disproportionately affected the Alzheimers disease group. The findings support the fractionation of central executive (CE) functions, and suggest that the ability to hold and manipulate activated information is strongly involved in everyday action performances. The findings support the theory that impairments to executive functions (specifically CE functions) lead to impaired everyday action task performances. The findings also support the fractionation of CE functions, and suggest that the ability to hold and manipulate activated information is strongly involved in everyday action performances. The findings have implications for the understanding of CE impairments and the nature of functional task difficulties in this population, and the management of people with mild Alzheimers disease.

Correspondence: *Clare Ramsden, Doctor of Psychology (Clinical Neuropsychology), Ivanhoe Private Rehabilitation Hospital, 11/42 Nicholson St., Abbotsford, VIC 3067, Australia. E-mail: clareramsden@iprimus.com.au*

C. JULIEN, J. SNOWDEN, J. THOMPSON & D. NEARY. Semantic Dementia and Concepts of Number.

Recent single case studies of patients with semantic dementia suggest that number knowledge is fully preserved in the context of a profound impairment of semantic memory. However, it is not known to what extent this represents a general feature of semantic dementia and whether the progressive degradation of semantic memory places any constraints on numerical understanding. We investigated numerical abilities in 9 patients (5 men, 4 women) with semantic dementia. Patients were assessed on a wide variety of tasks including basic number processing, calculation, as well as tasks requiring a more conceptual understanding of number, such as factual numerical knowledge, understanding of time and age estimation. In a series of single case analyses, patients' performance on numerical tasks was compared to that of 8 controls (4 men, 4 women) matched for age and education. All patients performed normally on most numerical tasks, however, patients presenting with more severe semantic impairment were impaired (Crawford & Howell, 1998) on tasks tapping conceptual components of number knowledge. The study provides support for the dissociation between different components of number knowledge and suggests that certain aspects of numerical understanding are dependent on the integrity of the semantic system. Reference: Crawford, JR & Howell, DC (1998). Comparing an individual's test scores against norms derived from small samples. The Clinical Neuropsychologist, 12, 482-6.

Correspondence: *Camille Julien, M.Psychology, Cerebral Function Unit, Department of Neurology, Hope Hospital, Stott Lane, Salford M6 8HD, United Kingdom. E-mail: camille.julien@manchester.ac.uk*

A. GADE, G. SKIBINSKI & S. GYDESEN. Frontotemporal Dementia Related to Chromosome 3 (FTD3): Preclinical Neuropsychological Screening.

We have studied a large kindred in Jutland with autosomal dominant frontotemporal dementia linked to chromosome 3, the only such family yet known (Gydesen et al., Neurology 2002, 59: 585-94). The early

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

phenotype is not yet known, and we studied well subjects at risk of developing the disease to detect early signs. At risk subjects between 40 and 70 years of age and spouses were invited to participate in neuropsychological assessment performed without knowledge of status. 38 family members and 20 spouses participated. Some participants have not yet been haplotyped, and we report preliminary results from comparisons of 20 test measures in 3 groups of well-matched subjects: 11 high risk subjects, 16 low risk subjects, and 19 spouses. T-tests without corrections for multiple comparisons showed: 1) No significant differences between the two control groups. 2) A total of 8 significant differences between high risk subjects and controls, all with high risk subjects impaired. Trail Making B was impaired relative to both control groups, and significant differences between high risk subjects and one control group (but not both) were found in cognitive estimations, letter-number sequencing, design fluency, immediate (but not delayed) story recall, and one further test. This pattern of subtle impairment is indeed compatible with predominantly frontal involvement. We want to confirm these preliminary results in the full data set and replicate them in further cross-sectional and longitudinal analyses in a planned follow-up. At present, our results indicate that overt symptoms may be preceded by many years of subclinical impairment.

Correspondence: *Anders Gade, Ph.D., Psychology, University of Copenhagen, 88 Njalsgade, Copenhagen 2300, Denmark. E-mail: Anders.Gade@psy.ku.dk*

P. MCMONAGLE & A. KERTESZ. The Evolution of Aphasia in Cortico-basal Degeneration.

Cortico-basal degeneration (CBD) is part of the Pick complex of diseases which is recognised to include aphasic disorders. Recently it has been recognised that aphasia is part of the spectrum of cognitive disorders encountered in patients with CBD. We set out therefore to examine for changes in language function in patients with cortico-basal degeneration (CBD) using a standardised language battery the Western Aphasia Battery (WAB). We identified patients with CBD according to standard clinical criteria (Lang et al, 1994) from attenders to a cognitive disorders clinic in London, Ontario. Annual assessments of language over 3 years were performed with the Western Aphasia Battery (WAB) which yields a maximal Aphasia Quotient (AQ) of 100 with values < 95/100 indicating aphasia. General cognitive assessments were performed over the first 2 years with the Dementia Rating Scale (DRS). We identified 10 patients with CBD who underwent annual assessments of language over 3 years. Pathological confirmation of CBD was available in 4 patients who later came to autopsy. Statistical analysis of AQ and DRS was performed with a repeated measures ANOVA. The average age of onset (+/- SD) was 63 +/- 7.3 years with 2.7 +/- 1.7 yrs of illness before their first cognitive asssessment. DRS scores declined from 117.7 +/- 12.4 at year 1 to 102.7 +/- 21.2 at year 2 ($p = 0.02$). AQ also declined from 89.5 +/- 12 at year 1 to 80.7 +/- 18.7 at year 2 and 62.4 at year 3 ($p = 0.008$). Language dysfunction was evident among our cohort of patients with CBD showing progression from mild to significant aphasia over the three years of assessment.

Correspondence: *Paul McMonagle, MB, MRCPI, MD, Cognitive Neurology, St Joseph, 268 Grosvenor St, London, ON N6A 4V2, Canada. E-mail: Paul.mcmonagle@sjhc.london.on.ca*

N. PENDER & L.H. GOLDSTEIN. Investigating Recall-Recognition Discrepancies in Huntington's Disease Using the Dual Route Signal Detection Model of Recognition Memory. . .

In Huntington's disease (HD) progressive cortical and striatal degeneration leads to impaired episodic memory where free recall is often impaired relative to recognition. The latter effect has been ascribed to faulty retrieval processes. We investigated this effect in HD patients using a dual-process signal detection model of recognition memory. Twenty two clinically symptomatic HD patients (mean UHDRS Functional Independence scale of 90.9) were compared to 22 matched healthy controls on neuropsychological measures of recall and recognition memory. Both groups also undertook a yes/no verbal recognition task under full and divided attention conditions. Measures of recollection (R), familiarity (F), response bias (c) and discrimination (d') were obtained. HD patients showed significantly lower target discrimination than controls (d' HD=2.0; d' Controls=3.06) but no significant response bias. HD patients were impaired on measures of delayed verbal recall and verbal recognition relative to controls. They also showed a significantly larger recall-recognition discrepancy than controls (HD=-0.24; Controls=-0.15). Yet, using the dual-process approach, both groups showed equivalent levels of recollection (HD =0.07; Controls =0.07) and familiarity (HD = 0.85; Controls = 0.86). HD patients were impaired on neuropsychological measures of recall and recognition, and recognition ability was significantly better than free recall. No impairments were observed when recollection was examined using an alternative process orientated recognition task. This finding questions both the comparability of retrieval processes operating in free recall and recognition memory and the logic of interpreting recall-recognition discrepancies as markers of faulty retrieval. In the current study, HD patients showed poor retrieval on free recall and recognition tasks but no impairments on a dual process recognition task.

Correspondence: *Niall Pender, BA, MSc, MSc, Dept. of Psychology, Beaumont Hospital, Beaumont Road, Dublin 9, Ireland. E-mail: niallpender@beaumont.ie*

Symposium 5/4:00–5:40 p.m.

Neuropsychological Contributions to the Assessment and Management of Patients With Very Low Levels of Awareness

Chair: Barbara Wilson

B.A. WILSON, J. PICKARD, A. OWEN, D. BADWAN, H. GILLTHWAITES, M. REIMER & T. MCMILLAN. Neuropsychological contributions to the assessment and management of patients with very low levels of awareness.

Traditionally neuropsychologists have had little involvement with people who are in coma or the vegetative state or the minimally responsive state. This is a field where the medical profession, nurses, physiotherapists, occupational therapists and speech and language therapists have been the prime movers. Until fairly recently most neuropsychologists have entered the scene only when patients have recovered consciousness. In the past few years, however, an increasing number of psychologists have become involved in the assessment and management of patients in states of reduced awareness. However we are skilled in assessment, behavioural observations, goal setting and decision making so these skills can be transferred to work with low awareness patients. It would seem that there are at least four reasons why neuropsychologists should be part of the multidisciplinary team involved in the care of low awareness patients: namely, in the assessment of the behavioural repertoire of these patients, in the careful observation of change, in helping to make decisions about the diagnosis, and in the early goal setting with health care staff and families. We cannot function efficiently, however, if we work in isolation. We need to recognise the contributions of the medical profession, nurses, therapists, radiographers, dieticians, physiologists and other professions contributing to good clinical care and research. This multidisciplinary symposium addresses issues of assessment, diagnosis, quality of life and recovery from states of very low awareness.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

Correspondence: *Barbara A. Wilson, Ph.D, Cognition and Brain Sciences Unit, Medical Research Council, Box 58 Addenbrooke, Hills Rd, Cambridge CB2 2QQ, United Kingdom. E-mail: barbara.wilson@mrc-cbu.cam.ac.uk*

A. OWEN. Using a Hierarchical Approach to Investigate Residual Auditory Cognition in Persistent Vegetative State. .

Persistent vegetative state is arguably one of the least understood and most ethically troublesome neurological conditions in modern medicine. In recent years, a number of studies have demonstrated an important role for functional neuroimaging in the identification of residual cognitive function in patients meeting the clinical criteria for persistent vegetative state. Such studies, when successful, may be particularly useful where there is concern about the accuracy of the diagnosis and the possibility that residual cognitive function has remained undetected. Unfortunately, functional neuroimaging in persistent vegetative state is extremely complex and subject to numerous methodological, clinical and theoretical difficulties. In this talk, it will be argued that in order to most effectively define the degree and extent of preserved cognitive function in persistent vegetative state, a hierarchical approach to cognition is required. To illustrate this point, a series of functional neuroimaging paradigms in the auditory domain will be described, which systematically increase in complexity in terms of the auditory and/or linguistic processes required and, therefore, the degree of preserved cognition that can be inferred from 'normal' patterns of activation in persistent vegetative patients. Preliminary results in a small series of patients provide a strong basis for the systematic study of possible residual cognitive function in persistent vegetative state.

Correspondence: *Barbara A. Wilson, Ph.D, Cognition and Brain Sciences Unit, Medical Research Council, Box 58 Addenbrooke, Hills Rd, Cambridge CB2 2QQ, United Kingdom. E-mail: barbara.wilson@mrc-cbu.cam.ac.uk*

D. BADWAN. Low Awareness States - Diagnostic Dilemmas and Resolutions.

Disturbance in the level of consciousness as a result of acquired brain injury remains a diagnostic dilemma for many practising clinicians. The implications of a clear diagnosis of the level of awareness in any individual case cannot be overestimated. In spite of the progress in medical science, ethical considerations remain problematic and method of assessment that is reliable and validated needs to established. A multi-disciplinary team approach remains the main stay in achieving such diagnosis. Sensory modalities assessment programmes are used as a tool in the establishing such diagnosis. The usefulness of such programmes, including coma-awakening programmes, has failed to demonstrate a clear undisputed evidence for the usefulness of such programmes. It is argued in this article that the research methodologies used in some studies in this field are unlikely to reveal such evidence. At the Royal Leamington Spa Rehabilitation Hospital such programmes have been in use for over ten years. The programme used is described. Its evaluation and outcomes are noted. Tools used in the in sensory assessment programmes are briefly described. The need for universally accepted tools in these assessments and for collaborative multi-centre research in this field is emphasised. As a consequence clarification of the diagnostic criteria of Vegetative and Minimally Conscious states is expected to lead to a better clinical and ethical understanding. There is a need for further clarification of other clinical states that fall within the spectrum of low awareness states. A classification based on neuro-behavioural observations is suggested.

Correspondence: *Barbara A. Wilson, Ph.D, Cognition and Brain Sciences Unit, Medical Research Council, Box 58 Addenbrooke, Hills Rd, Cambridge CB2 2QQ, United Kingdom. E-mail: barbara.wilson@mrc-cbu.cam.ac.uk*

H. GILL-THWAITES & R. MUNDAY. The Sensory Modality Assessment and Rehabilitation Technique.

The Sensory Modality Assessment and Rehabilitation Technique, (SMART) (Gill-Thwaites, 1997) was developed as a tool to identify evidence of awareness in patients diagnosed in a Vegetative State (VS) or Minimally Conscious State (MCS). The formal aspect of SMART includes the SMART sensory assessment, providing a structured programme to assess the patient's level of response to sensory stimuli. Retrospective and prospective research (Thwaites, 1996, Gill-Thwaites and Munday 2005) has established SMART as a sensitive tool to measure awareness in patients diagnosed in VS. The informal component includes the gathering of information from relatives and friends in respect of their observation of the patients' responses and behaviours during everyday activities and interactions. Evidence shows that whilst the family and relatives have been encouraged to be members of the multidisciplinary team (Kreutzer et al, 1992 and Rosenthal & Young, 1988), the focus has been primarily upon individuals with a diagnosis of traumatic brain injury, with little research existing in relation to VS and MCS. A recent research study has compared the results of the SMART formal sensory assessment of patients' behaviour and responses to those recorded by the identified relatives using a subject comparative design. The aim being to identify the type of behaviour the relatives observe and ascertain when these are observed in comparison to formal assessment. The outcomes of the research may change the way in which relatives/carers are involved in the process of intervention and provide evidence of the value of their contribution and inclusion in the treatment process.

Correspondence: *Barbara A. Wilson, Ph.D, Cognition and Brain Sciences Unit, Medical Research Council, Box 58 Addenbrooke, Hills Rd, Cambridge CB2 2QQ, United Kingdom. E-mail: barbara.wilson@mrc-cbu.cam.ac.uk*

M. REIMER. Quality of Life and the Minimally Conscious State.

The concept of quality of life of adults in a minimally conscious state is controversial and problematic. There are those who would say that without consciousness of self there can be no quality of life. Others, including this author, argue that there are degrees of quality of life that even the most minimally conscious individual can experience and communicate. This argument will be supported through discussion of three relevant research projects in which the author has been involved: Indicators of quality of life changes for adults with traumatic brain injury in a community rehabilitation program, Development and initial testing of a severe brain injury recovery scale, and Observing and interpreting behavior to understand the 'Inside-Perspective'. The argument will continue with a brief exploration on alterations in the sense of being, drawn from the author's experience as a neuroscience nurse as well as a researcher.

Correspondence: *Barbara A. Wilson, Ph.D, Cognition and Brain Sciences Unit, Medical Research Council, Box 58 Addenbrooke, Hills Rd, Cambridge CB2 2QQ, United Kingdom. E-mail: barbara.wilson@mrc-cbu.cam.ac.uk*

T.M. MCMILLAN & C.M. HERBERT. Ten Year Follow-up of a Potential Treatment Withdrawal Case.

Following an extremely severe traumatic brain injury in 1993, a young woman was rendered severely disabled. When first seen two years after injury, she was thought to be in a minimally conscious state and withdrawal of artificial nutrition and hydration was considered. Neuropsychological assessment made clear that she was sentient and wished to continue living, and the petition to Court was withdrawn. She was followed up at 5 years and now at 10 years after injury with evidence of significant recovery of function at each follow-up. As a 'rule of thumb' many clinicians think that meaningful recovery will have ended within 2 years of injury. At that time she was tetraplegic and anarthric, was tube fed and completely dependent for all care needs. She now lives in

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

the community with 24 hour support, she speaks, initiates conversation, has a spontaneous sense of humour, expresses clear and consistent preferences, uses an electric wheelchair, eats solid food and drinks though a straw. This case demonstrates the need for routine neuropsychological assessment in cases thought to be 'near to' a vegetative state, in a minimally conscious state or otherwise severely disabled and have communication difficulty and indicates a need for caution in predicting long term outcome even two years after injury.
Correspondence: *Barbara A. Wilson, Ph.D, Cognition and Brain Sciences Unit, Medical Research Council, Box 58 Addenbrooke, Hills Rd, Cambridge CB2 2QQ, United Kingdom. E-mail: barbara.wilson@mrc-cbu.cam.ac.uk*

Poster Session 7: Neurological Disorders/4:00–5:30 p.m.

K.E. THOMASON & I. WRIGHT. Transient Cognitive Impairment in Children with Epilepsy.
Children with epilepsy are often found to have educational and learning difficulties that are linked with variability in performance. One factor that may contribute to children's variability is the abnormal electrical activity that can occur between seizures (interictal epileptiform activity). When this activity is present, a corresponding transient cognitive impairment (TCI) is commonly observed (Aarts et al, 1984). Many different cognitive tests have been employed to identify TCI but they are known to differ in their sensitivity and suitability for children. As a result, a new measure of TCI was piloted in children with epilepsy alongside simultaneous EEG and video monitoring. It is hypothesised that frequent interictal epileptiform activity will be correlated with variability in performance on the new task. 20 children with frequent interictal spiking on a recent EEG and/or reported fluctuations in cognitive performance were included in the study along with 20 age-matched controls. Both groups were administered the Computerised Children's Colour Trails (CCCT) to complete for 30 minutes alongside EEG and video monitoring. Evidence for variability was examined in relation to EEG abnormalities and other factors, such as fatigue and motivation. Type of epilepsy, age at onset and medication were also examined in relation to performance on the CCCT in the clinical sample. Correlations between interictal epileptiform activity and variability in performance suggest that TCI is still a valid concept and that the CCCT is a robust TCI-sensitive test. However, further research is required to assess the long-term effect of such variability and its impact on more stable aspects of cognition such as educational achievement.
Correspondence: *Kate E. Thomason, Psychology, Psychology, University of Sheffield, Western Bank, Sheffield S10 2TP, United Kingdom. E-mail: pcp03ket@shef.ac.uk*

A.J. CLARKSON, L. TIPPETT & J. OGDEN. Adjustment to Life Following Temporal Lobectomy for Refractory Epilepsy.
Although temporal lobe surgery may alleviate seizures, psychosocial benefits may not neccessarily accompany seizure cessation, with some patients experiencing a decline in psychosocial functioning post-surgery. This study aimed to identify relationships between personal resources (dispositional optimism, learned resourcefulness, self-efficacy, locus of control, social support), seizure outcome and post-surgical psychosocial adjustment (subjective handicap, functional outcome and mood states) following temporal lobectomy for chronic epilepsy. Additionally, qualitative interviews explored the main challenges and tasks of adjustment required after surgery together with the perceived resources necessary to meet these demands. Fifty-six New Zealanders who had undergone temporal lobectomy for refractory epilepsy within the past 7 years, were assessed retrospectively. Questionnaires were administered, comprising measures of personal resources, coping strategies and psychosocial adjustment. Semi-structured interviews were conducted to explore the journey of adjustment following surgery and gain an understanding of how surgery impacted on life, difficulties experienced and perceived rehabilitative requirements. Quantitative findings: Regression analyses showed that self-efficacy was strongly associated with better psychosocial adjustment following temporal lobectomy for refractory epilepsy, after controlling for seizure outcome. Qualitative findings: Epilepsy-related stigma emerged as a barrier to successful transition to life without seizures. Additionally, low self-efficacy and low self-esteem were also impediments to adjustment. Self-efficacy appears to be an important component of adjusting to life post-surgically, however, lifestyle constraints induced by epilepsy may erode the development of this personal resource. Implications for rehabilitation will be discussed.
Correspondence: *Anne-Marie J. Clarkson, Psychology, University of Auckland, 9B Lauriston Avenue, Newmarket, Auckland 1005, New Zealand. E-mail: annac@gestrohorne.co.nz*

N. CHE DIN, N. SANUSI & M. AHMAD. Predictors of Memory in Adolescents with Epilepsy.
The study examined the factors affecting memory in adolescents with epilepsy and the influence of depression on memory. The factors include types of epilepsy, severity, site of lesion, handedness, onset and academic performance. Comparison between genders were carried out for all factors. A sample of 31 adolescents with epilepsy with age between 11 to 19 years was selected from Neurology Out Patient Clinic. Verbal memory was assessed using Rey Auditory Verbal Learning Test (RAVLT), visual memory with Benton Visual Retention Test (BVRT) and depression with Reynold's Adolescent Depression Scale (RADS). The result showed that adolescents with epilepsy has lower memory compared to adolescents with mixed neurological illness. Half of them (54.8%) has good shoert-term visual memory. Among the significant factors influencing verbal memory are handedness and gender. Male and female differ significantly on BVRT and all Trials of RAVLT except Trial II. Depression did not significantly influenced memory in this sample. Verbal and nonverbal memory of adolescents with epilepsy is lower than other neurological illness. Some of the results contradicted the previous findings and could not be generalized to epilepsy population due to small and hetergenous sample.
Correspondence: *Normah Che Din, Master of Arts in Clinical Psychology, Health Psychology Unit, Universiti Kebangsaan Malaysia, Faculty of Allied Health Sciences, Jalan Raja Muda Abdul Aziz, Kuala Lumpur 56000, Malaysia. E-mail: normah@medic.ukm.my*

A. GIOVAGNOLI, R.F. MENESES, F. VILLANI & G. AVANZINI. Drawing from Memory and Semantic Memory Deficits in Temporal Lobe Epilepsy.
Drawing from memory (DFM) implicates several processes. In temporal epilepsy patients (TEp) assessment of DFM could contribute to determine the interaction between these functions defining the position of semantic memory deficits. This study aims to explore the effect of side of epileptic region and the interrelationships between drawing, semantic memory, perception, and constructional abilities. Sixty-two TEp with left (n=32) or right (n=34) epileptic region and 30 healthy subjects were assessed. The DFM test includes living and non-living items. Drawings were scored by three judges, unaware of test items (1=correctly identified, 0=unidentified/misidentified); the total score was the sum of scores (0-48). The verbal and visual version of the Pyramid and Palm trees test (PPTT), Ravens Coloured Progressive Matrices (RCPM), and Reys Complex Figure copying (RCFc) assessed semantic memory, visuo-spatial reasoning, and constructional praxis. Between-group comparisons showed significant differences in all test performances. Post-hoc analyses showed that both TE groups were impaired in DFM compared to controls. Right TEp were impaired on RCPM, RCFc, and visual PPTT. Left TEp were impaired on RCPM and RCFc, and on both versions of the PPTT. Correlation and regression analyses showed that in right TEp

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

the DFM score was significantly associated with RCPM and visual PPTT scores; in left TEp with RCPM and verbal PPTT scores. These results show that DFM is impaired in TLEp irrespective of side of epileptic region and that impairment reflects an altered functioning of semantic memory. The performance possibly requires complex verbal and visual semantic competence involving functions of both hemispheres.
Correspondence: *Anna Rita Giovagnoli, Neurologist, Neuropathology and Neurology, Carlo Besta National Neurological Institute, Via Celoria 11, Milan 20133, Italy. E-mail: rgiovagnoli@istituto-besta.it*

N. WHITTIER, J. BOTTOMS & J.B. ALLEN. Personality Assessment Inventory (PAI) Findings in Individuals Diagnosed with Multiple Sclerosis (MS).

Multiple Sclerosis (MS) affects approximately 350,000 people in the United States alone. While behavioral manifestations include both cognitive and psychosocial disturbance, the wide range of personality and cognitive changes make it difficult to identify an MS personality (Mahler, 1992). However, individuals may manifest a relatively limited and predictable set of personality patterns on objectives personality measures. The current study utilized the PAI to identify potential profile clusters of individuals diagnosed with MS. The current study included 55 individuals (mean age=52.6) diagnosed with MS that that received a battery of cognitive and personality tests as well as a full medical workup as part of an ongoing project investigating factors that predicted physical activity levels and overall functioning in this population. Data from this population was subjected to descriptive and correlational techniques as well as a K-Means Cluster Analysis within SPSS. Mean elevations were seen on a number of scales and subscales of the PAI. Perhaps most notable was the elevation on the Somatic Complaints Scale (Mean T-Score=60.1). Interestingly, subscales within this scale appeared to differentially contribute to this overall elevation (Health Concerns=60.26; Somatization=53.37; and Conversion.=62.8). Cluster analysis using a K-means approach suggested a two group solution (with 37 and 17 cases in the two groups respectively) as the most effective classification. Findings support the conclusion that the psychosocial characteristics of individuals diagnosed with MS are variable but tend to fall within a predictable set of personality findings. Implications for further investigations will also be discussed.
Correspondence: *Jeffery B. Allen, Ph.D., SOPP, Wright State University, 3640 Colonel Glenn Highway, Dayton, OH 45435-0001. E-mail: jeffery.allen@wright.edu*

J.M. BOTTOMS, N.C. WHITTIER & J.B. ALLEN. Self-report Accuracy of Patients with Multiple Sclerosis.

Several studies have documented inaccurate self-reports of memory and/or cognitive impairment in multiple sclerosis (MS) often without correlation between self-report of impairment and actual performance on memory and/or cognitive tasks. This study examined auditory memory performance and self-report accuracy of personality functioning in MS patients (n=54). Participants completed the Personality Assessment Inventory (PAI) and either the Rey Auditory-Verbal Learning Task (RAVLT) (n=19) or the California Verbal Learning Test (CVLT) (n=35). The validity scales of the PAI, Inconsistency (ICN), Infrequency (INF), Negative Impression (NIM), & Positive Impression (PIM) were examined to determine if correlations were present between self-report accuracy and memory performance. Significant ($p<.05$) negative correlations were found between ICN and overall performance on the CVLT($r = -3.66$, $p<.05$), short delayed free recall ($r = -4.94$, $p<.001$), short delayed cued recall ($r = -.373$, $p<.001$), long delayed free recall ($r = -.378$, $p<.05$). ICN was also found to have a significant negative correlation with retention ($r = -.507$, $p<.05$) on the RAVLT. Regression equations indicated that the five trial total on the CVLT, and the total scores of the depression and somatic complaints scales on the PAI accounted for almost 37% of the variance in ICN scores, and that same scale scores on the PAI combined with the retention and the total of retention and delayed relay trials from the RAVLT accounted for almost 36% of the variance in ICN scores. Findings suggest that inconsistent responses for personality functioning may partly be explained by memory deficits, depression, and somatic complaints in MS.
Correspondence: *Jeffery B. Allen, Ph.D., SOPP, Wright State University, 3640 Colonel Glenn Highway, Dayton, Ohio, OH 45435-0001. E-mail: jeffery.allen@wright.edu*

J. DELUCA, Y. GOVEROVER, J. KALMAR, E. GAUDINO-GOERING, M. SHAWARYN & N.B. MOORE. The relationship between subjective and objective measures of everyday life activities in persons with multiple sclerosis. .

To investigate the relationship between subjective and objective performance-based measures of functional status in persons with Multiple Sclerosis (MS), and to compare their performance to healthy controls. A between-groups design examining differences in objective and subjective measures of functional performance. A correlational approach was used to examine the relationship between objective and subjective measures of functional capacity. 74 individuals with clinically definite MS and 35 healthy controls who live in the community. Outcome measures are: Executive Function Performance Test (EFPT), a performance-based measure of actual everyday life activities; Functional Assessment of Multiple Sclerosis (FAMS), measure of quality of life; Functional Behavior Profile (FBP), a self-report measure of functional activities. MS participants reported more difficulties on functional tasks, relative to healthy controls. MS participants also performed significantly worse on actual performance of everyday life tasks on the EFPT relative to healthy individuals. However, all correlations between subjective and objective functional measures were non-significant. Neuropsychological functioning correlated with EFPT but not self-report measures. MS participants displayed difficulties on everyday life measures of functional activity. However, these actual functional difficulties did not correlate with subjective complaints of everyday life problems. The lack of association between objective performance-based measures and subjective self-report measures of functional activities is a challenge to outcomes measurement and has implications for assessment of functional performance. Results will be discussed in terms of the different dimensions these tools are assessing and their respective strengths and limitations. Supported by grant RG 2596B2 from the national multiple sclerosis society
Correspondence: *John DeLuca, Ph.D., Physical Medicine and Rehabilitation, UMDNJ/KMRREC, 1199 Pleasant valley Way, West Orange, NJ 07052. E-mail: jdeluca@kmrrec.org*

S. LAATU, R. RINNE & J. KIVILAHTI. The Effects of Rivastigmine on Cognitive Impairments in Multiple Sclerosis: A Case Study.

Cholinergic medication is not commonly used among MS patients with cognitive impairments. In other neurodegenerative diseases, like Alzheimer's disease, cholinergic medication is commonly used and the effects on cognition have been found to be positive. According to the present theoretical view, MS is regarded as a diffuse and dynamic neurodegenerative disease, which affects the functions of the neurons in many ways. During the disease progress alterations in many neurotransmitters may happen. We hereby suggest that cholinergic medication may have a positive influence on the cognitive functions in MS. A 61 years old man with MS and significant cognitive deficits was studied. The neurological examination and neuropsychological tests were performed before the starting of acetylcholinesterase inhibitor (rivastigmine), and six months later. At the beginning the dose of rivastigmine was 1,5 mg/day and after one month 1,5 mg x 2. During the six months, the symptoms of MS continued to progress. Some of the neuropsychological symptoms - deficits in executive functions, functions of working memory and attention - progressed. Most of the episodic

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

memory functions remained stable. Semantic memory functions, including understanding of concrete and abstract concepts and their interrelations, improved. The spouse of the patient reported improvements in the mood and sense of humor of the patient as well as in his ability to make contact with other people and show interest in his daily life. According to our preliminary results, cholinergic medication may have positive effects on the cognitive functions of MS patients.
Correspondence: *Sari Laatu, Masku Neurological Rehabilitation Centre, P.O. Box 15, Masku FIN-21251, Finland. E-mail: sari.laatu@msliitto.fi*

L.A. BARKER & E. MOES. Relationships Among Fatigue, Mental Effort and Cognitive Performance in Individuals with Multiple Sclerosis and College Students.

Fatigue is both a phenomenon experienced by healthy individuals and a common disabling symptom of neurological disorders. Although prior research has found few or no relationships between fatigue and cognitive performance, this may be related to the emphasis on physical or non-specific aspects of fatigue. We developed a new subjective measure (the Mental Effort Scale or MES) in an attempt to more carefully measure daily mental fatigue and effort. In this study, 28 Multiple Sclerosis (MS) participants and 23 college students (CS) provided ratings of subjective mental and physical fatigue (MES, Chalder), subjective effort during a demanding cognitive task, and objective performance on the Paced Auditory Serial Addition Test (PASAT). Objective measures on the PASAT included total score as well as objective fatigue (OF; decline in performance from ten items of the second trial to ten items of an added fifth trial). Depression (CES-D), IQ (WASI), medications and sleep were also assessed. The MS group was older, scored higher on the WASI, and used more medication. Using ANCOVAs, the MS group had higher ratings on the MES and the Chalder fatigue scales, and greater OF on the PASAT than the CS group. There were no significant correlations between subjective mental effort /fatigue and objective measures in this group. Higher ratings on the MES were correlated with improvement on the PASAT over time in the CS group. Mean PASAT performance total scores did not differ, suggesting that MS participants are able to outwardly perform similarly to those without neurological impairment, despite higher subjective ratings of mental fatigue and effort. Differences in OF were found when dyadic scoring was used. Subjective measures of mental or physical fatigue were not related to objective performance on the PASAT in either group. Only when divided attention was directly measured (dyadic scoring) did difficulties appear in the MS group.
Correspondence: *Lindsay A. Barker, MA, Psychology, Suffolk University, 16 Stanley Ave, Medford, MA 02155. E-mail: lindsaybarker35@hotmail.com*

G.J. CHELUNE & L. STONE. Risk of Processing Speed Deficits Among Patients With Relapsing Remitting and Secondary Multiple Sclerosis.

Processing speed deficits (PSD) are common in Multiple Sclerosis (MS) patients, especially those with Secondary Progressive (SPMS) compared to Relapsing Remitting (RRMS) MS. We compared Trails B, Paced Auditory Serial Addition Test (PASAT) raw and dyad scores, and the Wechsler-III Processing Speed Index (PSI) to differentiate SPMS and RRMS, and calculated estimates of relative risk for the most favorable measure. Subjects were 346 patients with clinically definite MS (274 RRMS and 72 SPMS). Adjusting for age, education and sex, separate canonical correlations were computed to compare individual test measures. A multivariate stepwise procedure was computed to determine the best variable(s) for distinguishing SPMS from RMSS, and estimates of relative risk for SPMS were computed for the most favorable PSD measure using the 16th and 5th percentiles. PSD measures were moderately intercorrelated (.53 to .60). TrB and PASAT scores yielded significant canonical correlations (.304 to .308), accounting for 10.2% to 10.4% of the variance. The PSI canonical correlation was .383, accounting for 17.1% of the variance. When all 4 measures were included in a stepwise procedure, only PSI was retained. The relative risk of SPMS was 5.8 with PSI scores below the 16th percentile and 7.0 with scores below the 5th percentile. Although PSD measures were intercorrelated, PSI was best at differentiating SPMS from RMSS. Patients with PSI deficits (16th or 5th percentile) were 5.8 to 7 times more likely to have a SPMS course. These results suggest that PSI may be clinically useful for identifying disease progression in the individual case.
Correspondence: *Gordon J. Chelune, Ph.D., Mellen Center (U-10), Cleveland Clinic Foundation, 9500 Euclid Avenue, Cleveland, OH 44195. E-mail: cheluneg@ccf.org*

C.V. FLAHERTY-CRAIG & Z. SIMMONS. Impaired Social Judgment in Amyotrophic Lateral Sclerosis.

Frontotemporal dementia occurs in 30 to 50 percent of patients with ALS. Early cognitive changes involve declines in self monitoring, while the primary behavioral effect involves alerations in social conduct. This study evaluated the prevalence of social judgment change in non-bulbar and bulbar ALS sub-groups. We hypothesized that both groups would demonstrate diminished social judgment, in association with poor self monitoring. A neuropsychological battery was administered to 65 subjects and 65 controls. 39 subjects had limb involvement only, while bulbar involvement was present in 26. Subjects were evaluated with the COGNISTAT tests of Social Judgment (SJ) and Verbal Memory (VM). Self-monitoring was evaluated by the Controlled Oral Word Association (COWA) test, a reflection of self-monitoring during the word retrieval process. Pearson's correlations evaluated the relationship between neuropsychological results and physical function, represented by ALS Functional Rating Scale (FRS) and Forced Vital Capacity (FVC) data. Mann-Whitney or t-tests were computed to compare patient and normal control findings. In comparison to controls, non-bulbar ALS subjects demonstrated significant differences for SJ ($p<.0001$), COWA ($p<.05$), and VM ($p<.001$). Neither ALSFRS nor FVC correlated with SJ, COWA, or VM. Compared to controls, bulbar subjects demonstrated significant differences as well: SJ ($p<.0001$), COWA ($p<.001$), VM ($<.0001$). FVC did not correlate with SJ, COWA or VM. However, ALSFRS showed a significant correlation with SJ ($p<.005$), while not with COWA or VM. Results evidenced an association in ALS between a deficiency in self monitoring during the word retrieval process and a deficiency in social judgment. Compromised social judgment in ALS disease progression calls for a therapeutic alliance between the patient, caregivers and health care providers during critical end of life decision making.
Correspondence: *Claire V. Flaherty-Craig, PhD, Neurology, Penn State Hershey Medical Center, 500 University Drive, H037, Hershey, PA 17037. E-mail: ccraig@psu.edu*

C.M. MAMOLO, G. DESMARAIS, E.A. ROY, S.E. BLACK, M.J. DIXON & N.W. PARK. Limb Apraxia, Aphasia, and Cognitive Function.

Limb apraxia may reflect disruptions at various stages in a conceptual-production system (Heath et al., 2003). As such disruptions in cognitive and speech-language functions may underlie some expressions of apraxia. The main question of interest was how aphasia relates to gesture performance. Stroke patients were examined on an apraxia battery involving pantomime and imitation of transitive (tool use) and intransitive (communicative) gestures. We predicted that performance from memory (pantomime) would be more related to aphasia given the common need to access semantic representations when gesturing or expressing knowledge through speech. Participants were fifty-six patients with unilateral left hemisphere stroke (confirmed by CT scan) admitted to Sunnybrook and Women's College Health Sciences Centre, Toronto, Canada. Participants were given the Western Aphasia Battery, the Mini Mental State Exam (MMSE), and were tested on an apraxia battery. Per-

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

formance was videotaped and scored for accuracy. Participants were classified into two groups based on their Aphasia Quotient (AQ) score: non-aphasic (AQ ≥94.0; N=31) and aphasic (AQ < 94.0; N=25). A repeated measures analysis of variance involving group (non-aphasic, aphasic), performance (pantomime, imitation), and gesture type (transitive, intransitive) was performed. There was a significant group by performance interaction [$F(1, 54) = 9.762$, $p < 0.005$] such that the accuracy of the aphasic group was significantly below that of the non-aphasic group in the pantomime but not the imitation conditions. Regression analyses indicated that the AQ score was a better predictor of pantomime performance than the MMSE score. These results support our prediction that aphasia would be related to the performance of gestures from memory (pantomime) but not imitation. As well, aphasia was found to be a better predictor of pantomime performance than cognitive functioning. The implications of these findings for understanding the cognitive and speech-language factors underlying apraxia will be discussed

Correspondence: *Carla M. Mamolo, BSc., MASc., Psychology, University of Waterloo, 200 University Ave. West, Waterloo, ON N2L 3G3, Canada. E-mail: cmmamolo@uwaterloo.ca*

E.B. KLAASSEN, G. HAMMOND & A.M. FOX. Electrophysiological Correlates of Preparatory Motor Processes .

Neurological and neuroimaging evidence has implicated the left hemisphere in preparatory motor processes. The aims of the present studies were to develop experimental tasks that independently operationalized the processes of response selection and response preparation and to examine the distribution of neural activity associated with these preparatory motor processes using electrophysiological techniques. Participants (N=16) completed warned choice reaction time tasks in which an informative warning signal allowed selection of the relevant digit for response during the foreperiod (Experiment 1), or preparation of a sequence of successive responses by a specified digit (Experiment 2). Event-related potentials (ERPs) elicited during the foreperiod were extracted following informative and neutral warning signals. Informative warning signals facilitated reaction time compared to neutral warning signals. ERPs elicited following informative warning signals were more negative than those following neutral warning signals, and the amplitude of this negativity was larger over the left than the right hemisphere in both reaction time tasks. The scalp topography of the ERP foreperiod negativity differed for the selection and preparation tasks, with the selection task characterized by a central and parietal distribution and the preparation task characterized by a more frontal distribution. These results further support the assertion that preparatory motor processes are lateralized to the dominant left hemisphere and suggest that response selection and response preparation are distinct aspects of motor preparatory processes with different neural generators.

Correspondence: *Elissa B. Klaassen, Bsc Psychology, University of Western Australia, 60 Flore tce, North Beach, Perth, WA 6020, Australia. E-mail: klaase01@hotmail.com*

B. HANNA-PLADDY, A.L. THOMPSON & K.M. HEILMAN. Dopaminergic Modulation of the Spatiotemporal Features of Limb Sequences in Parkinson's Disease.

Parkinson's disease (PD) is characterized by hallmark motor features reflective of basal ganglia (BG) dysfunction and dopamine (DA) depletion. The BG and DA have been strongly implicated in motor skill learning, although it is unclear whether DA facilitates the acquisition of limb movement sequences. To investigate DA modulation in the acquisition and retrieval of the spatiotemporal features of complex limb movements, PD patients were studied in on and off medication states. Controls and non-demented subjects with PD (n=12) were assessed in their spatial and temporal execution of i) novel hand postures, ii) novel limb sequences, and iii) representational limb sequences. Movement executions were video taped and scored on a quantitative and qualitative basis across learning trials for on and off medication states. Patients with mild PD displayed impairment in the acquisition of novel limb sequences relative to controls. They were not impaired in the acquisition of static hand postures, or in the retrieval of representational limb movements. DA modulation did not facilitate improvement in the spatial accuracy or timing of the limb sequences impaired in PD subjects. However, PD patients in the on state made significantly more spatial errors than controls. These results suggest that DA may have a detrimental effect on the accuracy of executed skilled movements. These findings support PD related deficits in the acquisition stage of limb sequencing, and raise the question of whether motor skill learning, limb sequence acquisition, and retention of limb sequence representations are subserved by distinct neural systems.

Correspondence: *Brenda Hanna-Pladdy, PhD, Psychiatry, Cognitive Neurology & Alzheimer's Disease Center, Northwestern University Feinberg School of Medicine, 320 East Superior Street, Searle 11-504, Chicago, IL 60611. E-mail: bh-pladdy@northwestern.edu*

G. DESMARAIS, C.M. MAMOLO, E.A. ROY, S.E. BLACK, M.J. DIXON & N.W. PARK. An Investigation of the Pantomime and Imitation Performance of Apraxic Patients: A Contrast between Accuracy and Impairment.

Apraxia is a movement disorder that cannot be attributed to sensory loss, weakness, poor coordination, or poor comprehension of or attention to command. Apraxia batteries often include imitating gestures and performing gestures to command (pantomime). Also, patients can be asked to perform transitive gestures (using a hammer) or intransitive gestures (waving hello). Apraxic patients often show greater impairment when pantomiming gestures than when imitating gestures. Furthermore, patients are often reported to show greater impairment when pantomiming transitive gestures than intransitive gestures. In this study, we examined the severity of apraxia in both pantomime and imitation in patients with left-hemisphere (LHD) or right-hemisphere (RHD) stroke for both transitive and intransitive gestures. 83 apraxic and 15 healthy participants were asked to pantomime and imitate transitive and intransitive gestures. Patients` accuracy and z-score relative to healthy controls were calculated. Apraxic patients were less accurate when pantomiming than when imitating gestures, and they were less accurate when pantomiming intransitive gestures. However, the z-score analysis revealed patients` z-scores were lower during imitation than pantomime, and that they were lower when asked to perform transitive than intransitive gestures. The absence of difference between LHD patients and RHD patients suggests that movement production may not be as dependent on the left hemisphere as previously thought. The findings suggest that transitive and intransitive gestures may place different demands on the gesture production system. The z-score analysis suggests idiosyncratic variability in healthy controls when performing intransitive gestures. Experimenters may need to look at the communicative effectiveness of gestures.

Correspondence: *Geneviève Desmarais, Psychology, University of Waterloo, PAS Building, 200 University Avenue West, Waterloo, ON N2L 3G1, Canada. E-mail: gdesmara@watarts.uwaterloo.ca*

C. DIJKERMAN & M.C. SMIT. Interference of grasping observation during prehension, a behavioral study.

During the last ten years a considerable number of neurophysiological and functional imaging studies have provided evidence that observation and execution of movements activate common neural representations. Furthermore, behavioral studies have found that action observation can influence the performance of movements. Recently

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

it was shown that viewing incongruent movements interferes with the execution of non-object oriented sinusoidal arm movements (Kilner et al., 2003). In the current study, we investigated whether interference of action observation also occurs during goal-directed prehension movements. Twelve subjects were required to grasp cubes of different sizes while simultaneously observing an actor performing grasping or pointing movements. The actors movement could be directed at objects that were identical, or different in size to the cube grasped by the subject. The results showed that maximum grip aperture was affected by observation of grasping towards larger objects. No effect of object size was found during observation of pointing movements. These results suggest that observation of grasping movements can interfere with the on-line control of prehension movements and provides further evidence for overlapping neural networks for grasping observation and execution.
Correspondence: *Chris Dijkerman, Helmholtz Research Institute, Utrecht University, Heidelberglaan 2, Utrecht 3584 CS, Netherlands. E-mail: c.dijkerman@fss.uu.nl*

SATURDAY MORNING, JULY 9, 2005

Symposium 6/9:00–11:00 a.m.

Recent Developments in Neuropsychological Approaches to Awareness

Chair: Linda Clare

L. CLARE, B.A. WILSON, B. RAFAL, K. HANNESDOTTIR, F. O'KEEFFE & T. OWNSWORTH. Recent Developments in Neuropsychological Approaches to Awareness.
This symposium presents recent developments in neuropsychological approaches to understanding impairments of awareness. The contributions reflect the broad relevance of changes in awareness and the increasingly fine-grained analyses being undertaken, while also emphasising current attempts to integrate findings and models across a range of domains and disorders. Following an overview of cognitive neuropsychological theories and models of awareness, new research will be presented that focuses on aspects of awareness in brain injury and dementia. Presenters will discuss the implications of their findings for theoretical models of awareness and, where relevant, will also consider the implications for neuropsychological practice.
Correspondence: *Linda Clare, PhD, School of Psychology, University of Wales Bangor, Brigantia, Penrallt Road, Bangor Gwynedd LL57 2AS, United Kingdom. E-mail: l.clare@bangor.ac.uk*

L. CLARE. Can Cognitive Neuropsychological Models help in understanding impaired awareness?
Objectives: This presentation will review concepts and models that are relevant to understanding awareness and disturbances of awareness, with a particular focus on models derived from cognitive neuropsychology. Awareness is a complex construct, and this review will highlight some of the key tensions and debates that arise in attempting to conceptualise awareness and to address the implications of disturbances in awareness for clinical practice. Methods: Review of theoretical and empirical literature. Results: Influential neuroanatomical and neuropsychological explanations will be outlined and critically reviewed, along with associated approaches to assessing level of awareness. In addition, the role of psychological factors such as denial will be considered, and the possible influence of social context on the expression of awareness will be discussed. Illustrative examples will be drawn from recent research on awareness in early-stage Alzheimer's disease. Conclusions: It will be argued that, while cognitive neuropsychological models have contributed significantly to understanding impairments of awareness, there is a need to develop a comprehensive biopsychosocial theoretical framework that can account for experimental evidence and clinical findings in order to guide future research and practice in this area.
Correspondence: *Linda Clare, PhD, School of Psychology, University of Wales Bangor, Brigantia, Penrallt Road, Bangor Gwynedd LL57 2AS, United Kingdom. E-mail: l.clare@bangor.ac.uk*

R. RAFAL. Consciousness is Gated by Attending for Action.
Objectives: To test the hypothesis neglected information is processed to a level where its meaning - and potential implications for response - are represented outside awareness. Methods: Experiments measured whether the degree of visual extinction was modulated by similarity based on visual features, semantics or response. Results: Extinction was determined by whether the competing items shared the same response, regardless of whether they shared or differed in their visual features or semantics. Not only was there more extinction between (ONE+ONE) than (ONE+TWO): there was just as much extinction between (ONE+1) or (ONE + WON) as there was between (ONE + ONE). Conclusions: Attention gates access to consciousness at the level of processing at which a stimulus is selected for action.
Correspondence: *Linda Clare, PhD, School of Psychology, University of Wales Bangor, Brigantia, Penrallt Road, Bangor Gwynedd LL57 2AS, United Kingdom. E-mail: l.clare@bangor.ac.uk*

K. HANNESDOTTIR & R. MORRIS. Primary Versus Secondary Anosognosia in Alzheimers Disease.
Objectives: The objectives of the study were: (1) to compare three main methods to explore different aspects of anosognosia and their cognitive correlates in Alzheimers Disease (AD); and (2) to relate these findings to differentiated causes of anosognosia according to a cognitive model of awareness. Methods: 92 AD patients (Mean age=75.30) and 92 case matched controls were investigated using (1) experimenter rating of insight into illness; (2) discrepancy between informant and self rated cognitive abilities; and (3) Objective Judgement Discrepancy (OJD) ratings. These measures were explored in relation to language, memory, visuospatial and executive dysfunction in order to determine the contribution of specific cognitive impairments to anosognosia in AD. Results: The different measures of anosognosia were correlated. Only the OJD measure of anosognosia showed significant correlations between memory anosognosia and memory functioning, specific within each domain of awareness. There was also a significant correlation between OJD verbal memory anosognosia and susceptibility to intrusional errors. Conclusions: Memory or executive dysfunction may affect the immediate ability to judge cognitive performance in a domain specific manner. Longer term perception of awareness of cognitive deficit is less influenced by impaired basic cognitive functions, but by the decline of metacognitive function, termed primary anosognosia.
Correspondence: *Linda Clare, PhD, School of Psychology, University of Wales Bangor, Brigantia, Penrallt Road, Bangor Gwynedd LL57 2AS, United Kingdom. E-mail: l.clare@bangor.ac.uk*

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

F. O'KEEFFE & I. ROBERTSON. Awareness of Deficits Measures and their Relation to Neuropsychological Abilities in Traumatic Brain Injury and Three Tauopathy Patient Groups.
Objectives: To examine awareness of impairments and its link to sustained attention, memory and planning abilities in people with Traumatic Brain Injury (TBI), Fronto-Temporal Dementia (FTD), Progressive Supranuclear Palsy (PSP) and Corticobasal Degeneration (CBD). Methods: This paper will report the results from 3 studies with TBI participants and matched controls, and case studies with FTD, PSP and CBD participants and matched controls. A variety of measures were used to identify impaired insight of deficits in TBI participants. These include error detection on a go/no-go sustained attention task (SART; Robertson et al, 1997), self and other rated questionnaires, an awareness interview, error detection on everyday tasks and pre and post task estimates. Electrodermal Activity (EDA) was also measured during the sustained attention task. Results: TBI participants detected significantly fewer errors while performing the SART. The degree of error awareness was strongly correlated with sustained attention capacity. Error feedback significantly reduced errors. EDA was also significantly attenuated for TBI participants, even to aware errors. Error detection rates and EDA amplitude were also correlated. The varying degrees of insight in the three tauopathy groups will also be discussed. Conclusions: We confirm the presence of impaired awareness of error in TBI participants using a highly discriminatory go/no-go task of sustained attention. The reduction in errors following feedback suggests a possible route for rehabilitation of sustained attention or awareness of error. EDA attenuation for TBI participants possibly suggests the lack of emotional evaluation on the detection of an error, potentially resulting in diminished error correction.
Correspondence: *Linda Clare, PhD, School of Psychology, University of Wales Bangor, Brigantia, Penrallt Road, Bangor Gwynedd LL57 2AS, United Kingdom. E-mail: l.clare@bangor.ac.uk*

T. OWNSWORTH, J. FLEMING & J. DESBOIS. A Metacognitive Intervention for Enhancing Error Awareness and Functional Performance in Naturalistic Settings .
Objectives: This N=1 study describes the outcome of a metacognitive intervention for awareness deficits related to neuropsychological factors. Methods: JM was a 36-year-old man with a severe TBI who was previously involved in a longitudinal investigation of psychological and neuropsychological factors underlying awareness deficits. This study led to the development of a neuropsychologically based intervention for improving metacognitive skills at 4 years post-injury. A 16-week programme targeted error awareness and self-correction in two naturalistic treatment settings: (a) cooking at home; and (b) community volunteer work. Outcome measures included behavioural observation of the number and nature of errors and standardised awareness measures. The intervention was evaluated using a single case experimental design with multiple baselines. Results: Relative to baseline performance in treatment setting (a), JM demonstrated a 50% reduction in errors, increased error awareness and self-correction and associated functional gains. No spontaneous generalisation was evident in treatment setting (b) and therefore specific training in this setting was required to promote gains. His global awareness of deficits was relatively unchanged after the programme. Conclusions: This study provides preliminary support for a metacognitive approach to improve error awareness and self-correction in naturalistic settings. The proposed mechanisms for functional gains will be discussed.
Correspondence: *Linda Clare, PhD, School of Psychology, University of Wales Bangor, Brigantia, Penrallt Road, Bangor Gwynedd LL57 2AS, United Kingdom. E-mail: l.clare@bangor.ac.uk*

Poster Session 8: Traumatic Brain Injury, Stroke/9:00–10:30 a.m.

T. MCMILLAN & R. SUMPTER. Midiagnosis of Post Traumatic Stress Disorder After Traumatic Brain Injury.
To compare diagnosis of post trauamtic stress disorder after severe traumatic brain injury using questionnaire and structured interview methods. 34 people with severe TBI were given the Post-traumatic Stress Disorder scale and the Impact of Events Scale and then a structured interview (Clinician Administered PTSD Scale). 59% of people were 'cases' according to DSMIV criteria using questionnaire measures but only 3% using the CAPS interview. There were no false negatives using questionnaire measures. Differences between PTSD 'cases' and 'non-cases' using questionnaires were non significant in terms of premorbid IQ or TBI severity. There was no relationship between information processing rate or accuracy and questionnaire scores. Although questionnaires are potentially useful as screening tools, srtuctured interview is required for diagnosis of PTSD after TBI. False positive findings can arise if using questionnaires for several reasons, including misunderstanding instructions, symptom overlap between PTSD and TBI and misattribution of effects of TBI. These findings are relevant when considering the wide range of incidence of PTSD after TBI (0-57%) that has been reported.
Correspondence: *Tom McMillan, PhD, Psychological Medicine, University of Glasgow, Gartnavel Royal Hospital, 1055 Great Western Road, Glasgow G41 5QP, United Kingdom. E-mail: t.m.mcmillan@clinmed.gla.ac.uk*

K. BEECKMANS, K. VANSCHOENBEEK, P. VANCOILLIE & R. CLUYDTS. Assessment of emotional and behavioural functioning after moderate to severe traumatic brain injury: A comparison of self- and other-report of the Neuropsychology Behavior and Affect Profile.
In this study the emotional and behavioural consequences of moderate to severe traumatic brain injury (TBI) were assessed using the Neuropsychology Behavior and Affect Profile (NBAP). The emotional and behavioural functioning of 30 patients (24 males and 6 females) with a moderate to severe TBI were compared to that of 30 healthy matched controls (HC). We used the NBAP to measure the emotional and behavioural consequences of TBI. Each item in this inventory was rated both before and after TBI by the patient (self-report) and a close relative (observer-report). The subjects in the HC group were only asked to complete the NBAP with regard to their current emotional and behavioural functioning. The TBI group showed significantly higher levels of post-injury indifference, inappropriateness, pragnosia and depression than the HC group. The self-reports revealed a significant increase in inappropriateness, pragnosia and depression and a significant decrease in mania following TBI. When the observer-reports were analysed, a significant increase in indifference, inappropriateness, pragnosia and depression could be seen after TBI. Comparisons of the premorbid NBAP scores from the self-report and observer-report displayed no significant differences. Finally, comparisons of the post-injury scores from the self-report and observer-report revealed that the indifference subscale scores (observer > patient) differed significantly. In conclusion we can state that our study document multi-faceted changes in emotion and behaviour associated with TBI.
Correspondence: *kurt beeckmans, M.Sc., CEPOS, rooienberg 21, duffel 2570, Belgium. E-mail: kurt.beeckmans@emmaus.be*

J.F. MALEC, A.M. MOESSNER & A.W. BROWN. Relationships of Early Patient and Significant Other Disability Assessments after Traumatic Brain Injury to Their Long Term Perceptions of Outcome.
To evaluate the contribution of pre-injury factors, injury severity, and early ratings of disability and depression by patients and significant others (SO) after traumatic brain injury (TBI) in predicting long term outcome rated by patients and SO. Participants were an inception cohort of TBI hospital admissions; 78 patients and 66 SO with complete data. Through multiple regression analyses, best predictors of long term outcome as rated 1-2 years post-injury independently by patients and SO on the Mayo-Portland Adaptability Inventory (MPAI) were determined in four categories: pre-injury factors (age, education, psychiatric and

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

substance abuse history), injury severity (Glasgow Coma Scale, positive head CT, Injury Severity Scale; post-traumatic amnesia, PTA), early disability (hospital discharge disposition, self and SO MPAI), and depression (self and SO ratings on NEO Personality Inventory Revised and Neurobehavioral Functioning Inventory depression scales). Using these best predictors, the optimal regression model for long term outcome as rated by patient and SO on the MPAI was determined. Only education and early SO MPAI contributed significantly to predicting long term SO MPAI (R^2=.28). Only education and early self MPAI rating significantly predicted long term self MPAI (R^2=.34). Objective indicators of injury severity (PTA, positive CT) correlated more strongly with SO than with self disability ratings. Depression ratings correlated highly with disability ratings. Self and SO ratings of early disability are significant predictors of long term self and SO disability ratings. Factors, such as, depression and self-awareness may affect perception of long term outcome.
Correspondence: *James F. Malec, PhD, Psychiatry and Psychology, Mayo Clinic College of Medicine, Generose ME TBI, Rochester, MN 55905. E-mail: malec.james@mayo.edu*

J. FISH, H. WILLIAMS, B.A. WILSON & H. EMSLIE. Neuropsychological Correlates of Prospective Memory Performance in Acquired Brain Injury.
Problems with prospective remembering are a frequent sequela of brain injury, and yet problems of this type remain poorly understood. We aimed to establish which cognitive processes are critical for prospective remembering, and to examine the impact of compensatory strategy use on prospective memory performance. Neuropsychological tests of memory, attention and executive functioning were administered to participants with acquired brain injury (ABI; n=23), and controls (n=18), along with a new test of prospective memory (CAMPROMPT, Wilson et al, in press). Self-report measures of mood and memory problems were also taken. Partial correlations identified measures of attention and planning as related to prospective memory performance when controlling for brain injury. Prose recall scores correlated with prospective memory scores only within the control group. ABI participants performed worse than controls on the CAMPROMPT overall, but analysis of strategy use revealed that taking thorough notes facilitated performance to such an extent that ABI and control performance was indistinguishable. Taking partial notes had no such facilitatory effect. The implications of this research are twofold: for the study of prospective memory, that non-mnemonic influences should not be underestimated; and for neuropsychological rehabilitation, that the quality of strategy used might be as important as its initial implementation.
Correspondence: *Jessica Fish, MRC Cognition & Brain Sciences Unit, 15 Chaucer Road, Cambridge CB2 2EF, United Kingdom. E-mail: jessica.fish@mrc-cbu.cam.ac.uk*

A.C. FORMAN, P.A. VESEY & N.B. LINCOLN. The Effectiveness of an Adjustment Group on Improving Mood in Brain Injury Patients.
Mood disturbances are a common consequence of brain injury (BI) and can reduce the affectiveness of rehabilitation. Therefore the study evaluated a group intervention designed to reduce the effects of depression, to determine the effect on adjustment and mood. An ABAB single case experimental design was used. The Hospital Anxiety and Depression scale (HAD), was used to measure mood and the Mental Adjustment to Brain Injury (MABI), to measure adjustment. These were recorded three times during each baseline and intervention phase. In the intervention phases participants attended an adjustment group, designed to increase adjustment and improve mood, once a week for 16 weeks. 10 participants with BI, (mean age 45.6) were recruited and 7 were men. Comparison of baseline and intervention phases showed a significant improvement on anxiety and depression scores. Visual observations showed that when intervention was removed during the B phase patients' mood scores worsened but improved with the second introduction of intervention. There was no corresponding pattern on the MABI. Participants with BI attending the group showed a reduction in low mood but there was no significant effect on adjustment. The ABAB design showed that it was group participation that had an effect on mood.
Correspondence: *Alexandra C. Forman, Psychology BSc, Institute of Work, Health and Organisations, The University of Nottingham, 5/6 William Lee Buildings, Science Park, University Boulevard, Nottingham NG7 2QR, United Kingdom. E-mail: lwxacmf@nottingham.ac.uk*

K.F. PAGULAYAN, N.R. TEMKIN & S.S. DIKMEN. Lack Of Awareness in Traumatic Brain Injury: How Prevalent is the Problem?
Current research suggests that patients frequently under-report impairments after traumatic brain injury (TBI). However, these studies often utilize clinical populations, such as individuals participating in rehabilitation, rather than selecting solely on the injury characteristics. This may lead to over-estimation of the incidence of this problem. This study aims to evaluate the magnitude of under-reporting of symptoms in a sample of TBI patients who were enrolled and prospectively studied based on head injury characteristics. 199 patients with complicated mild to severe TBI's and their significant others (SO) completed the Sickness Impact Profile (SIP) at one month post injury as it relates to the current functioning of the patient. At 6 months post injury, 208 patients and their SO completed the SIP. At one month, patients endorsed more problems than their SO on the Total ($p < .05$) and the Physical Factor ($p < .05$), but there was no difference on the Psychosocial Factor. At 6 months, the patients reported more problems on the Total Score ($p < .05$), but the Physical and Psychosocial Factor scores did not differ. Patients did not under-report symptoms in any of the domains assessed at 1 and 6 months post injury. In contrast, patients actually report more limitations than their SO on some scales at both 1 and 6 months post injury. This stands in contrast to current literature and suggests that poor awareness, although a problem for some individuals, may not be as prevalent as previously reported.
Correspondence: *Kathleen F. Pagulayan, Ph.D., Rehabilitation Medicine, University of Washington, University of Washington, Box 356490, Seattle, WA 98195-6490. E-mail: farkat@u.washington.edu*

K.F. PAGULAYAN, S.S. DIKMEN & N.R. TEMKIN. Recovery of Psychosocial and Physical Limitations Over One Year After Traumatic Brain Injury.
The aim of this study was to determine psychosocial and physical limitations reported by individuals who have sustained traumatic brain injuries (TBI), and their recovery. 148 individuals with complicated mild to severe TBI were enrolled in the study within 24 hours of injury and prospectively studied at 1, 6, and 12 months. They completed the Sickness Impact Profile, a health related quality of life measure that yields Psychosocial (difficulties in communication, alertness behavior, emotional behavior and social interaction) and Physical (difficulties in ambulation, body care and movement and mobility) Factor Scores. To evaluate differences within time, t-tests were conducted comparing the Psychosocial and Physical Factor Scores at 1, 6, and 12 months. Additional t-tests were conducted comparing change in the Psychosocial and Physical Factor Scores over time. Psychosocial Scores were significantly higher (worse) than Physical Scores at 6 months ($p < .05$) and 12 months ($p < .05$). There was no significant difference at 1 month. In addition, both Psychosocial and Physical Factor Scores significantly declined (improved) from 1 to 6 months (each $p < .05$), but not from 6 to 12 months. Results demonstrate that patients report substantial but equal amounts of psychosocial and physical limitations at 1 month post injury. Although improvements in both areas occur over 12 months, improvement in the physical area is far greater. This results in significantly higher endorsement of psychosocial than physical limitations, suggesting that psychosocial difficulties remain an increased concern for individuals at least one year after brain injury of this severity.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

Correspondence: *Kathleen F. Pagulayan, Ph.D., Rehabilitation Medicine, University of Washington, University of Washington, Box 356490, Seattle, WA 98195-6490. E-mail: farkat@u.washington.edu*

M. ARIZA, R. PUEYO, C. JUNQUE, M. MATARO, N. BARGALLO, A. POCA & J. SAHUQUILLO. Neurobehavioural Dysfunctions and Regional Ventricular Dilation after Severe TBI.

Ventricular dilation is the most common finding after severe TBI. Neuropsychological studies have related ventricular enlargement to impaired cognitive functions and to severity of injury. The aim of the present study was to relate the ventricular regions to cognitive status and to neurobehavioural outcome. Fourteen patients with severe TBI and fourteen matched controls were studied at least 6 months after injury. Volumetric measures of the ventricular system were obtained by using a semiautomatic method. The neuropsychological test battery included assessment of functions usually impaired after TBI (attention, speed of processing, memory and frontal functions). We also assessed neurobehavioral disturbances and general outcome. TBI performance in all neuropsychological tests was significantly poorer in TBI subjects than in control subjects. Global ventricular volume and its different parts were statistically larger in TBI patients than in control subjects. GCS score and coma length were associated with ventricular dilation. Dilation of the third ventricle was significantly related to poor impairment of speed of mental processing and attention, and dilation of temporal horns of the lateral ventricles was significantly related to poor execution in verbal memory. On the other hand, worse global outcome was related to ventricular atrophy, and greater positive (disinhibition, hyperactivity) and negative (hostility, blunted affect) symptoms were related to larger temporal horns. The results indicate that brain atrophy measured by regional ventricular volumes is related not only to cognitive impairment but also to neurobehavioural disturbances after severe TBI.

Correspondence: *Mar Ariza, University of Barcelona, Passeig Vall d'Hebron 171, Barcelona 08035, Spain. E-mail: rpueyo@ub.edu*

Y. WANG, R.C. CHAN, V.Y. DENG & M. GUO. Examination of postconcussion-like symptoms and its neuropsychological correlates in college students.

The present study aimed to examine the postconcussion-like symptoms in a group of college students with standardized checklists and to explore its relationships to neuropsychological function performance. A total of 64 college students were recruited. All participants received a set of standardized checklists: Rivermead Post-concussion Symptoms Checklist (RPCS), Postconcussion Checklist (PCL), Postconcussion symptom checklist (PCSC). They also completed another comprehensive set of neuropsychological tests on various cognitive domains of attention, memory and executive function. In general, the present sample reported a low base-rate of postconcussion-like symptoms. The most frequently endorsed postconcussion-like items in this sample were: fatigue (79.4 %), poor concentration (55.6 %), longer time to think (54.0 %), sleep disturbance (47.6 %), frustrated and impatience (42.9 %). The three checklists were significantly correlated with one another. However, when we examined the relationships of total scores of these three checklists to the various domains of neuropsychological performances, the RPCS were better predicted by working memory and executive function performance (R-sq = .392, $p<0.05$) as compared to the remaining PCSC (R-sq = .202, $p<0.05$), and PCSC (R-sq = .176, $p<0.05$). Moreover, no significance differences were found between low symptom reporters and high symptom reporters in all domains of neuropsychological performances. The present findings demonstrate that (1) the base-rate of postconcussion-like symptoms in a group of healthy college students is relatively low; (2) participants reporting a high score of postconcussion-like symptom did not perform significantly worse than those reporting a low score of symptoms; (3) the RPCS appears to be a more sensitive checklist to detect postconcussion-like symptoms among healthy sample.

Correspondence: *Raymond C. Chan, PhD, Psychology, Sun Yat-Sen University, NA, Guangzhou 510275, China. E-mail: edschchq@zsu.edu.cn*

H.S. LEVIN & J.V. HUNTER. Magnetic Resonance Spectroscopy in Relation to Cognition in Children After TBI.

This initial study explored the relation of magnetic resonance spectroscopy (MRS) to cognitive function in children at various stages of outcome following traumatic brain injury (TBI). Seven children (median age=9.9 years) who sustained a TBI ranging from mild to severe underwent MRS calibrated by a phantom and cognitive testing (WASI, Woodcock-Johnson Arithmetic, Clinical Examination of Language Function) after postinjury intervals from 6 weeks to 3 years. Five healthy, age matched controls were also imaged and tested. Spectra were obtained from frontalparietal white matter of each hemisphere.The anterior aspect of the plane was located > 2 cm above the floor of the anterior cranial fossa, parallel to the anterior aspect of the body of the corpus callosum, and immediately above the cingulate gyrus at an angle of 25-30 degrees to the anterior commissure-posterior commissure line. N-acetylaspartate(NAA), a brain metabolite index of neuronal integrity, was lower in the patients when expressed as a ratio to choline (NAA/Ch), $F(1,10)=5.51$, $p=0.041$. No group effect was present for Ch, $F(1,10)=1.21$, $p=.29$ or creatine, $F(1,10)=0.06$). Values were higher in the L left than right hemisphere for choline, $F(1,10)=8.65$, $p=0.015$, NAA, $F(1,10)=7.11$, $p=.024$, and creatine (Cr), $F(1,10)=7.01$, $p=0.024$. Arithmetic achievement was correlated with NAA in left ($r=.64$, $p=.03$) and right ($r=.71$, $p=0.01$) frontal regions. The correlation between left frontal NAA and intellectual level (WASI) approached significance, $r=.54$, $p=0.09$. Correlations for Ch and Cr were not significant. TBI patients performed significantly below controls on all cognitive tests. Despite heterogeneity in TBI severity and chronicity,frontoparietal NAA was decreased and related to arithmetic performance. NAA may be a useful biomarker for resdiual effects of TBI. Hemispheric asymmetries in brain metabolites merit further investigation.

Correspondence: *Harvey S. Levin, Ph.D., Cognitive Neuroscienc e Lab, Baylor College of Medicine, 6560 Fannin Ste 1144, Houston, TX 77030. E-mail: hlevin@bcm.tmc.edu*

A. SHUTTLEWORTH-EDWARDS & S. RADLOFF. Residual Deficits in Visuo-perceptual Processing in Players of Rugby Union from School through to the Professional Level.

The aim of this study was to investigate the permanent effects of cumulative mild brain injuries due to participation in rugby on two prototypically sensitive tests of visuo-perceptual tracking (Digit Symbol Substitution; Trail Making Test A and B). Participants were top level male rugby players (N = 124) versus equivalent non-contact sport controls (N = 102), including three levels of play: high school (rugby n = 79, controls n = 58); national under-21 (rugby n = 19, controls n = 23) and national open (rugby n = 26, controls n = 21). The total rugby group was divided for comparison between the more exposed forwards and backs (n = 71, n = 53, respectively). All comparative groups were equivalent for age, education and estimated IQ (Vocabulary and Picture Completion subtests). Exclusion criteria were a history of substance abuse, neurological disease, learning disorder, moderate to severe head injury. Testing took place pre-season to identify residual rather than acute effects. Significantly poorer group mean performance was revealed for rugby players relative to controls on the Digit Symbol Substitution and Trails tasks, and for forwards versus backs on Digit Symbol Substitution ($p < 0.01$ in all instances). Correlations between age and test performances were of no significance. These results imply deleterious effects on visuo-perceptual processing in association with participation in rugby for a substantial number of athletes at all levels of play.

Correspondence: *Ann B. Shuttleworth-Edwards, PhD, Psychology Department, Rhodes University, Psychology Clinic, Rhodes University, Grahamstown 6139, South Africa. E-mail: a.edwards@ru.ac.za*

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

M. THOMAS, C.E. SKILBECK & M. SLATYER. Subjective Quality of Life in the First Year Following Traumatic Brain Injury .

The present study aimed to track changes in quality of life within the first year following traumatic brain injury (TBI), using Frisch's (1994) Quality of Life Inventory (QOLI), and to establish normative information supporting the use of this measure within the TBI population. This prospective study admitted 200 people who had sustained TBI in Tasmania, Australia. Respondents estimated pre-injury quality of life completing the QOLI as soon as practical following injury. Data collections were repeated at four weeks, three months, six months and twelve months following TBI. The QOLI is a theory-based, subjective measure of quality of life. It contains an importance-weighted satisfaction measure across sixteen domains of psychosocial functioning such as Health, Work, Money, Family, Friends and Home. Analysis compared normative distributions of this TBI sample with the QOLI's normative population, and examined differences between subgroups of participants based on demographic and injury related variables. Results showed negative trends in quality of life following injury compared with respondents' pre-injury estimates. As expected, differences in subjective quality of life were found between several subgroups of the TBI sample, based on demographic and injury variables. This study provided information supporting the use of the QOLI within the TBI population, and highlighted the importance of considering normative differences related to demographic and injury variables upon measures of subjective well-being.

Correspondence: *Matthew Thomas, University of Tasmania, 23 Cleburne Street, Claremeont, TAS 7011, Australia. E-mail: md_bathomas@bigpond.com*

N.R. KIDD, H. GARAVAN, F. O'KEEFFE & S. CARTON. The Assessment of Neuropsychological, Cognitive and Emotional Variables of Financial Competency in Acquired Brain Injury.

Financial competency is one area which can be altered due to an acquired brain injury (ABI). The aetiology of this area is not clearly delineated, however. Clinicians, therefore, lack clear guidelines on how to assess this paradigm. Preliminary study has speculated about the cognitive processes involved without empirical testing. The role of executive functioning has been found to be a key variable when considering other areas of competency and research has also hinted that emotion may have a role in competent financial decisions. The present study aimed to provide better definition of the cognitive and emotional processes within financial competency. Specific neuropsychological and cognitive tests were administered to 30 ABI patients and 16 controls. Galvanic skin response (GSR) was also measured while participants were completing a gambling test. Analysis was carried out using multiple regression analysis. When controlling for age, gender and education, multiple regression analysis showed that general cognitive impairment, as assessed by the Mini-Mental State Examination (MMSE), was significantly associated with the measure of financial competency. The present study found little involvement by executive and emotional processes. The present study proposes that financial competency may be best assessed by considering global cognitive impairment, using measures such as the MMSE, as opposed to specific cognitive processes such as executive functioning and measures of emotion.

Correspondence: *Nick R. Kidd, MSc, Clinical Neuropsychology, National Rehabilitation Hospital, Rochestown Ave, Dun Laoghaire, Co. Dublin N/A, Ireland. E-mail: nickykidd@eircom.net*

L. CAHILL, A. THOMAS, B. MURDOCH & M. COOK. Long-term Language Deficits Following Subarachnoid Haemorrhage of Aneurysmal Origin.

Several studies have reported the presence of aphasia following aneurysmal sub-arachnoid haemorrhage (SAH), Most of these studies, however, have evaluated only gross measures of language, and as such, many individuals who presented with what might have appeared to be normal language function may actually have had underlying high-level linguistic deficits that were not detected. As individuals with cognitive deficits following SAH have been found to demonstrate diffuse complaints such as irritability, personality change, loss of interests and emotional disturbances it is likely that individuals with high-level language deficits may also suffer symptoms that affect their quality of life. The present study reports on the comprehensive evaluation of language function in a group of individuals following SAH. The language ability of 20 individuals who had suffered an aneurysmal SAH, was evaluated using a comprehensive battery of both gross and high-level language assessments. Results were compared to those of a control group matched for age, sex, and educational level. Impairment in several areas of high-level language function was identified in the SAH group. In addition, individual case analyses revealed that several participants displayed substantial impairment in both gross and high-level language functioning subsequent to SAH. The findings of the present study highlight the need to monitor the language outcomes of individuals following SAH using a comprehensive high-level language battery, as the presence of deficits in high-level language functioning has important implications for quality of life in these individuals. The findings of the present study will be discussed in terms of the implications for the monitoring and management of individuals with language impairment subsequent to SAH.

Correspondence: *Louise Cahill, BSpThy, PhD, Speech Pathology, The University of Queensland, Therapies Building, The University of Queensland, St Lucia, QLD 4072, Australia. E-mail: L.Cahill@uq.edu.au*

K. MICHIELS, K. BEECKMANS, H. BEYENS & C. KIEKENS. Do mood changes after stroke affect subjective and objective memory ?

In this study we evaluated the possible impact of mood changes after stroke on subjective and objective (audioverbal and visuospatial) memory. Fourty patients with a stroke and 40 healthy matched controls (HC) were examined concerning their subjective memory complaints, objective (audioverbal and visuospatial) memory performance and actual mood states. All stroke patients were investigated at least 3 months post-injury. The instruments we used were the California Verbal Learning Test (CVLT) (to evaluate objective audioverbal memory), the Rey Visual Design Learning Test (RVDLT) (to evaluate objective visuospatial memory), the subscale Memory from the Cognitive Symptom Checklist (CSC-M) (to evaluate subjective memory) and the Profile of Mood States (POMS) (to evaluate mood states). Statistical analysis indicated that patients had significant worse scores than HC on all measured variables of the CVLT and the RVDLT, and patients had significant higher scores than HC on the subscales Depression and Fatigue of the POMS. In our stroke patients we also noticed that depression was correlated with a greater subjective deterioration of memory and a worser long-term delayed visuospatial memory performance, fatigue and tension were correlated with a greater subjective deterioration of memory, and vigor was correlated with less subjective memory complaints and a better long-term delayed visuospatial memory performance. In conclusion we can state that mood changes such as depression, fatigue, tension and vigor can affect subjective memory and/or objective visuospatial memory (long-term delayed memory performance) in stroke patients. In contrast, no relation could be found between mood states and objective audioverbal memory.

Correspondence: *karla michiels, M.Sc., University Hospital Pellenberg, Weligerveld 1, pellenberg 3212, Belgium. E-mail: karla.michiels@uz.kuleuven.ac.be*

M. . JUNCADELLA, I. DE LA FUENTE, N. BUSQUETS, A. RODRIGUEZ, F. RUBIO & C. JUNQUE. Study of Memory and Visuospatial Functioning Patients with Subcortical Vascular Lesions .

To evaluate the course of memory deficits and visuospaciela functionning in patients with subcortical vascular lesions according to type (ischemic/haemorragic) and site: caudate and putamen, putamen, pallidus

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

and thalamus, right/left hemisphere. To study their relationship with CT, MIR and SPECT. To assess memory and visuospacial functioning throughout the year. Group of 47 patients with first subcortial lesion, without neurological or psychiatric antecedents. Three evaluations were carried out: emergency CT, MR between the third and fourth month and two SPECT: on first hopsitalisation and after 12 months. Significant differences were observed in:Delayed verbal memory (time), associative learning (site). The left hemisphere group shows poorer performance. The observed differences according to hemisphere were significant in both the secon and third evaluations. Regarding visual memory, age was an important factor. With regard to visuospatial functioning age had a negative correlation. Lesion type (infarction or heamorragic) is significant. The group with putamen lesions demostrated greater speed in completing the test. Memory functioning is altered after subcortical vascular lesions. Associative learning showed significant differences between the two groups. Those with right hemisphere lesions showed better performance and these differences remained constant over time. Lesion volume did not influence logic memory or learning. The temporal and basal ganglia SPECT results correlated with lesion volume, the greater the volume, the greater the hypoperfusion. These studies support the literature in the relationship between the lesion volume, reduction in cerebral blood flow and neuropsychological deficit.
Correspondence: *Montserrat . Juncadella, Dr, Neurology, Hospital Universitari de Bellvitge, Feixa Llarga s/n, Hospitalet de Llobregat 08904, Spain. E-mail: mjuncadella@csub.scs.es*

N. LINCOLN, H.E. BENNETT & S.A. THOMAS. Validation of Screening Measures for Depression and Anxiety in Stroke Patients with Communication Problems . .

The aim was to determine the validity of the Hospital Stroke Aphasic Depression Questionnaire (SADQ-H), Signs of Depression Scale (SODS), Visual Analaog Mood Scale (VAMS) and Visual Analogue Self- Esteem Scale (VASES) in screening for mood problems after stroke. 50 healthy adults and 100 stroke inpatients were asked to complete the VAMS, VASES and HADS. A nurse completed the SADQ-H and SODS in relation to the inpatients. A relative/ carer completed the SADQ and SODS in relation to the healthy elderly. Internal consistency of the SADQ-H was high in stroke patients (alpha = 0.84) but not in the healthy elderly (alpha = 0.69). Internal consistency of the SODS was low in both participant groups (alpha < 0.6). Internal consistency of the VAMS was high in stroke patients (alpha = 0.71) and in the healthy elderly when items Happy and Energetic were deleted (alpha = 0.73). Internal consistency of the VASES was high in both participant groups (alpha = 0.83). Appropriate cut-offs were found for the SADQ-H (17/18), SODS (1/2) and VAMS (81/82) in comparison to depression on the HADS. No cut-offs could be identified on the SADQ, SODS or VASES for detecting anxiety on the HADS but an appropriate cut-off was identified for the VAMS (255/256). The SADQ and SODS are appropriate for screening for depression after stroke but not as a screening method for anxiety. The SADQ had greater internal consistency and higher sensitivity and specificity than the SODS. The VAMS is appropriate for screening for anxiety after stroke. The cut-offs identified need further validation in an independent sample of stroke patients.
Correspondence: *Nadina Lincoln, PhD, University of Nottingham, I-WHO, William Lee Buildongs, Science Park, Nottingham NG7 2RQ, United Kingdom. E-mail: nadina.lincoln@nottingham.ac.uk*

A. DROMERICK, L. MORRIS, L.T. CONNOR, C. BAUM, D.F. EDWARDS & D.A. WHITE. How Mild Is Mild Stroke? From Cognition to Everyday Life.

Objective: Individuals with mild stroke are expected to achieve full recovery, but little research has been conducted to examine the consequences of mild stroke on cognition and return to everyday life. We used a multidisciplinary (neuropsychology, neurology, and occupational therapy) approach to examine the overarching hypothesis that recovery and return to premorbid function are not complete following mild stroke. Methods: Data were collected by the Washington University Cognitive Rehabilitation Research Group. Acute neurological and cognitive status was examined, as well as chronic outcomes such as ability to complete complex daily tasks, participation in premorbid occupational and leisure activities, and quality of life. Results: Of 839 patients on our acute stroke service, 440 (52.5%) had mild stroke as defined by NIH Stroke Scale scores ≤ 5. Individuals with mild stroke exhibited subtle impairments in executive abilities and had a surprising degree of difficulty in completing everyday tasks. In addition, participation in premorbid activities was reduced and quality of life was diminished. Conclusions: Approximately one-half of strokes are classified as mild. Our findings demonstrate that recovery and return to premorbid function is not complete following mild stroke. Results from acute and chronic assessments provide empirical evidence that individuals with mild stroke have a range of difficulties, from performance on neuropsychological tests to performance on everyday tasks in dynamic real world environments. Interrelationships among neurological, neuropsychological, and occupational variables will be discussed. Taken together, our results suggest that rehabilitation services are warranted for individuals with mild stroke.
Correspondence: *Desiree A. White, Ph.D., Psychology, Washington University, Campus Box 1125, Washington University, St. Louis, MO 63130. E-mail: dawhite@wustl.edu*

L.T. CONNOR & D.A. WHITE. How Mild Is Mild Stroke? Impact on Executive Abilities.

Objective: We tested the hypothesis that subtle impairments in executive abilities occur following mild stroke. Methods: Data from 197 individuals with mild stroke (NIH Stroke Scale ≤ 5) were examined using a brief cognitive battery that was administered during acute hospitalization. Mean age was 60 years (SD=14.2, range 20-97) and mean education was 12.8 years (SD=2.4). Participants met the following criteria: no chronic substance abuse, no substance abuse 24 hours preceding admission, no major medical (e.g., epilepsy, head injury, lupus) or psychiatric (e.g., schizophrenia) disorder affecting cognition, and Short Blessed ≤ 5. Executive measures included Trail Making, Letter and Animal Fluency, and Digit Span Forward and Backward. Z scores were computed based on normative data. Results: Digit Span Forward (z = .06), Digit Span Backward (z = -.29), and Animal Fluency (z = -.41) were within expected limits. Letter Fluency (z = -.87) and Trails A (z = -.89) were somewhat lower than expected. The strongest evidence of subtle impairment was on Trails B (z = -1.12). Impaired performance on both Letter Fluency and Trails B was more pronounced in younger than older individuals with mild stroke (correlations with age, r=.2, p<.01). Conclusions: Individuals with mild stroke have subtle impairments in executive abilities. The executive abilities of younger individuals with mild stroke are more impaired relative to their peers than those of older individuals. Although impairments are quite subtle, they may present obstacles for successful reintegration into everyday life.
Correspondence: *Desiree A. White, Ph.D., Psychology, Washington University, Campus Box 1125, Washington University, St. Louis, MO 63130. E-mail: dawhite@wustl.edu*

T. MORRISON, C. BAUM & J.D. RYAN. How Mild Is Mild Stroke? Impact on Performance of Real World Tasks .

Objective: We examined the hypothesis that the individuals with mild stroke have impairments in performing everyday tasks in complex, dynamic, real world environments. Methods: Fifteen individuals with mild stroke (NIH Stroke Scale ≤ 5) were tested 6 months following stroke. Mean years of age and education were 56.9 (SD = 11.4) and 13.1 (SD = 2.8), respectively. Two performance-based tests were administered. The Executive Function Performance Test (EFPT; Baum et al., 2004) identified the level of support needed to complete everyday tasks such as cooking, making phone calls, taking medications, and paying bills.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

The Multiple Errands Test (MET; Shallice & Burgess, 1991) was revised using a scoring system based on animal navigation studies (O'Keefe & Nadel, 1978) and measured the ability to multitask while navigating through an urban hospital. Results: On the EFPT, individuals with mild stroke required cuing to perform higher order tasks. On the MET, individuals with mild stroke completed only 52% of the required tasks and broke 75% of the test rules. Individuals who were successful took more time and performed with greater efficiency. Discussion: Individuals with mild stroke are generally expected to fully recover with little or no rehabilitation services. Our findings, however, demonstrate that individuals with mild stroke have substantial difficulty in performing everyday tasks in complex, dynamic, real world environments. These results suggest that rehabilitation services may be beneficial to individuals with mild stroke.
Correspondence: *Desiree A. White, Ph.D., Psychology, Washington University, Campus Box 1125, Washington University, St. Louis, MO 63130. E-mail: dawhite@wustl.edu*

D.F. EDWARDS, M. HAHN & C. BAUM. How Mild Is Mild Stroke? Impact on Activity Participation and Quality of Life.
Objective: It is widely assumed that individuals with mild stroke will return to premorbid levels of functioning without rehabilitation services. There is, however, little empirical data to support this assumption. We examined the hypothesis that mild stroke has a substantial negative impact on participation in activities and quality of life. Methods: Data from 219 individuals with mild stroke (NIH Stroke Scale ≤ 5) were collected through telephone interviews 6 months following stroke. Individuals with prior stroke or premorbid functional dependence were excluded. Mean age was 64.7 years (SD=15.9, range=20-97). The sample was 57% female and 42% African American. The Functional Independence Measure, Functional Assessment Measure, Barthel Index, Stroke-Adapted Sickness Impact Profile, Reintegration to Normal Living Scale, and the Activity Card Sort were administered. Results: Although participants were independent in basic activities of daily living (ADLs), 87% reported significant stroke-related problems. Common complaints included concentration problems (37%), mood problems (22%), decreased interest in social activities (40%), poorer driving ability (25%), decreased reading and writing ability (32%), and decreased participation in work and volunteer activities (62%). Regression analyses showed that stroke symptoms and loss of participation in activities predicted life satisfaction. Stroke severity, ADLs, age, race, and gender were not significant predictors. Conclusions: Negative changes in activity participation and quality of life result from mild stroke. Our findings suggest that there are lasting sequelae of mild stroke, that the significance of these sequelae should not be minimized, and that individuals with mild stroke may be in need of rehabilitation services.
Correspondence: *Desiree A. White, Ph.D., Psychology, Washington University, Campus Box 1125, Washington University, St. Louis, MO 63130. E-mail: dawhite@wustl.edu*

Poster Session 9: Dementia/11:00 a.m.–12:30 p.m.

R. GRIFFITH, J.A. DEN HOLLANDER, W.T. EVANOCHKO, L.E. HARRELL, E.Y. ZAMRINI, J.C. BROCKINGTON & D.C. MARSON. Posterior Cingulate MRS is Associated with Cognitive Impairment in Amnestic MCI.
Patients with amnestic mild cognitive impairment (MCI) demonstrate deficits on non-memory cognitive tests. Neuroanatomical studies of MCI indicate pathology in the hippocampus (HC) and posterior cingulate (PC), presumably representing early AD pathology. While memory deficits in MCI are presumably related to HC pathology, neuroanatomical correlates of non-memory deficits are unclear. We used proton magnetic resonance spectroscopy (MRS) of the HC and PC to study memory and non-memory performance in MCI and AD. Six patients with MCI (diagnosed by Mayo criteria), four patients with mild AD, and 6 normal controls completed the Dementia Rating Scale (DRS) and its subscales: Memory, Initiation, Conceptualization, Construction and Attention. Participants also underwent point-resolved MRS (TR/TE = 2000/32) in the PC (20x20x20 mm) and left HC (25x15x10 mm). N-acetylaspartate (NAA), myo-inositol (mI), and choline (Cho) were measured and normalized using creatine (Cr). Pearson correlations were computed between MRS ratios and DRS Total and subscale scores. A positive correlation occurred between PC NAA/Cr and DRS Memory ($r=0.67$, $p<0.01$). Negative correlations occurred between PC mI/Cr and DRS Initiation ($r= -0.74$, $p<0.001$), Memory ($r= - 0.54$, $p<0.05$), Conceptualization ($r= -0.53$, $p<0.05$), and Total ($r= -0.53$, $p<0.05$). Correlations remained significant between mI/Cr and DRS Total, mI/Cr and Initiation, and NAA/Cr and Memory after controlling for overall cognitive impairment using the Mini Mental State Exam. No significant correlations occurred between HC ratios and DRS scores. Patients with MCI and AD demonstrated relationships between PC MRS ratios and memory and non-memory scores, but not between the left HC and cognition. NAA is thought to represent neuronal integrity and mI to represent gliosis. These findings highlight the importance of posterior cortical integrity to cognitive functioning early in the course of AD and implicate the PC in cognitive impairments due to MCI.
Correspondence: *Randall Griffith, Ph.D., Neurology, University of Alabama at Birmingham, 1216 Jefferson Tower, 625 19th Street South, Birmingham, AL 35233. E-mail: rlgriffith@uabmc.edu*

J. CHEY, H. KIM & M. SHIN. Cognitive Aging and Development of Dementia: A Six-Year Follow-Up Study on Community-Residing Elders.
Low cognitive performances in elderly Korean subjects reflect lack of education as well as deteriorating cognitive functions in preclinical phase of dementia. This is in contrast to the situation in U.S. and other industrialized societies where most of the elderly people received formal education. Low cognitive performance, especially in memory, is indicative of oncoming dementia. The complex nature of low cognitive performance poses a challenge to clinicians in Korea and probably other societies where formal education has been scarce for the elderly population. The implication for the elderly people with MCI in Korea could be quite different from their U.S. counterparts. In order to examine the underlying mechanism of MCI in Korea, a follow-up study examined neuropsychological functions in 243 community-residing elderly Koreans between 1998 and 2004. Rates of dementia cases were analyzed for four groups: the MCI (K-DRS)group, the MCI (EMS) group, the cognitive-decliner group and the control group. MCI (K-DRS) was defined as the performance below the one standard deviation below the mean on the K-DRS and the MCI (EMS) was based on the EMS secondary memory index score. Chi-square test was used to examine the differential rate of dementia. Hierarchical Linear Model and discriminant analysis were utilized to identify variables predicting dementia. Incidence was highest in the cognitive-decliner group, 25 percent, compared to the two MCI groups, 10-15 percent, and the control group, 5%. Cognitive decline rate ($p <. 01$) and initial K-DRS performance ($p <. 01$) proved to be significant factors predicting dementia ($p <. 01$) as well as age ($p< .05$). Low education is a confounding factor in identifying prodromal stage of dementia. In populations with low educational attainment, repeated measurements of the cogntive functions provides a more accurate picture of who will develop dementia in the near future.
Correspondence: *Jeanyung Chey, Ph.D., Psychology, Seoul National University, San 56-1 Shillimdong, Kwanakgu, Seoul 151-742, South Korea. E-mail: jychey@snu.ac.kr*

J. CHEY & H. KIM. Clock Drawing, Literacy, and Education in Dementia Evaluation.
Clock drawing test (CDT) has been recognized as an effective tool for dementia detection (Freedman et al., 1994). The administration of the

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

test is simple, yet it requires the coordination of multiple neuropsychological functions, such as visuospatial construction skills, semantic memory or conceptualization of the clock, and executive function. This study examined neuropsychological characteristics of 243 normal and 30 Alzheimer's disease patients. Additionally, it purported to examine the effects of literacy and education; and compare the error patterns in normal and demented patients. Two hundred-sixty-four nondemented community-residing elderly people and and 30 patients of the dementia of the Alzheimers type in their early stage participated in the study. "10 after 11" version of the CDT was administered. Todd et al (1995)'s quantitative scoring system and Rouleau et al. (1992)'s qualitative error analysis were utilized. Regression analysis was used to examine the effects of demographic variables. Percentiles as well as means and standard deviations are provided for each age-and education-specified normative group. Age effect was significant ($p < .01$), as has been observed in the U.S. population (Freedman et al., 1994). Contrary to the common belief that clock drawing is easy and not influenced by education we found that educational attainment and literacy status of the elderly influenced his/her performance ($p < .01$). Additionally, this study established age- and education-specific norms for the elderly Korean population. Error characteristics committed by subjects with low educational attainment were qualitatively different from dementia patients. Conceptualization error characterized performance of early DAT patients. CDT may be an effective dementia screening tool for people who received more than primary education. It may,however, identify too many false-positive cases in elderlies with low educational attainment.

Correspondence: *Jeanyung Chey, Ph.D., Psychology, Seoul National University, San 56-1 Shillimdong, Kwanakgu, Seoul 151-742, South Korea. E-mail: jychey@snu.ac.kr*

C. GARCIA-SANCHEZ, J. KULISEVSKY, A. BOLTES, B. PASCUAL-SEDANO, M. LOPEZ-GONGORA & A. ESTEVEZ-GONZALEZ. Reproductive period and cognitive performance in postmenopausal MCI women.

The relationship between a longer exposure to endogenous estrogens and a lower risk of dementia remains still controversial. Post menopausal use of estrogen replacement therapy in order to improve cognition and reduce the risk of dementia is also controversial. Objective: To examine the relationship between exposure to endogenous estrogens, indicated by the reproductive period, and cognitive performance in patients with Mild Cognitive Impairment (MCI). Thirty unselected female patients (aged: >50 to 80 years) from a wider cohort of patients with subjective memory complaints referred to our Neurological Service were diagnosed with MCI according to criteria by Petersen et al (1999, 2001). All patients had a natural menopause. We correlated reproductive period with multiple functional and cognitive measures: MMSE, Blessed's Scale, Informant Questionnaire on Cognitive Decline in Elderly (IQCDE), memory profile (working, prospective, semantic, episodic, autobiographical and nondeclarative memory: procedural, incidental and priming), attention (CPT, go/Nogo and Stroop paradigms), language (Token, BNT) and executive functions (WCST). Reproductive period and age at menarche or menopause did not correlate with any functional and cognitive measures. Our results did not show relationship between time of exposure to endogenous estrogens and cognitive performance in MCI female patients. Preventive estrogen therapy in MCI patients requires further research.

Correspondence: *Armando Estevez-Gonzalez, MD, Psychiatry & Clinical Psychobiology, University of Barcelona, Mitre 59, at, 1, Barcelona 08017, Spain. E-mail: aestevez@comb.es*

A.J. HUTCHINSON & J.L. MATHIAS. Differentiating Between Frontotemporal Dementia and Alzheimers Disease: A Meta-analytic study.

An early and accurate diagnosis of dementia of the Alzheimers type (DAT) is important to the efficacious use of pharmacological treatments for DAT. Time and cost efficient cognitive assessments are needed to assist differential diagnosis, which must exclude other types of dementia. Fronto-temporal dementia (FTD), can be difficult to distinguish from DAT due to an overlap in the cognitive problems evidenced by these groups, particularly as these disorders progress. The current study therefore undertook a meta-analysis of all research published between 1980 and 2004 that used either screening measures or neuropsychological tests to examine the cognitive deficits of patients with DAT and FTD. A comprehensive search of the PsychInfo and PubMed databases was undertaken using 16 search terms. All articles were screened using detailed inclusion and exclusion criteria. DAT and FTD diagnoses must have been established using independent criteria to ensure that test performance did not serve as both dependent and independent variables. Cohens d effect sizes and percentage overlap between the DAT and FTD groups were calculated for each of the neuropsychological measures in order to evaluate the research findings independently of the effects of sample size. Fail-safe Ns were additionally calculated to address the bias introduced by the tendency to publish significant results. The influence of moderator variables, including time since diagnosis, diagnostic criteria, education, age, and gender was also examined. The findings are discussed in terms of the tests that best discriminate between DAT and FTD in order to guide clinicians when they are required to provide a time-efficient and accurate differential diagnosis.

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

S. TOMASZEWSKI FARIAS & D. MUNGAS. Degree of everyday functional impairment differs across subtypes of Mild Cognitive Impairment (MCI).

Mild Cognitive Impairment (MCI) has become increasingly recognized because of its associated risk for dementia. However, there is considerable variability in diagnostic algorithms used to define MCI, and different subtypes can be identified. The degree of associated functional decline in MCI remains unclear. In this study we examined whether functional impairment differs across subgroups of MCI. The sample consisted of 111 older adults (46 Caucasians and 65 Hispanics), divided into four diagnostic categories: cognitively normal, MCI-memory impaired, MCI-nonmemory impaired, and demented. Functional status was measured using the informant-report version of the Daily Function Questionnaire. An analysis of variance revealed significant differences in everyday functioning across the groups ($p <.0001$). Follow-up comparisons revealed significantly more functional change in the demented group versus the normals, and in the demented group compared to the MCI-memory impaired group and the MCI-nonmemory impaired group (ps <.0001). There was more functional impairment in the MCI-memory impaired group compared to normals ($p = .028$), but not in the MCI-nonmemory impaired group compared to controls. Using a comprehensive battery of neuropsychological tests, verbal memory was the only neuropsychological test significantly associated with everyday functioning. Findings suggest the MCI-memory impaired group shows more functional impairment than the MCI group with an impairment in a cognitive domain other than memory. The implications of these results are that impairment in the cognitive domain of memory may be particularly relevant to early functional change. In support of this conclusion, only the neuropsychological measure of memory predicted functional status.

Correspondence: *Sarah Tomaszewski Farias, Ph.D., Neurology, University of California, Davis, 4860 Y Street, Suite 3700, Sacramento, CA 95817. E-mail: sarah.farias@ucdmc.ucdavis.edu*

R.P. KESSELS, J. FEIJEN & A. POSTMA. Implicit and Explicit Memory for Spatial Information in Alzheimer's Disease.

There is abundant evidence that memory impairments in Alzheimer's disease (AD) are related to explicit memory, whereas implicit memory

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

function remains relatively intact or is less severely affected. With respect to spatial memory function in AD, however, only a few studies have been performed, generally showing that AD patients are impaired in explicit spatial memory, possibly related to hippocampal dysfunction. Thus far, studies on implicit spatial memory in AD are lacking. The current study set out to investigate implicit and explicit spatial memory in AD patients (N=18; ages 75-89; MMSE≤24) using an ecologically valid computer task, in which participants had to remember the locations of objects in common rooms. The control group consisted of 22 non-demented elderly (ages 65-85; MMSE≥27). Using the process-dissociation procedure, the contribution of implicit and explicit memory function was estimated. The results showed an overall worse performance on the memory task in the AD patients ($p< 0.005$). Furthermore, we found that the AD patients were impaired on explicit spatial memory ($p<0.001$), but no group difference was found on implicit spatial function. These findings clearly support the notion that especially explicit spatial memory deteriorates in patients with dementia. Also, the present findings indicate that intact implicit memory in AD extends to the spatial domain. Clinically, this finding might be relevant, in that intact implicit memory function might be helpful in overcoming problems in explicit processing. Future studies should examine spatial memory function in AD in more detail, e.g. using route-learning tasks.

Correspondence: *Roy P. Kessels, PhD, Psychonomics, Utrecht University, Heidelberglaan 2, Utrecht 3584 CS, Netherlands. E-mail: r.p.c.kessels@fss.uu.nl*

A. VOGEL, E.L. MORTENSEN, A. GADE & G. WALDEMAR. Category Cued Recall in the Diagnosis of Mild Alzheimer's Disease.

Sensitive memory tests are of great importance in diagnosing Alzheimer's Disease (AD) and some studies have found that cued recall is the most effective measure in discriminating between AD patients and non-demented people. The objective of this study was to compare the discriminative validity of the Category Cued Recall portion of the Double Memory Test with the memory test from the Alzheimer's Disease Assessment Scale (ADAS-cog) a commonly used test measuring free recall. The discriminative validity of the two tests was investigated in 40 patients with mild AD and 44 healthy control subjects recruited from a prospective Memory Clinic cohort including consecutively referred patients with MMSE score of 20 or above. A fortran program was used to compute sensitivity and specificity for all possible cut-off values for each test and to find the optimal cut-off scores for classifying patients and controls. A multivariate classification program was used to find predictive values for different base rates. Performances on Category Cued Recall and ADAS-cog memory test were significantly impaired in AD patients compared to healthy controls. Both tests had had high sensitivity for both immediate and delayed recall (>85%) with high levels of specificity (>93%). Adequate Positive Predictive Value and Negative Predictive Value were found when the prevalence of AD in a population was set at 50%. With lower prevalence Negative Predictive Value decreased more for Category Cued Recall than for ADAS-cog memory test. Category Cued Recall can be used effectively in the diagnostic assessment of suspected AD. The ADAS-cog memory test had slightly better discriminative abilities than the Category Cued Recall and our results indicate that it would be superior in diagnostic screening for AD.

Correspondence: *Asmus Vogel, MA, Memory Disorders Research Unit., Rigshospitalet, Copenhagen University Hospital, N 6131, 9 Blegdamsvej, Copenhagen 2100 Copenhagen, Denmark. E-mail: asmus.vogel@rh.hosp.dk*

R.F. COEN, I. BRUCE, E. GREENE, H. O'CONNELL, A. CHIN, B. KATE, C. CUNNINGHAM, J.B. WALSH, D. COAKLEY & B.A. LAWLOR. Copying Pentagons: What is "Normal"?

There is only one visuoconstruction item in the MMSE which is scored on a gross pass/fail basis, but a variety of different errors can occur on drawing tasks. What constitutes normal/abnormal performance? The present study addressed this question. Sample: n=94 individuals with mild Alzheimers disease (NINCDS-ADRDA Prob AD, mean age=74.6 /-4.2, CDR 0.5-1, MMSE >19/30, mean=22.7 /-1.8) and n=99 age, gender and education matched community dwelling controls (AGECAT screened, mean age=74.4 /-5.5, mean MMSE=27.8 /-1.8). Pentagon copying was scored in 2 ways (i) Folstein criteria for pass/fail (ii) error analysis using Jefferson et al (J Neuropsychiatry Clin Neurosci 2002;14:311-320) 8 point Intersecting Pentagons Error Subindex. Error types: Size, Number of Figures, Intersection, Tremor/Segmentation, Five Angles, Rotation, Perseveration, Pull to Stimulus. (i) Folstein criteria: 50 ADs failed (53%). 45 controls failed (46%). (ii) Error analysis: for both ADs and controls the most common errors were failure to draw two 5 sided figures (42%, 37% respectively) and intersection errors (31%, 20% respectively). This was followed by Size alteration (34%, 14% respectively) and Tremor/Segmentation (27%, 9% respectively) but neither is a Folstein criterion for failure. All other error types were extremely infrequent or absent in controls. Number errors were more common in ADs than controls (13% vs 2%). Rotation was infrequent (4% vs 2%). Perseveration (6%) and Pull to Stimulus (3%) only occurred in ADs. Failure on copying pentagons occurs frequently in healthy elderly individuals. Some error types are extremely infrequent or absent in the healthy elderly, and may therefore be of diagnostic significance.

Correspondence: *Robert F. Coen, PhD, Mercer, St. James, St. James, Dublin 8 Dublin 8, Ireland. E-mail: rcoen@stjames.ie*

M. HERNANDEZ, M. JUNCADELLA, M. MORAL, R. MIRANDA, R. RENE & J. PENA. Adaptation, Standardization and Validation of the "Addenbrooke Cognitive Examination" (ACE) as a Brief Cognitive Test for Dementia: a Pilot Sudy on Spanish Older Adults.

To obtain normative data and to validate the ACE in an older adult Spanish population. Standardization: 81 healthy subjects (74.4% females), mean age 70.64 (SD: 5.42), mean years of education 8.17 (SD: 3.6). Validation: 46 subjects with a diagnosis of Mild Cognitive Impairment (MCI) or mild to moderate Alzheimer Disease (AD). Statistical procedure: Analysis of the influence of age and education. Determination of a cut-off score. Analysis of convergent validity. Detection rate comparison between ECA and MMSE. Significant influence of age and education that disappears after correction. The optimal cut-off score is 83 (maximum score:100).Good convergent validity. Better detection rate when using the ECA at mild stages of AD. Several screening and diagnostic test for dementia have been developed, but no single test is established standard. The MMSE is one of the widely used and validated screening instrument, but has certain limitations, such as insensitivity to low prevalence of dementia. We propose the ECA as a complement to the MMSE al mild stages of cognitive impairment. Normative data will allow the correct clinical application of the ECA in Spanish population.

Correspondence: *Mireia Hernandez, Neurology, Hospital de Bellvitge, Feixa LLarga s/n, Hospitalet de Llobregat 08907, Spain. E-mail: mire@cconline.es*

T.W. FRIEDMAN, G.W. YELLAND & S.R. ROBINSON. The SCIT: A Possible Predictor of Those at Risk of Developing MCI.

The Subtle Cognitive Impairment Test (SCIT) is a perceptual judgement task that uses accuracy and response time data to assess cognitive performance. The SCIT is thought to be sensitive to changes in the efficacy of synaptic communication in the subcortical and cortical pathways that underpin visual discrimination and decision making. This computer-based test can be conducted in approximately 5 minutes by untrained personnel, is suitable for participants of all ages, and has a high test-retest reliability [$r(9)=0.97$, $p<.01$]. The present study investigated whether the SCIT is sensitive enough to detect and/or predict subtle decline in elderly individuals within the normal cognitive range, over a 12 to 36 month period. Elderly participants were tested on the Mini

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

Mental State Examination (MMSE). Those with an MMSE score within the normal range (MMSE=26-30) were tested on the SCIT (N=108; age: 62-90 yrs). Participants were then re-tested 1 to 3 years later. Performance on the SCIT was strongly correlated with MMSE score [r(106)= -0.44, p<.01]. A proportion of participants were found to have impaired performance on the SCIT compared to others with the same MMSE score. On re-testing 12-36 months later, these participants exhibited a 1-3 point decline on MMSE, whereas participants with high SCIT scores generally, did not. These data indicate that the SCIT is sensitive to subtle deficits in cognitive performance, and may have potential for the screening of elderly individuals who are at risk of progressing to Mild Cognitive Impairment.

Correspondence: *Tim Friedman, Psychology, Monash University, Department of Psychology, Building 17, Clayton Campus, Melbourne, VIC 3800, Australia. E-mail: timothy.friedman@med.monash.edu.au*

J. STOKHOLM, A. VOGEL, A. GADE, A. HEJL & G. WALDEMAR. Relationships Between Cognitive and Behavioural Measures of Executive Function in Patients With Mild Alzheimer's Disease.

To examine the relationships between two different approaches to measurement of executive dysfunction: Behavioral reports by caregivers and neuropsychological testing in patients with mild Alzheimer's Disease (AD). 52 patients fulfilling the NINCDS-ADRDA criteria for possible or probable AD were included. All had mild AD (MMSE>20) and were 60 years or above. Executive cognitive functions were assessed using: Modified Wisconsin Card Sorting, Trail Making Test Part B, Stroop Color/Word Interference, Verbal Fluency, Design Fluency and Verbal Abstraction. To obtain a global executive measure an index including all executive tests was constructed. Based on the performances of healthy controls cut off scores of 1.5 SD was defined for each test. Scores below were considered impaired. To establish a composite score of the patients' executive dysfunction, we computed the number of tests that were impaired (score 0-7). Behavioral changes associated with frontal dysfunction were assessed using the Frontal Behavioral Inventory (FBI), a 24-item structured interview with the patient's caregiver. The patients scored significantly lower than an aged matched control group on all the executive tests. Mean score on the FBI was 10,1(SD: 6,7; range: 1-34 points). No significant correlations were found between the FBI-scores and the patients' performances on any of the executive test. Nor did we find any significant correlation between the FBI and the executive index. In patients with mild AD there is no relationship between scores on executive cognitive measures and the presence of behavior changes reported by caregivers.

Correspondence: *Jette Stokholm, MA, Memory Disorders Research Unit, 6131, Copenhagen university hospital, Blegdamsvej 9, Copenhagen 2100, Denmark. E-mail: jette.stokholm@rh.hosp.dk*

R.M. VAN WALSEM, T.N. VAN DEN KOMMER & E.J. SCHERDER. The Use of the MacArthur Competency Assessment Tool for Clinical Research in Patients with Mild Alzheimer's Disease and Healthy Elderly.

In research projects in which cognitively impaired subjects participate, a reliable determination of competency is an important issue for ethical and medical reasons. The purpose of this study is to examine whether elderly with mild AD are able to respond to the four subscales of the MacArthur Competence Assessment Tool for Clinical Research (MacCAT-CR), e.g. Understanding, Appreciation, Reasoning, and Expressing a Choice. The MacCAT-CR is a semistructured interview that assesses the capacity for giving informed consent and has to be adapted to reflect the content of individual protocols. Both a comparison between the performance of 10 mild AD patients and 10 healthy elderly, as well as an inventory of the individual performance of the AD patients was made. Using a Kruskal-Wallis test, the preliminary results show that there exists a significant difference between the two groups with respect to the median of the scores on the subscales Understanding and Appreciation. Spearman's rank correlation coefficients show that a higher MMSE score seems to correspond with a better performance regarding competency especially on the subscale Understanding. Preliminary results show that the ability to Understand was the most difficult part for the AD patients. In our opinion it is therefore important that information revealed in this subscale is repeated as many times as needed to eliminate the memory component. Taken together, this instrument seems to be valuable for determining the competence of possible participants with cognitive impairment in future research.

Correspondence: *Regina M. van Walsem, master's degree, Section Neuropsychology J3-R, Leiden University Medical Centre, P.O. Box 9600, Leiden 2300 RC, Netherlands. E-mail: marleenvanwalsem@yahoo.com*

F. PETERS, S. MAJERUS, M. DE LAMOTTE, E. SALMON & F. COLLETTE. A case series study of phonological and lexico-semantic processing at different stages of Alzheimer's Disease.

Semantic processing is found to be impaired at early stages of Alzheimer's disease (AD) while phonological processing is believed to remain preserved until late stages of AD. However, very few studies have systematically investigated phonological processing in AD. We administered a comprehensive battery of phonological and lexico-semantic processing tasks to patients at different stages of AD. The participants were 10 patients [age: 78.4 years] with mild AD (AD+) and 6 patients [age: 76.3 years] with moderate AD (AD-), as well as 10 healthy control subjects [age: 75.1 years]. Phonological processing was assessed using rime judgement, minimal pair discrimination and non-word repetition tasks. We also assessed phonological short-term memory (STM) capacity, administering an immediate serial recall tasks for nonword lists and a rime probe delayed recognition tasks. Naming, categorisation and synonym judgment tasks explored lexico-semantic processing. Phonological processing was preserved in most patients with mild AD (one patient affected); however, half of the AD- patients showed consistent impairments for the phonological tasks. STM deficits were nevertheless relatively rare, with only 1 AD+ patients and 2 AD- patients showing a consistent deficit in the STM tasks. For the semantic processing tasks, impairments were observed in only 2 AD+ but in 4 AD- patients. Our results confirm that lexico-semantic impairments arise relatively early during AD. However they disconfirm the view that phonological processing would be relatively spared in AD, by showing consistent impairments appearing at later stages of AD. This deficit in phonological processing appears furthermore to be independent from phonological STM capacities.

Correspondence: *Frederic Peters, Licence in Psychology, Cyclotron Research Center, University of Liege, 8, Allee du 6 aout, Liege 4000, Belgium. E-mail: Frederic.Peters@ulg.ac.be*

M.G. WIARDA. Stability of Attention Span as Measure of Concentration in Patients with White Matter Lesions.

White matter lesions (WML) should destabilize the wide-spread attentional network needed to maintain working memory contents. In particular, the more damage to the network, the more inefficient and instable should it be. We studied 71 patients with various degrees of WML as graded after the Fazekas criteria. The numerical attention span forward and backward was tested with blocks of ten numbers of equal length and over several lengths initially and after one year. Stability indices for the number of errors in the sub-maximal spans were calculated. Additionally, Trail-Making-Test, Stroop-Test and several other tests were used to measure cognitive impairment. We found good correlation of WML grade with the stability indices, backward more than forward. After one year, the patients showed worse stability indices, indicating progress of disease. This correlated with other measures (TMT, Stroop). Stability of attention span as measured in number of errors per block can be used to measure severity and progress of cognitive impairment in patients with white matter lesions.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

Correspondence: *Martin G. Wiarda, Dipl.-Psych., Neurology, University Clinic, Theodor-Kutzer-Ufer 1-3, Mannheim 68135, Germany. E-mail: wiarda@neuro.ma.uni-heidelberg.de*

K. DONNELLY, J. DONNELLY, E. CORY, J. DUQUIN & M. LAFRANCE. From Theory to Evidence Based Practice: Cognitive Screening in Primary Care.

Primary care providers in a large VA medical center are now mandated to screen elderly patients for dementia. The current protocol includes no formal cognitive testing. It was hypothesized that adding a brief, standardized test would improve the accurate identification of cognitively impaired patients. One hundred elderly primary care patients were administered a neuropsychological test battery in addition to the standard screening. The Mini-Mental State Exam (MMSE), Clock Drawing Test (CDT), Trail Making Test (TMT), and Hopkins Verbal Learning Test (HVLT-R) were evaluated to determine if one or more of these measures would improve the current screening process and better identify those patients who would benefit from more extensive evaluation and treatment. The criterion measure of cognitive impairment was the total score on the Mattis Dementia Rating Scale (DRS), with a cutoff for impairment set at one standard deviation (SD) below the mean. Of the 100 elderly participants, just one was classified as impaired by the existing screening procedure. Nonetheless, the DRS scores showed that 20% were one SD below the mean (impaired) and 4% were two SDs below the DRS mean (demented). The brief tests identified impairment in 11% (MMSE) to 63% (HVLT delayed recall) of the sample. ROC curves were examined for each test and the following produced statistically significant area under the curve (AUC) values: MMSE, TMT-A, TMT-B, and all four of the CDT scales used. The two best tests were the TMT-B (AUC=.74, p=.001) and the MMSE (AUC=.72, p=.002). Optimal cutoffs for sensitivity, specificity, and predictive values for impairment and dementia for these tests used alone and in combination will also be reported.

Correspondence: *Kerry Donnelly, Ph.D., VA WNY Healthcare System, 3495 Bailey Ave., 116B, Buffalo, NY 14215. E-mail: kerry.donnelly@med.va.gov*

M. NEWSON & S. BRAYBROOKE. Evaluating Two Versions of the MMSE Pentagon Copying Task.

The research was designed to investigate whether there is any advantage to using equal-sided pentagons versus unequal-sided pentagons (i.e., containing two 90 degree angles) as stimuli during a copying task when conducting assessments for dementia. Unequal-sided pentagons may be easier (i.e., requiring less effort), and perhaps less sensitive to the effects of dementia, than equal-sided pentagons. The participants consisted of three groups of 24 patients with a diagnosis of Alzheimer's Disease (AD), Vascular Dementia (VaD) or Mild Cognitive Impairment (MCI). Data were collected from a consecutive sample of referrals to a specialist memory clinic. When examining pass / fail performance, the MCI group was more likely to pass both types of pentagons than the other two patient groups, and there was no difference between the AD and VaD groups. When examining performance using the degree to which participant copies deviated from the stimulus pentagons, the equal-sided pentagon copies showed greater deviation from stimulus than the unequal-sided pentagon copies, across all groups. Also, the AD and VaD groups were more likely to have missing angles in their copies than the MCI group. This pattern was seen for both types of pentagon stimuli. All participants were less precise when copying equal-sided pentagons versus unequal-sided pentagons. There did not appear to be a specific advantage to using an equal-sided pentagons stimulus when assessing for dementia based on data from participants with AD, VaD, or MCI.

Correspondence: *Margaret Newson, PhD, Neuropsychology, Frenchay Hospital, The Burden Centre, Frenchay Park Road, Bristol BS16 1JB, United Kingdom. E-mail: margaret.newson@north-bristol.swest.nhs.uk*

A.M. BARRETT, L.M. LEIDIG, K.M. HEILMAN & G.P. CRUCIAN. Self-estimated Walking Speed in Parkinson Disease (PD).

Aged people may overestimate their functional performance. We wished to learn whether amnestic PD subjects would overestimate their walking speed compared to controls. 6 men with PD (mean MMSE 25.7, SD 3.08) and 30 male controls (mean MMSE 28.6, SD 1.08) walked 9 m. We assigned each subject a percentile rank referent to control walking speed. All subjects marked a Likert scale to self-estimate speed pre- and post-walking. We calculated percentiles for self-estimated speed (pre- and post-walking), and compared pre-/post- estimates between groups. However, baseline (pre-) estimates may reflect individual differences in self-rating criteria, not related to actual speed. Thus, we also compared adjusted self-estimated walking speed: Likert (‰ self estimates after walking)– (‰ self-estimate before walking). We assumed over- and underestimation errors are more significant in bradykinesia. We thus calculated an awareness ratio (AR) for performance self-estimates : (Estimated –Actual)/(Estimated + Actual). With this formula, overestimation errors (anosognosia) result in AR = 0 ≤1. UNDERestimation errors can also be measured, and result in negative AR values: −1 ≤0. PD subjects (mean 91.2 cm/sec, SD 31.30) had bradykinesia (control mean 174.5 cm/sec, SD 31.75; outside 99% CI controls). All subjects self-rated walking faster post-performance ($p < 0.001$), but this was exaggerated in PD subjects ($p = 0.001$). PD AR (mean = 0.96, SD 0.03) exceeded control AR (mean = –0.06, SD 0.039; $p < 0.001$), consistent with anosognosia for bradykinesia. PD subjects in this study overestimated their walking speed, especially post-walking and relative to actual performance. Motor anosognosia may increase safety risk, and affect other behaviors like driving or medication compliance, independent of actual motor problems. Further research examining the relationship between motor anosognosia and adverse outcomes in neurological disorders is needed.

Correspondence: *Anna M. Barrett, MD, Stroke Rehabilitation Research, Kessler Medical Rehabilitation Research Corporation, 1199 Pleasant Valley Way, West Orange, NJ 07052. E-mail: abarrett@kmrrec.org*

A.I. TROSTER, J.A. FIELDS, A.M. PAOLO & W.C. KOLLER. Apolipoprotein E Genotype Influences the Cognitive Phenotype of Parkinson's Disease .

This retrospective study sought to evaluate the role of the apolipoprotein E genotype (APOE) in cognitive differences among patients with Parkinson's disease (PD). It was hypothesized that those patients with at least one E4 allele would demonstrate weaker episodic memory than those without such an allele. The performance of 146 normal controls (NC), 42 PD patients without an E4 allele (PD-Non4) and 20 PD patients with at least one E4 allele (PD-E4) were compared on a neuropsychological test battery. The three groups were matched for education, and the PD-Non4 and NC groups on age. The two PD groups were comparable in education, overall severity of cognitive impairment, severity of depression symptoms, disease severity, and disease duration. The PD-E4 group had earlier disease onset than the PD-Non4 group, and was younger than the PD-Non4 and NC groups. Data were analyzed via ANOVA and ANCOVA, covarying for age differences where appropriate. Both PD-Non4 and PD-E4 demonstrated impairments relative to NC on episodic memory, attention/working memory, executive, and verbal fluency tasks. The two PD groups did not differ in episodic memory (California Verbal Learning Test, Logical Memory, Visual Reproduction) even after age was used as a covariate. However, the group without an E4 allele performed worse on tests of attention and working memory (digit and visual span, Trailmaking), and indeed (except for Trailmaking Part B) was the only PD group to show these impairments relative to NC. APOE genotype influences the cognitive phenotype of PD, and the E2 and/or E3 alleles appear associated with working memory impairment. Given recent studies associating APOE2 with increased risk for PD and with dementia in PD, future studies might seek to prospectively study the role of APOE2 in larger samples of patients with PD, PD dementia, and dementia with Lewy bodies (DLB), especially since working memory impairments are prominent in these dementias.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

Correspondence: *Alexander I. Troster, PhD, Dept. of Neurology, University of North carolina School of Medicine, CB 7025, 3114 Bioinformatics Building, Chapel Hill, NC 27599-7025. E-mail: trostera@neurology.unc.edu*

H.M. ERHAN, D. ROANE & M. TAGLIATI. Neuropsychological Outcome Following Deep Brain Stimulation of the Subthalamic Nucleus in a Woman with Premorbid Psychiatric History: A Case Presentation.

Cognitive functioning was examined in a woman with Parkinson's Disease(PD)and a psychiatric history, pre and post Deep Brain Stimulation (DBS), to compare her clinical presentation with findings reported in the literature. Neuropsychological measures from two pre and two post DBS assessments are reported. A 59 year old woman received bilateral subthalamic nucleus DBS for treatment of PD. She was treated for Generalized Anxiety Disorder many years prior to PD onset. Post DBS she developed symptoms of depression and psychosis. Tests administered included: Digit Span,Trail Making Tests Forms A & B, The Boston Naming Test, Controlled Oral Word Association Test, Hooper Visual Organization Test, Rey Auditory Verbal Learning Test, Rey Complex Figure Test, Wisconsin Card Sorting Test, Digit Symbol Coding, and The Grooved Pegboard Test. Tests were administered 10 months and one month prior to and 18 and 22 months post DBS. Stimulators were on and PD medications were taken at post DBS testing. Anti - depressant medication was taken only post DBS. Cognitive limitations were evident in some domains pre DBS. Performance was lower on all measures post DBS except for The Boston Naming Test and The Hooper Visual Organization Test. Declines in word fluency, executive function and some visuospatial functions were consistent with many reports in the literature. The notable decline in visual motor tracking was consistent with some reports and discrepant from others. The extent of memory and global cognitive decline, despite post DBS reductions in UPDRS scores (part III), appeared to exceed those reported in the literature. Many studies reporting neuropsychological outcome measures following DBS exclude individuals who meet criteria for dementia or major psychiatric disorder prior to DBS. Outcome measures in individuals with premorbid or concurrent psychiatric conditions are needed to determine the effect of psychiatric conditions on post DBS cognitive functioning.

Correspondence: *Hulya M. Erhan, Ph.D., Psychiatry, Beth Israel Medical Center, 16th Street at First Avenue, Bernstein Pavillion Room 2B05, New York, NY 10003. E-mail: herhan@bethisraelny.org*

R.J. STOLWYK, J.L. CHARLTON, T.J. TRIGGS, R. IANSEK & J.L. BRADSHAW. Neuropsychological Function and Driving Ability in People with Parkinsons Disease.

In this study the association between cognitive symptoms of PD and driving performance was investigated by examining the correlation between neuropsychological test performance and driving simulator behaviour. Eighteen participants with PD and 18 matched controls completed a range of neuropsychological measures. These data were correlated with driving simulator performance results from an earlier study. Significant correlations were found between several measures of neuropsychological test performance and driving behaviour in participants with PD. In contrast, few significant correlations were obtained in the control group. Results suggest that executive difficulties in people with PD such as working memory, planning and set shifting are associated with reduced tactical level driving performance such as speed adaptation and complex curve navigation. Impaired information processing, visual attention and visual perception in people with PD appears associated with reduced operational level driving performance, such as reacting to road obstacles and maintaining constant lane position. Few correlations were found between measures of physical mobility and psychomotor speed with driving measures. Overall, this study highlights the important role of cognitive function in driving performance within the PD population. Comprehensive assessment of cognitive function should be included when assessing driving competency in people with PD.

Correspondence: *Rene J. Stolwyk, BSci(Hons), Psychology, Monash University, P.O. Box 17, Clayton Campus, Monash University, VIC 3800, Australia. E-mail: rene.stolwyk@med.monash.edu.au*

K. LUKATELA, J. GRACE, M. AMICK & B. MELISSA. Naming Deficits in Early Parkinson's and Alzheimer's Dementia. .

There is a growing literature indicating naming and semantic processing problems in Parkinsons Disease (PD). Here, we investigate the nature of naming deficits in PD by comparing types of naming errors produced by patients with Parkinsons and Alzheimers dementia (PDD, AD) on the Boston Naming Test (BNT). Our aim was to compare the contributions of visuoperceptual, semantic, and phonological factors to naming errors in AD and PDD. AD and PDD patient groups differed in age but not in education or severity of dementia. Controls were healthy, elderly participants. BNT naming errors were classified into three general categories: visuoperceptual, semantic, phonemic. Semantic errors were further classified into three mutually exclusive categories: coordinate errors (responses belonging to the same semantic category as the target word), superordinate errors (responses belonging to a broader semantic category as the target word), and functional-circumlocutory errors (circumlocutions and responses that functionally describe the target word). (1) Overall naming was more impaired in AD than PDD. (2) The pattern of general error types was similar between the groups, with semantic errors being most prominent in all three groups. (3) In spite of their motor deficits, PD patients produced very few phonemic errors. (4) Qualitative differences in semantic errors occurred between the patient groups, with the PDD group making more coordinate, and AD group making more superordinate errors. Our results confirm impaired naming function in PDD and provide new evidence on the nature of semantic processing deficit. These results also suggest a qualitative difference in semantic processing between PDD and AD.

Correspondence: *Katarina Lukatela, Ph.D., Psychology, University of Connecticut, 409 Babbidge Rd., Storrs, CT 06269. E-mail: KLukatela@charter.net*

M. MEERSMANS, A. MINGUEZ-CASTELLANOS, F. ESCAMILLA-SEVILLA, A. ORTEGA-MORENO, A. LOPEZ-JIMENEZ, R. VILAR, C. OROZCO-GIMENEZ, M.J. KATATI, J. MARTIN-LINARES & M. PEREZ-GARCIA. Effects of serial position on episodic verbal memory in patients with advanced Parkinson's disease.

Parkinson's disease (PD) can show a broad spectrum of neuropsychological deficits, with memory being especially relevant due to its involvement in the diagnosis of dementia. The purpose of this study was to evaluate the verbal memory function in patients with advanced PD by means of the Rey Auditory Verbal Learning Test (RAVLT), and investigate whether the serial position effect that (it can be found in healthy people) are common in the population without brain damage are produced. Fortyeight patients with advanced PD who were candidates for surgery were evaluated following the CAPSIT-PD protocol. The RAVLT was administered in the context of a broader neuropsychological evaluation. An ANOVA was carried out for a repeated measure design, with the independent variable (IV) being the position in the learning curve (beginning, middle, ending) and the dependent variable (DV) being the number of words recorded for each position. The results showed that there were statistically significant differences between the position of the words recorded on the beginning versus middle position, and middle versus ending position. We can conclude that primacy and recency effects are produced, maintaining the verbal episodic information acquired across the 5 trials, which shows a productive learning curve.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

Correspondence: *Miguel Meersmans Sanchez-Jofre, Servicio de Neurologia, Hospital Virgen de las Nieves, C/ Pintor Lopez Mezquita, Granada 18002, Spain. E-mail: mmeersmans@fundacionhvn.org*

M. MEERSMANS, A. MINGUEZ-CASTELLANOS, F. ESCAMILLA-SEVILLA, A. ORTEGA MORENO, A. LOPEZ-JIMENEZ, R. VILAR, C. OROZCO-GIMENEZ, M.J. KATATI, J. MARTIN-LINARES & M. PEREZ-GARCIA. Quality of Life predictors after bilateral Deep Brain Stimulation of the subthalamic nucleus in patients with advanced Parkinson's Disease.

Deep Brain Stimulation (DBS) of the subthalamic nucleus (STN) is effective with the motor symptoms of advanced Parkinson's Disease. Our objectives are to evaluate the effects of DBS of the STN on quality of life and identify the main predictive factors, distinguishing between neurological and cognitive-emotional variables of the disease. Twenty-one consecutive patients who underwent bilateral DBS of the STN in our center were evaluated using the Core Assessment Program for Surgical Interventional Therapies in Parkinson's Disease (CAPSIT-PD). The main outcome variable was the percentage change in the score of a quality of life questionnaire (Parkinson's Disease Questionnaire (PDQ-39)), six months after the intervention. Multiple lineal regression analyses were performed considering two blocks of pre-surgical independent variables: on the one hand, subscale III of the Unified Parkinson's Disease Rating Scale (UPDRS-III) in the "off" condition, levodopa equivalent dose, duration of PD; and, on the other hand, the Montgomery-Asberg depression scale and the Mattis Dementia Rating Scale. The mean improvement on the PDQ-39 was 37% ($p<0{,}0001$). The main predictive factor was the presurgical equivalent dose of levodopa: a higher dose was associated in a directly proportional way with the degree of improvement ($\beta=-0{,}463$; $p=0{,}042$). Our study confirms that there is an improvement in the quality of life of patients with advanced PD six months after bilateral DBS of the STN intervention. A higher dose of pre-surgical medication predicts a greater improvement in these patients.

Correspondence: *Miguel Meersmans Sanchez-Jofre, Servicio de Neurologia, Hospital Virgen de las Nieves, C/ Pintor Lopez Mezquita, Granada 18002, Spain. E-mail: mmeersmans@fundacionhvn.org*

Symposium 7/11:30 a.m.–12:50 p.m.

The Functional and Neural Basis of Prospective Memory

Chair: Tom Manly

T. MANLY, D. SHUM, J.A. ELLIS, G. D|*SRQUOTE*|YDEWALLE & P.W. BURGESS. The functional and neural basis of prospective memory.

Achieving goals requires us to plan actions that will be executed at certain times, after certain events occur, or more generally 'at some stage' in the future. The intention must be maintained over minutes, hours or days, despite sleep, attentional engagement elsewhere and competition from actions more strongly cued by a particular context. Such prospective memory (PM) reflects a high level integration across a number of contributory systems (creative problem solving, encoding, spontaneous and cued retrieval and so forth). Given the number of systems involved —not to mention the frequency of error in the healthy population — it is not surprising that PM failures represent one of the most common complaints seen in many neurological conditions. This symposium addresses current leading-edge research into PM from a number of different perspectives. Shum discusses the problems faced by children and adolescents who have suffered traumatic brain injuries, the relationship between PM and other tasks, and the influence of the attentional demands of ongoing activity against which the PM elements have to be maintained. Freeman and Ellis extend the investigations over the life span, examining the effects of normal aging and the influence of the to–be– remembered information/context on the facilitation and inhibition of memory. De Bruycker, d'Ydewalle and Orban, and Burgess et al., report recent functional imaging findings. They emphasize the role of different brain systems at distinct points in the PM process and the apparently crucial role of anterior frontal regions in mediating the competition between ongoing activity and the to– be– executed intention.

Correspondence: *Tom Manly, PhD, Cognition and Brain Sciences Unit, MRC, Box 58, Addenbrooke, Cambridge CB2 2QQ, United Kingdom. E-mail: tom.manly@mrc-cbu.cam.ac.uk*

D. SHUM. Prospective memory following Traumatic Brain Injury in Children and Adolescents.

Objective: This study aimed to examine the effect of paediatric traumatic brain injury (TBI) on prospective memory, the ability to remember to carry out an intended action in the future. Method: Two groups of participants (35 children and adolescents with TBI and 58 matched controls) were administered an event-based prospective memory task with two levels of cognitive demand (low vs high) and three tests (viz., Self-Order Pointing Test, Stroop Colour and Word Test, and the Tower of London [4 disk version]) that measure executive functions. Results: Children and adolescents with TBI were found to perform significantly more poorly than the matched controls on the prospective memory task. More interestingly, performance of the adolescents with TBI on the prospective memory task was found to be significantly more affected when the cognitive demand of the ongoing task was increased. Results of hierarchical regressions indicated that performance on the event-based prospective memory task in the high cognitive-demand condition could be significantly predicted by performance on the Tower of London. Conclusions: Taken together, the results of the study corroborate the involvement of the prefrontal lobe in prospective remembering.

Correspondence: *Tom Manly, PhD, Cognition and Brain Sciences Unit, MRC, Box 58, Addenbrooke, Cambridge CB2 2QQ, United Kingdom. E-mail: tom.manly@mrc-cbu.cam.ac.uk*

J.E. FREEMAN & J.A. ELLIS. Aging and the accessibility of retrieval cue information in a delayed intention task.

Objective: Previous studies with both young and healthy older adults have demonstrated that intended actions are maintained in a heightened state of accessibility in memory as compared with neutral information not intended for action (intention–superiority effect or ISE; Goschke & Kuhl, 1993; Freeman & Ellis, 2003). There is also some indication, among young adults, that action representations may be inhibited (relative to neutral information) once the intention to perform the action has been satisfied (Marsh et al., 1998). These studies, however, focus on the representation of only one component of a delayed intention — the action — and neglect a second component — the retrieval cue or criteria for action completion. Method: The current study, therefore, extends research on the ISE by examining the representation of retrieval context information in young and older adults both before and after the performance interval in a delayed intention task. Results: In keeping with previous studies of the ISE, young adults demonstrated faster recognition latencies to items that were designated as retrieval cues for a forthcoming delayed intention task than to non–cue items. There was, however, no evidence of an ISE for retrieval cue information among healthy older adults and no indication of retrieval cue inhibition following intention completion in either age group. Conclusions: These findings suggest important differences in the representational properties of different components of an intention representation and their sensitivity to age effects.

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

Correspondence: *Tom Manly, PhD, Cognition and Brain Sciences Unit, MRC, Box 58, Addenbrooke, Cambridge CB2 2QQ, United Kingdom. E-mail: tom.manly@mrc-cbu.cam.ac.uk*

W. DE BRUYCKER, G. D'YDEWALLE & G. ORBAN.
Brain regions associated with retention and retrieval in event–based prospective memory: Evidence from functional magnetic resonance imaging.
Objectives: Event-based prospective memory involves remembering to perform a planned activity when a certain external event occurs in the future (e.g., remembering to post a letter upon passing a postbox). The crucial issue in performing an event–based prospective memory task is that an intention has to be retained over time, typically while one is engaged in an ongoing activity. This implies affinities with processing demands in dual task or divided attention situations. Similarly, event–based prospective memory bears resemblance to sustained attention tasks or 'vigilance' situations, in that it requires monitoring for environmental cues to interrupt ongoing activities and carry out the intention. Methods: We used event–related fMRI to disentangle common and distinctive neural correlates of prospective memory, vigilance, and dual task processing. Results/Conclusions: Results show increased neural activity bilaterally in occipital cortex during the retention phase of the prospective memory task, suggesting an early visual attention system directed at identifying the relevant prospective memory cue. Upon detection of the cue, increased left inferior frontal cortex (BA 10/46) activity was found uniquely in the prospective memory condition, serving either as a trigger to execute the planned action or merely reflecting successful memory retrieval. In a follow-up study we used a mixed blocked and event-related fMRI design in order to differentiate between sustained neural activity during the retention phase of a prospective memory task (e.g., intention maintenance) and transient, item–related neural activity (e.g., target–checking). Implications of the results for theories of prospective remembering will be discussed.
Correspondence: *Tom Manly, PhD, Cognition and Brain Sciences Unit, MRC, Box 58, Addenbrooke, Cambridge CB2 2QQ, United Kingdom. E-mail: tom.manly@mrc-cbu.cam.ac.uk*

P.W. BURGESS, I. DUMONTHEIL, C. FORBES, S.J. GILBERT, J. OKUDA & M. SCHOLVINCK. The role of rostral prefrontal cortex (Area 10) in prospective memory.
Findings from both human lesion studies and functional neuroimaging implicate the rostral prefrontal cortex (Area 10) in prospective memory. Recent findings from our lab elucidate the role that this region is playing, with five key findings: (i) Haemodynamic changes in Area 10 provoked by prospective memory situations are unrelated to the difficulty of these situations, but are related to maintenance of an intention over a delay period. (ii) There is specialisation within brain area 10 in PM situations, with lateral areas showing increased activation and medial regions showing a concomitant decrease. (iii) These lateral Area 10 increases occur equally when either retrieval or cue detection demands are high. Furthermore, a processing distinction between time– and event–based prospective memory is suggested by both lesion and imaging studies: (iv) In humans, lesions to the right rostral prefrontal region (i.e. Area 10) cause prospective memory deficits on multitasking tests which use time–based switching cues, whereas left rostral lesions cause impairments in the use of event-based cues (including arbitrary rules). (v) Time–based PM tasks where a clock is available provokes medial Area 10 activation because of the additional low–level attentional demand. Four additional lesion and imaging studies from this lab support the "Gateway Hypothesis" of the role of Area 10: that it supports the biasing of attentional modes between stimulus–oriented thought (required for ongoing task performance) and stimulus–independent thought (required for maintenance of the intention), with medial aspects supporting the former, and lateral regions the latter.

Correspondence: *Tom Manly, PhD, Cognition and Brain Sciences Unit, MRC, Box 58, Addenbrooke, Cambridge CB2 2QQ, United Kingdom. E-mail: tom.manly@mrc-cbu.cam.ac.uk*

Symposium 8/11:30 a.m.–12:50 p.m.

Some New Ideas About Cognitive and Motor Recovery After Traumatic Brain Injury

Chair: Ian Robertson

R. GREEN, B. MELO, B. CHRISTENSEN & L. NGO. Some New Ideas about Cognitive and Motor Recovery after Traumatic Brain Injury.
The efficacy of neurorehabilitation for TBI has been called into question. We contend that this is partly attributable to a dearth of knowledge about natural recovery, and that much greater knowledge is needed about the mechanisms and mediators of recovery to design more effective interventions. This symposium will present new data on: (1) the natural history of cognitive and motor recovery, (2) previously unexamined factors that may undermine recovery and, (3) the role of environmental enrichment in promoting recovery. The first participant will briefly overview the topics, provide the conceptual framework and discuss the implications for neurorehabilitation. The second participant will discuss natural history of cognitive and motor recovery following TBI. While this topic has been examined in the past, methodological limitations (e.g. attrition in cognitive recovery studies and global, nonspecific measures in motor recovery studies) have weakened studies. The research we will present has circumvented these limitations. The third participant will discuss the relationship between cognitive and motor recovery. We have proposed that there may be a competitive relationship between cognitive and motor recovery, such that a trade-off may occur between the two. This would influence 'how' and 'how much' recovery occurs after TBI. The fourth participant will present a framework that we are developing within which to understand how environmental enrichment may influence recovery. This has entailed an intellectual and empirical examination of what enrichment means for the human with brain injury. We ask what the specific factors are that drive neuroplastic change observed in response to enrichment and whether enrichment or lack thereof might influence the type of recovery that occurs after TBI (i.e. new growth vs. reorganization of existing pathways). We will present preliminary data on this topic.
Correspondence: *robin green, toronto rehab, 550 University, toronto, ON m5j2g2, Canada. E-mail: green.robin@torontorehab.on.ca*

B. MELO, B. CHRISTENSEN & R. GREEN. Cognitive and Motor Recovery after Traumatic Brain Injury.
Many studies of cognitive and motor recovery have been undertaken, but methodological challenges have limited the strength and breadth of conclusions drawn. Attrition and necessarily small neuropsychological batteries in cognitive recovery studies have resulted in sample bias and limited generalizeability. In motor recovery studies, global and insensitive clinical measures of functioning have frequently resulted in ceiling effects and narrow domains of assessment, diminishing the validity and reliability of findings. We have undertaken a large recovery study (N-120) employing comprehensive clinical and experimental tests of cognitive and motor functioning at 1, 4 and 12 months post-injury. To reduce attrition and increase compliance with lengthy test batteries, patients are provided with clinical feedback on all as-

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

sessments as well as a full neuropsychological report. The preliminary results have illustrated one important finding. While some degree of variability in test performance is expected in TBI, when performance was looked at across domains, a substantial number of patients declined across assessments (more than 25% of patients in some domains), and in some cases, the decline was clinically meaningful, greater than one standard deviation. If this finding is attributable to test measurement and variability alone, this has important implications for the validity and reliability of clinical assessments, especially for follow-up assessments, which are sometimes given more clinical weight given that a patient's data is compared to his/her own baseline. The findings also raise other questions: What factors give rise to this absence of improvement? Are the benefits of early rehabilitation transient, for example, does "use it or lose it" apply to the recovering brain? A novel way to understand such risk factors in the context of longitudinal data is to employ mixed models analysis. The final results of this study will be presented in the symposium.
Correspondence: *robin green, toronto rehab, 550 University, toronto, ON m5j2g2, Canada. E-mail: green.robin@torontorehab.on.ca*

R. GREEN, B. MELO, B. CHRISTENSEN, L. NGO, C. TILL & D. FRASCA. 'Cognitive and Motor Recovery from TBI' - Symposium Overview: Conceptual Framework, Summary of Presentations and Implications for Neurorehabilitation.
In this symposium we present the conceptual framework and preliminary findings of our lab. The research we are undertaking concerns (1) the natural history of recovery, (2) factors that may undermine recovery and, (3) the role of enrichment in influencing recovery. We will present preliminary findings on natural recovery that show that some people decline or show an absence of improvement on some cognitive tests from one assessment to the next. We will present preliminary data on one factor that may be undermining recovery - competition: we have contended that there may be a competitive relationship between cognitive and motor recovery following TBI such that a trade-off occurs between the two. We are also examining the role of environmental enrichment in recovery from TBI. There is ample evidence that enrichment facilitates recovery in animals, but the question is not straightforward in humans. What constitutes environmental enrichment in a brain-injured human's life? How can enrichment be measured? What are the mental processes/behaviours that, in response to environmental enrichment, drives neuroplastic change? We are currently attempting to define and operationalize these concepts, and to examine the possibility that different recovery environments may give rise to different types of recovery. For example, we know that some recovery occurs in most environments, but might it be the case that a highly stimulating environment causes new neural growth (as illustrated in the lab of Brian Kolb and others) while a minimally stimulating environment gives rise to reorganization of existing pathways? The current approach to neurorehabilitative interventions for TBI patients has given rise to very limited efficacy. We contend that new approaches to understanding the basic mechanisms of recovery are necessary. A better understanding of underlying mechanisms should lead to the development of more efficacious interventions.
Correspondence: *robin green, toronto rehab, 550 University, toronto, ON m5j2g2, Canada. E-mail: green.robin@torontorehab.on.ca*

B. CHRISTENSEN, B. MELO & R. GREEN. Competition between Cognitive and Motor Recovery after Traumatic Brain Injury.
The status of neurorehabilitation for traumatic brain injury (TBI) is under active debate because of a dearth of research findings demonstrating effectiveness. This may be due, in part, to limitations in our understanding of basic mechanisms of cognitive and motor recovery, including those that might impede recovery. In this regard, we examined whether recovery following TBI might be undermined by competition between cognitive and motor functions for finite neural resources. There is ample evidence that the conditions that could foster competition exist: (1) recovery proceeds largely through functional reorganization of the brain, with intact regions taking over functions for damaged ones, (2) there are cells/networks that can support either cognitive or motor functions, and (3) neural resources available for recovery are finite and can be measurably depleted. In this preliminary study, 21 moderately and severely impaired patients were administered cognitive and motor assessments at 1, 4.5 and twelve months post-TBI, and recovery of cognitive and motor functions was measured using regression residuals. A negative correlation between cognitive and motor recovery was used as evidence of competition. We found suggestive evidence that there may indeed be a trade-off between the recovery of cognitive and motor functions after TBI. We are currently undertaking a replication in a larger study. If competition exists, there are significant implications for rehabilitation: The limited efficacy of existing interventions/programs might be partially explained by competition. Further basic research would be needed to better characterize competition so that interventions could be developed that minimize competition, thereby maximizing recovery.
Correspondence: *robin green, toronto rehab, 550 University, toronto, ON m5j2g2, Canada. E-mail: green.robin@torontorehab.on.ca*

L. NGO, C. TILL, D. FRASCA, M. BRENDA, K. MAK-FAN & R. GREEN. Can Brief and Intensive Cognitive Stimulation Enhance Cognitive Functioning: Development of a Normal Control Model.
There is evidence that environmental enrichment enhances recovery in brain-injured animals and that it may promote maintenance of cognitive function in elderly. In brain injured humans, our pilot data show that some patients do not recover as expected, and we are examining the possibility that this is partially attributable to their recovery environment. We are currently attempting to identify the specific factors that drive neuroplastic change in response to enrichment. There are difficulties in examining this topic in humans. First, what constitutes enrichment for humans? Second, does an enriched environment (e.g. participation in cognitively stimulating activities) promote enhanced cognitive function/recovery or does enhanced functioning promote greater involvement in enriched environments? To circumvent this latter problem, we manipulated the environment of a group of healthy young people, providing a highly enriched environment for a brief period of time to provide a model of enrichment over which there is experimenter control. Partipants memorized lengthy prose passages and performed speeded mental computations nightly for a two-week period. Cognitive functioning was measured before and after the intervention, and after a lengthy washout period. (A control group performed the cognitive function tests, but not the intervention.) Despite a small sample size, we found a trend towards improvement in working memory in the intervention group, consistent with the finding of Schaie and colleagues that novel information processing is correlated with improved working memory in the elderly. We also found that this improvement was transient - when the intensive stimulation was removed for 3 months, the benefits were lost. We will present related findings on healthy elderly and TBI subjects in the symposium. As well, we will briefly discuss a screening tool we have designed to measure environmental enrichment in people with TBI.
Correspondence: *robin green, toronto rehab, 550 University, toronto, ON m5j2g2, Canada. E-mail: green.robin@torontorehab.on.ca*

SATURDAY AFTERNOON, JULY 9, 2005

Poster Session 10: Assessment/1:30–3:00 p.m.

K. STRINGER & J.B. ALLEN. Cross-cultural Differences in Facial Recognition on the Wechsler Memory Scale .
The current study investigated the impact of three critical variables in the study of facial recognition: (1) subject racial identity, (2) racial attitudes, and (3) extent of previous racial experience. It is believed that variables in addition to the racial identity of the subject may contribute to the proficiency in which both same and other race faces are recalled. The study included 68 individuals (37 Caucasian; 31 Non-Caucasian) recruited from a moderate-sized university in the Midwest region of the US. Participants received a battery of visual-perceptual, memory, and racial attitudinal measures. Participants also completed the immediate and delayed recall segments of the Faces Subtest from the WMS-III. Data from this population was subjected to descriptive and correlational techniques as well as group comparison using ANOVA procedures through SPSS. Importantly, the non-Caucasian group displayed a significant relationship between their attitudes towards Caucasians and the percent correct for other (non-Caucasian) faces on the WMS-III (r=.45, p<.01). Additionally, a significant correlation was seen between social experience and percent correct for own race facial recognition with the Caucasian sample (r=.55; p. <.01). Group comparisons in facial recognition yielded no significant differences between Caucasians and non-Caucasians in the overall ability to recognize faces. Descriptive statistics for each group will be presented as well. Implications for clinical assessment using facial recognition tests will be discussed. Specifically, the issue of whether racial based norms alone are adequate for such assessment in light of the impact of attitudinal and experiential factors in the current study.
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. TAUB, S.B. ANDREOLI & P.H. BERTOLUCCI. Realiability of the Portuguese Version of the Zarit Caregiver Burden Interview.
The aim of this study is to examine the test-retest reliability of the Portuguese version of the ZBI. The instrument is a 22 item scale assessing the extent to which caregivers view their responsibilities as having an adverse impact on their social life, health, emotional well-being and finances. We assessed 50 primary informal caregivers of demented patients from 3 different health-care centers, using the test-retest method. Analysis of the results showed an intraclass reliability coefficient of 0.88, Cronbach coefficient alpha was of 0.77 for the test and 0.80 for the retest items. The reliability of the Portuguese version of ZBI is, therefore, comparable to the original version and is a useful tool to evaluate caregiver burden and can also be used to plan treatment for this at risk population.
Correspondence: *Anita Taub, Albert Einstein Hospital, Rua Capitão Antonio rosa, 151 ap 21, São Paulo 01443-010, Brazil. E-mail: anita_taub@uol.com.br*

E.A. SHORES, J.R. CARSTAIRS & J. CRAWFORD. Excluded Letter Fluency (ELF) Test: Norms and Test-Retest Reliability Data for Healthy Young Adults.
The aim of this research was to obtain normative and reliability data for the Excluded Letter Fluency (ELF) Test. This is a test that requires patients to generate as many words as they can that do not contain the letters A, then E, then I. Preliminary research has demonstrated this test to be sensitive to cognitive impairment in patients with traumatic brain injuries. A stratified random sample of 399 healthy young adults aged 18 to 34 years from Sydney, Australia, completed the ELF Test as well as a full-length WAIS-R. After a one-year interval 99 of these individuals were re-tested on the same forms of the tests. The influence of age, sex and education was investigated on the ELF Test and only education was found to have a significant overall effect. Tables are provided for converting ELF Test raw scores, corrected for years of education, to standard scores with 90% and 95% confidence intervals for both test and retest purposes. A table for calculating the base rate of errors on the ELF Test is also provided. As with initial-letter fluency tasks level of education was found to be influential in determining the number of words generated. There was no significant effect for gender or age. The availability of the base rate of errors should assist future researchers in determining the value of the ELF Test error scores as a measure of self-monitoring and evaluate its predictive validity in head trauma and other samples.
Correspondence: *E. Arthur Shores, PhD, Psychology, Macquarie University, Dept Psychology, Macquarie University, Sydney, NSW 2109, Australia. E-mail: ashores@psy.mq.edu.au*

R.C. CHAN, M.Y. GUO, Y. WANG & V.Y. DENG. The development of a Chinese equivalence version of Letter-Number Span Test.
The present study aimed to develop a Chinese equivalence version of Letter-Number Span (LN-Span) Test in the Chinese context and to explore the construct validity of the developed version among a group of healthy Chinese volunteers. A group of 74 (27 men and 47 women) psychology undergraduates were recruited. They were randomly assigned to either group by receiving the Chinese version first and then the English version of LN-Span test, or vice versa. Another comprehensive set of neuropsychological tests were also implemented to them. The two sub-samples did not differ in terms of age, education level and gender proportion. No significant differences were found between the two groups in either version of the LN-Span test and other neuropsychological function performances. They were then aggregated together for subsequent correlation analysis. The Chinese version correlated significantly with the English version in total number of correct span (r= 0.6, p<0.00001) and the longest span (r = 0.5, p<0.00005). The Chinese version of LN-Span test also found to be significantly associated with memory-loaded tests but not other tests. The preliminary findings suggest that the Chinese version of the LN-Span Test has impressive convergent and divergent validity among a group of healthy volunteers. However, further work on the test-retest reliability and discriminative validity should be done in the near future.
Correspondence: *Raymond C. Chan, PhD, Psychology, Sun Yat-Sen University, NA, Guangzhou 510275, China. E-mail: edschchq@zsu.edu.cn*

I. GORNY, T. MERTEN, M. HENRY & R. BROCKHAUS. Information, Warning, Coaching - How Much Do They Need? An Analogue Study on Feigned Cognitive Symptoms.
Results of simulator studies are highly dependent on the specific scenarios used and the amount of information given to the experimental malingerers. Thus, comparability of different studies may be low, and estimates of sensitivity and specificity of single tests vary depending on the experimental conditions. Four groups of experimental simulators (n = 15, each) were given scenarios to feign cognitive symptoms in the context of a civil forensic assessment. Group A received a very basic scenario. For Group B, detailed information on sequelae of mild traumatic brain injury was added. Group C obtained that information plus an explicit warning. Group D obtained all this and an introduction into principles of effort measurement. All groups were given the Complex Figure Test, the Trail Making Test, and Digit Span as well as three symptom validity tests (SVTs): the Amsterdam Short-Term Memory test (ASTM), the Medical Advice Compliance Test (MACT), and the Word Completion Memory Test (WCMT). There was a general trend for better results in SVTs from Groups A/B to Group C and, more so, Group D. Only in Group D were pass rates elevated for MACT and WCMT. However, not

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

a single participant passed the ASTM, so the overall classification for all participants was that of suboptimal performance. Coaching is only effective when principles of effort testing are described in detail. Nonetheless, using multiple effort tests successfully attenuates such coaching effects.

Correspondence: *Thomas Merten, PhD, Neurology, Klinikum im Friedrichshain, Landsberger Allee 49, Berlin D - 10249, Germany. E-mail: thomas.merten@vivantes.de*

I. GOMEZ-RUIZ & A. AGUILAR. Discriminative Capacity of the Bilingual Aphasia Test of M. Paradis for the Clinical Diagnosis of Spanish Bilingual Persons .

Language impairment is one of the initial cognitive features that appear together with progressive memory loss in patients with early Alzheimer's disease. For this reason, the purpose of the present study was to find the most discriminative linguistic variables of the Spanish version of the BIlingual Aphasia Test in detection of very mild dementia. Thirty bilingual subjects were divided into three groups: 10 healthy volunteers, 10 patients with mild cognitive impairment and 10 patients with early Alzheimer's disease according to NINCDS-ADRD criteria. All subjects were tested with the entire Bilingual Aphasia Test of Michel Paradis. In order to find the best combination of subtest scores that discriminate between the different groups studied, we used a stepwise discriminant function analyses, ANOVA and ANOVA. The discriminant analysis shows good capacity to differ among the subject of the samples. The MANOVA & ANOVA results of the raw scores of the test show differences statistically significant among the samples. The Spanish version of the Bilingual Aphasia Test is an excellent tool for clinical diagnosis.

Correspondence: *Isabel Gomez-Ruiz, Psychology G, Hospital Cruz Roja, University of Barcelona, Av. Josep Molins, Barcelona 08035, Spain. E-mail: misabelgr@hotmail.com*

S. SOPENA, B. DEWAR & B.A. WILSON. Establishing the Reliability of the European Brain Injury Questionnaire (EBIQ).

In 1997 Teasdale et al. published the European Brain Injury Questionnaire, a self-report measure concerning the subjective experience of cognitive, emotional and social difficulties designed to be given to people with brain injury and their close relatives. The study discriminated between people with brain injury and controls and between people with stroke or traumatic brain injury. Responses can be analysed in terms of nine subscales. It is now used in several rehabilitation centres as an outcome measure even though test-retest reliability has not been determined. The primary purpose of this study was to improve our knowledge of the properties of a clinically used questionnaire and to find out whether this test is reliable over time. The questionnaire was administered twice within a month to people with brain injury (N=50) and controls (n=50). The results showed a significant test-retest reliability for both groups. It is concluded that the EBIQ is a clinically reliable measure to determine the subjective well being of people with brain injury and to assess change of subjective concerns over time. Ease of administration and analysis suggests that the questionnaire provides a useful and efficient tool for clinicians to measure different subjective domains in people with brain injury.

Correspondence: *Sara Sopena, MSc, mrc cognition and brain sciences unit, BOX 58. Addenbrooke, Hills rd., Cambridge CB2 2QQ, United Kingdom. E-mail: sara.sopena@mrc-cbu.cam.ac.uk*

L.H. GOLDSTEIN, J.C. HENRY, A. RUSSELL, L.A. SMART, H. LIDDIARD & F. AMBERY. Pilot Study; Neuropsychological Assessment of Adults with Mild/Borderline Intellectual Disabilities.

Performance of people with intellectual disability (ID) on neuropsychological tests often shows a 'floor' effect making it unclear whether low scores indicate specific deficits or are simply commensurate with the person's IQ. We are carrying out a pilot study (n=75) which aims to a) identify a range of neuropsychological tests that are clinically viable for people with ID; b) develop normative data for this range of standardised neuropsychological tests for adults with ID. Participants completed a battery of neuropsychological tests assessing IQ, memory, comprehension, visual perception and executive functioning. Participants were divided into 3 groups FSIQ i) 55-60 ii) 61-70 iii) 71-80 based on WAIS-III. Analysis using linear regression will be used across the 3 IQ groups to determine whether tests scores are dependent upon IQ. Correlational analysis will be carried out examining the association between IQ/age and tests scores (preliminary data suggests a correlation between IQ and memory and cognitive flexibility in this population n=34, r=.42, p=.05). Descriptive data will be derived to provide clinically useful information for the interpretation of test results. There is a range of clinical neuropsychological tests with which it is possible to generate meaningful, applicable data for assessment of people with ID. The next stage to carry out a larger standardisation and validation study will indicate the range of scores that be can considered average for people with ID and enable clinicians to determine whether specific cognitive functions are impaired relative to impairments in IQ.

Correspondence: *Jayne C. Henry, DClinPsy, Psychology, Institute of Psychiatry, De crespigny Park, Denmark Hill, London SE5 8AF, United Kingdom. E-mail: jayne_henry@hotmail.com*

S.A. LANGENECKER, A.F. CAVENEY, B. GIORDANI, E.A. YOUNG, L.J. RAPPORT, L.A. BIELIAUSKAS, K.A. NIELSON, M. MORDHORST, S. MARCUS, N. YODKOVIK, K. KERBER & J. ZUBIETA. Brief Computer-based Cognitive Screening Measures in a Psychiatric Population: Feasibility, Psychometric Properties, and Factor Structure. .

At present there are few validated, objective, widely used cognitive instruments that measure cognitive signs in psychiatric disorders. This fact, combined with the demonstrated poor correlation between clinician ratings of signs and patient self-report of cognitive symptoms suggests that the development of standardized, and easily and inexpensively administered tests of cognitive symptoms in psychiatric disorders would be well-received. The current feasibility study examined whether a computerized test battery consisting of objective measurements of psychomotor retardation, impaired attention and concentration, and impaired emotion perception and interpersonal sensitivity could be administered and interpreted within 30 minutes during an outpatient visit. It also examined whether patient data were valid and interpretable with acceptable psychometric properties; and that dependent variables could be combined into useful factors. The test battery was administered to 308 participants, including psychiatric patients (72%) and healthy volunteers (28%). Ninety-one percent of participants performed within the valid range on all instruments. The factor structure of the dependent variables matched currently accepted constructs including inhibitory control, attention, visual perception, and both executive and visual processing speed. The psychometric properties of the battery are presented. Ninety-seven percent of the evaluations were conducted, scored, and interpreted within 30 minutes. This study is an early step toward the development of valid, objective measures of behavioral and cognitive signs in psychiatric disorders. Future research will explore how this battery can aid in the initiation of treatment trials; augment ratings of signs and symptoms; and allow for reliable monitoring following treatment.

Correspondence: *Angela F. Caveney, Ph.D., Psychiatry, University of Michigan, Med Inn Room C414, Box 0840, 1500 East Medical Center Drive, Ann Arbor, MI 48109. E-mail: angif@umich.edu*

Y. KANEDA, K. JAYATHILAKE & H. MELTZER. A Reanalysis of the Cognition Subscale of the Positive and Negative Syndrome Scale (PANSS).

The present study correlated scores based upon 11 previously identifed Positive and Negative Syndrome Scale (PANSS)-derived Cognition sub-

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

scales with performance on a neuropsychological test battery (NTB) consisting of eight neuropsychological test in 40 patients with schizophrenia/schizoaffective disorder participating in a clinical trial. PANSS Cognition subscale scores and performance on a NTB were determined at study entry and at 6 weeks in 40 subjects with diagnoses of treatment-resistant patients who had been randomized to treatment with clozapine or high dose olanzapine. Scores on all 11 proposed PANSS Cognition subscale scores were highly and significantly correlated with performance on nearly all neuropsychological tests, more so than in previous attempts to study such correlations. The correlation coefficients between the 11 PANSS Cognition subscales and three- derived neuropsychological factors (Memory, Attention, and Executive Function) were not significantly different from each other. Several of the PANSS Cognition subscale scores accounted for nearly 50% of the variance in the California Verbal Learning and Memory Test and Attention factor, and 30-40% in other tests and factors. Comparison of the coefficients of determination among the 11 cognition subscales revealed that the Cognition subscale proposed by Lancon et al. (Schizophr Res, 42 (3): 231-9, 2000) was numerically the best predictor of neuropsychological performance at baseline. However, in terms of prediction of neuropsychological changes during the course of drug treatment, the subscale proposed by Bell et al. (Psychiatry Res, 52 (3): 295-303, 1994) was numerically the best predictor. These results demonstrate that a PANSS Cognition subscale may provide a clinically useful index of cognitive deficits and changes in those deficits in patients with schizophrenia/schizoaffective disorder.

Correspondence: *Yasuhiro Kaneda, M. D., Ph.D., Psychiatry, Dept. of Psychiatry, Tokushima University Hospital, 3-18-15 Kuramoto-Cho, Tokushima 770-8503, Japan. E-mail: kaneday-tsh@umin.ac.jp*

M.G. WIARDA & M.G. HENNERICI. Development of a New Screening for Cognitive Impairment (Mannheim Aphasia and Cognition Screening, MACS).

During development of the Mannheim Acute Aphasia Screening (MAAS), the usefulness of the instrument in screening for cognitive impairment became obvious. We tried to determine how specific the MAAS can not only differentiate acute aphasia from other cognitive impairment, but also differentiate several grades of cognitive impairment. 400 neurological patients of heterogeneous etiology and 40 normal controls were screened with the MAAS (a five minute screening with sequence recital and verbal fluency measures) and examined neuropsychologically in depth. The neuropsychological examination suggested a group of aphasics (n=100), a group with light to moderate dementia (n=35), a group with major cognitive impairment (n=200), mild cognitive impairment (n=65) and a normal control group without any cognitive impairment (n=40) and no lesions in MRI. The MACS succeeded in dividing the aphasic, demented, major cognitive impaired and normal control groups highly significant from each other. Mild cognitive impairment was not significantly different from major cognitive impairment, but different from normal controls and from the other groups. It is possible with the MACS to screen within five minutes for severity of cognitive impairment. The screening instrument is easily translatable into other languages.

Correspondence: *Martin G. Wiarda, Dipl.-Psych., Neurology, University Clinic, Theodor-Kutzer-Ufer 1-3, Mannheim 68135, Germany. E-mail: wiarda@neuro.ma.uni-heidelberg.de*

M. VANIER, J. LAMOUREUX, P. LAZURE, W.H. BROUWER, A. MORIN, I. GELINAS, B.L. MAZER, J. DUQUETTE, C. LEROUX & G. LAVIGNE. Comparison of Three Measures of Fitness to Drive after Stroke: Preliminary Data on a Pilot Study.

There is a need for validity studies of off-road tests used to predict fitness to drive in experienced drivers after CVA. An ongoing study with 40 participants examines the relative usefulness of a driving simulator compared to two currently used off-road tests in the prediction of on-road test performance. Preliminary data on the comparison of the three off-road measures are presented. The hypothesis is: The simulator should correlate with the two off-road measures as all three share the same objective of predicting the road test results. A convenience sample of 40 experienced drivers who sustained a stroke and referred for driving evaluation. The design is cross-sectional observational. Off-road tests: (1) Screen DriveABLE, assessing motor visual field, attention, judgment, and (2) CBDI, assessing attention, decision speed, stimuli discrimination, response differentiation, sequencing, visual acuity and exploration and (3) Driving simulator Faros F230 PMR (ErgoDrive), developed on the basis of models of safe driving behaviour and reproducing traffic and weather conditions. The preliminary data are based on the first 20 participants, (47 to 77 years). Spearman rank correlations were obtained between all three measures. The only significant correlation was between the simulator score and the CBDI score (r=0.73, p=0.001, n=17). They were negatively correlated with age (Spearman) (r=0.60, p=0.006, n=20 and r=0.62, p=0.008, n=17 respectively), but not the Driveable Screen score. Preliminary results suggest that age is a contributing factor. This must be confirmed with the complete sample of 40 participants in this ongoing study.

Correspondence: *Marie Vanier, PhD, Réadaptation, Université de Montréal, C.P. 6128, succ. Centre-ville, Montréal, QC H3C 3J7, Canada. E-mail: marie.vanier@umontreal.ca*

A. SCHWEIGER, A. ABRAMOVITCH, G.M. DONIGER & E.S. SIMON. A Clinical Construct Validity Study of a Novel Computerized Battery for the Diagnosis of ADHD in Young Adults.

Continuous performance tests are widely used as a key diagnostic instrument in the evaluation of ADHD. Researchers argue that these tests should be used only as a confirmatory tool to the DSM-IV and other neuropsychological tests. The Mindstreams (NeuroTrax Corp., NY) cognitive assessment tests constitutes a computerized testing system incorperating a Go-No-Go task but also provides information on other skills such as language, visuospatial analysis, verbal and non-verbal memory, problem-solving, planning, and arithmetic abilities. Our aim was to examine Mindstreams' Go-No-Go test construct validity as well as the discriminant utility of Mindstreams' variables. A group of 28 adult males fulfilling DSM-IV criteria for ADHD were administered the Conners CPT-II and the Mindstreams ADHD battery. Their performance on the Mindstreams was compared to their CPT-II results, and with that of 71 age matched controls. Results showed strong correlations between the two Go-No-Go tests on reaction time and S.D., commission errors and accuracy within the ADHD group. Furthermore, results show significant differences between the ADHD and non-ADHD groups on Mindstreams' 'finger-tapping' task, RT and accuracy on math tasks and on Stroop-like task. Results from the Mindstreams Go-No-Go test show that ADHD participants performed significantly worse on RT, S.D., omission errors, accuracy and a composite score (accuracy/RT; ROC curve analysis, area under curve=0.92!) No differences were found in non-verbal memory, visuospatial tasks, verbal functions and Mindstreams' eye-hand coordination tasks. This study demonstrates that Mindstreams battery provides a reliable clinical tool for the complex diagnostic process of adult ADHD. This unique platform offers clinicians and researcher an integrated neuropsychological profile evaluating executive functions, attentional and other cognitive and psychomotor skills.

Correspondence: *Avraham Schweiger, Ph.D., Behavioral Sciences, Academic College of Tel Aviv, 952 5th Ave., 1-C, New York, NY 10021. E-mail: schweige@mta.ac.il*

J.S. SMIGIELSKI, M.R. POWELL & D.E. CRAGAR. Assessment of Effort in a Clinical Setting: Findings and Conceptual Issues.

Research in the assessment of effort in neuropsychological evaluation has focused upon investigation of compensation-seeking subjects. We report findings of assessment of effort in a clinical population seen for evaluation for rehabilitation treatment. Participants were 87 patients with mixed brain injury diagnoses who were routinely administered the

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

Test of Memory Malingering (TOMM) within a standard neuropsychological test battery before admission to an intensive outpatient brain injury rehabilitation program. The percentage of those failing the TOMM was computed. Data were analyzed to investigate differences between those who passed and those who failed the TOMM on neuropsychological test performance, as well as demographic, medical, psychosocial and injury variables. Findings showed that 22% of this sample failed the TOMM. The proportion on disability was high in both the passing and failing group, but significantly higher in those who failed ($p<.01$). The groups did not differ on other psychosocial variables. Those who failed performed significantly poorer on most cognitive measures, but for a sub-sample of traumatic brain injury participants, severity of injury, depression and anxiety were unrelated to TOMM performance. Results show suboptimal effort is a significant factor in a treatment-seeking group. We argue that an adequate understanding of failed effort testing in clinical settings requires a conceptualization that goes beyond dichotomous categorization of validity versus invalidity. Alternative interpretations for effort test failures are offered utilizing a multidimensional conceptual approach. Implications for understanding the nature of suboptimal effort in a clinical group are discussed. The use of effort testing in clinical settings is considered.
Correspondence: *Jeffrey S. Smigielski, PhD, Psychiatry and Psychology, Mayo Clinic, 200 First Street SW, Rochester, MN 55905. E-mail: smigielski.jeffrey@mayo.edu*

Symposium 9/1:30–2:50 p.m.

Mild Traumatic Brain Injury: Incidence, Neuropsychological Profiles and Management

Chair: Huw Williams

H. WILLIAMS. Mild Traumatic Brain Injury: Incidence, Neuropsychological profiles and management .
Mild-Traumatic Brain Injury (MTBI) and Post-concussional Syndrome (PCS) has received increased interest of late, with concern over the identification of those who might be at increased risk of such injuries, and of those who may experience greater longer-term neuro-disability as a consequence of such injuries. In this symposia there are papers that address rates of injury, risk factors, neuropsychological consequences and management. Yates, P. et al. present an epidemiological study of MTBI and minor head injury in the U.K. Analysis of 11,700 head injury presentations at an Accident & Emergency Department are described. Data is presented on risk factors - including age and social deprivation. Scarcia, M.J. & Geffen, G. present 2 studies on the The Assessment of Executive Functioning following MTBI. They provide evidence for a process fractionation account of executive functions. The second study examined the utility of process fractionation theory in a clinical sample and recovery of such functions. Their results indicated recovery of many executive processes at one month post-injury, but continued decrements in dual-task processing. Wall et al. present a study of neuropsychological profiles of 600+ licensed jockeys with recent and historical concussion. They describe measures that are sensitive to recent concussion, and those that are sensitive to multiple concussion. Dr N King presents an overview to the management of MTBI and PCS. He described cognitive behavioural models of interventions at specified "windows of vulnerability" that may protect from persisting symptoms.
Correspondence: *Huw Williams, Psychology, University of Exeter, Washington-Singer Labs, Exeter EX4 4QG, United Kingdom. E-mail: w.h.williams@exeter.ac.uk*

P.J. YATES, H. WILLIAMS, B. JENKINS, A. ROUND & A. HARRIS. Determining risk Factors for Mild Head Injury and Mild Traumatic Brain Injury in an U.K. health district.
The epidemiology of mild traumatic brain injury and minor head injury in the U.K. is poorly understood. The aim of this study was to carry out a descriptive analysis of data collected over six years on 11,700 head injury presentations at an Accident & Emergency Department serving a U.K. local health population of approximately 350,000 . The objective was to determine whether the data could provide an understanding of the potential risk factors for minor head injury and mild TBI. Method: Extracted all head injury cases from an A&E attendance database (1997-2003) and matched them to resident electoral wards and PCT populations in order to derive incidence rates. Results: Significant variation was found between rates for urban and rural areas. 17% of all head injuries have a degree of brain injury (9% moderate-severe). An annual incidence rate was calculated at 426.55 per 100,000 (351.67/100,000 for minor cases). There was a male/female ratio of 1.55 to 1. High levels of head and brain injury were found in early childhood (0-4 yrs.) relative to other age groups. For minor traumatic brain injuries, those under 5 years and females over 79 years are most at risk. Regression analyses revealed that social deprivation was a significant predictor of head injuries of all severity levels
Correspondence: *Huw Williams, Psychology, University of Exeter, Washington-Singer Labs, Exeter EX4 4QG, United Kingdom. E-mail: w.h.williams@exeter.ac.uk*

S.E. WALL, H. WILLIAMS, J. MURRAY, S. CARTWRIGHT-HATTON, T. KELLY, A. OWEN, M. GIBSON & M. TURNER. The Effects of Recent and Historical Concussion on Neuropsychological Test Performance in Jockeys.
Concussion is a trauma-induced change in mental state, not necessarily involving loss of consciousness, affecting neuropsychological performance and mood. Despite its prevalence, limited research has explored the short and long-term consequences, considering complicating factors such as gender, age and multiple injuries. The current study explored the neuropsychological profiles of licensed jockeys with recent and historical concussion. Computerised test was a reliable detector of recent concussion, and Reaction Time was slower amongst those with recent rather than historical concussion. Jockeys reporting multiple historical injuries showed decrements on Stroop colour-word and Colour Trails 2 performance. Increased Trails 2 number errors potentially indicate long-term consequences of concussion(s). Women outperformed men in 'baseline' testing.
Correspondence: *Huw Williams, Psychology, University of Exeter, Washington-Singer Labs, Exeter EX4 4QG, United Kingdom. E-mail: w.h.williams@exeter.ac.uk*

N. KING. Mild Head Injury and the Post Concussion Syndrome: Aetiology, assessment and intervention.
"No head injury is too trivial to ignore" (Hippocrates, 460 - 477 BC). Mild head injury and the post concussion syndrome have presented clinicians with controversy and intrigue for at least 130 years. Debate and argument has often focussed on the relative contribution of organic and psychological features to the syndrome and consequently the literature has often neglected the practicalities of assessment, intervention and treatment for people suffering from mild head injury. This talk outlines the current literature on the aetiology of the syndrome and the issues surrounding assessment and intervention. It concludes by presenting the cognitive behavioural models from the adult mental health literature which may help in the development of psychological interventions for the syndrome and some initial ideas regarding a "windows of vulnerability" model for the development of post-concussion symptoms.
Correspondence: *Huw Williams, Psychology, University of Exeter, Washington-Singer Labs, Exeter EX4 4QG, United Kingdom. E-mail: w.h.williams@exeter.ac.uk*

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

M.J. SCARCIA & G. GEFFEN. The Assessment of Executive Function following Mild Traumatic Brain Injury.
This research describes the development of a theoretical basis for executive functioning, and tests its application in a mild traumatic brain injury (MTBI) sample. The first study examined the validity of domain specific (Goldman-Rakic, 1987) versus process fractionation (Luria, 1971; Stuss, Shallice, Alexander & Picton, 1995) theories of executive functioning. A group of normal participants (n=73) was administered a selection of neuropsychological tests according to four domain specific executive constructs. Principal components analysis produced a four factor structure which accounted for 57.6% of the total variance. This study provided empirical evidence for a process fractionation account of executive functions, and experimentally defined four separable executive processes: checking, inhibiting, sharing and integrating. The second study examined the utility of process fractionation theory in a clinical sample. A group of patients with mild traumatic brain injury (MTBI) (n=22) was selected because of assumed damage to the cortical networks that have been implicated in executive functioning, and were tested one month after injury. Differential impairment of four executive processes was hypothesized between the MTBI group and a group of demographically matched orthopaedic controls. The results indicated good recovery of the majority of executive processes at one month post-injury, with a significant decline in dual-task processing within the executive process of sharing. This task may be uniquely sensitive to the very subtle but disruptive effects of MTBI on the broad neuroanatomical networks involved in executive processes. This research highlights the need to use theoretically driven and empirically validated approaches in the investigation of executive functioning.
Correspondence: *Huw Williams, Psychology, University of Exeter, Washington-Singer Labs, Exeter EX4 4QG, United Kingdom. E-mail: w.h.williams@exeter.ac.uk*

Symposium 10/1:30–2:50 p.m.

Models of Neurocognitive Outcome After Developmental Disorders of the CNS: Moderating Effects of Biology, Age, Time, and Reserve

Chair: Maureen Dennis

M. DENNIS, B.P. ROURKE, J.M. FLETCHER, S.H. LANDRY, K.O. YEATES & H. TAYLOR. Models of Neurocognitive Outcome After Developmental Disorders of the CNS: Moderating Effects of Biology, Age, Time, and Reserve.
In studying the neurocognitive outcome of developmental disorders of the CNS, the disorder itself has often been treated as a main effect, with inter-subject variability considered as error variance. Recent models of neurocognitive outcome have shown, instead, that the main effect of developmental CNS disorders is often moderated by biology, age, time, and reserve, and that variability in outcome is related to these moderators. In this symposium, we review outcome models that explicitly study the moderating effects of biology (genetic heterogeneity, pattern and severity of brain insult); age (at evaluation and at onset of CNS disorder); time (rate and direction of developmental change); and reserve (pre-insult cognitive abilities, family and environmental resources, and parenting). We also consider how differences in outcome models might shape differences in clinical practice. In the context of biological moderators, Fletcher and Dennis show how genetic heterogeneity within spina bifida produces patterns of brain dysmorphology, agenesis, and hypoplasia that are associated with distinct neurocognitive outcomes. In the context of age, time and reserve moderators, Landry shows how the developmental course of infants and preschoolers with spina bifida is shaped by preschool abilities and parenting factors. In the context of biology and reserve moderators, Yeates examines the relation between closed head injury severity and pre-injury cognitive and attention on the risk of long-term attention problems. In the context of biology, time, and reserve moderators, Taylor examines the conjoint effects on rate of developmental change of brain insult and environmental factors.
Correspondence: *Maureen Dennis, Psychology, The Hospital for Sick Children, 555 University Avenue, Toronto, ON M5G 1X8, Canada. E-mail: maureen.dennis@sickkids.ca*

J.M. FLETCHER & M. DENNIS. Spina Bifida: Genes, Brain, and Behavioral Outcome.
Objective: Neurobehavioral outcomes in spina bifida myelomeningocele are variable. The variability is a product of complex interactions of genes and environment that result in phenotypic variability involving the spinal lesion (physical phenotype), brain (neural phenotype) and cognition/behavior (cognitive phenotype). Understanding the variability requires a comprehensive approach to spina bifida involving assessment of the genotype, the three phenotypic components, and the environment in which development occurs.This presentation discusses a model for conceptualizing different levels of genotypic and phenotypic analysis, their interactions, and their variable influences on neurobehavioral outcomes. Method/Participants: We will discuss recent data from neurobiological studies of children with spina bifida and typically developing age-matched controls. Results: Data will be presented that bear on several issues: 1) the signature neurocognitive profile, which includes strengths in data-driven problem-solving, categorical perception, and retrieval of meaning, and deficits in algorithmic problem solving, relational perception, and the assembly of meaning; 2) the limited number of core deficits in timing, attention orientation, and movement underlying the neurocognitive profile; 3) the typical pattern of brain defects (dysmorphology of the cerebellum and midbrain, agenesis and hypoplasia of the corpus callosum, and thinning of the posterior cortex); 4) the moderating effects of genetic heterogeneity on the typical pattern of brain defects; and 5) the relation between the brain effects and a number of neurocognitive functions (perceptual and motor timing, adaptive motor learning, overt and covert attention orienting, and the comprehension of non-literal language). Conclusion: Genetic heterogeneity within spina bifida produces patterns of brain dysmorphology, agenesis, and hypoplasia that are associated with distinct neurocognitive outcomes.
Correspondence: *Maureen Dennis, Psychology, The Hospital for Sick Children, 555 University Avenue, Toronto, ON M5G 1X8, Canada. E-mail: maureen.dennis@sickkids.ca*

K.O. YEATES. The Concept of Reserve Capacity in Pediatric Neuropsychology: Research Findings and Clinical Implications.
Objective: Although it has received few empirical tests among children with brain disorders, the concept of reserve capacity has been proposed to account in part for individual differences in response to acquired brain injury. We tested the reserve hypothesis using data from two prospective, longitudinal studies, one of moderate to severe closed-head injuries (CHI) and another of mild CHI. Method/Participants: We tested the reserve hypothesis by examining the interaction between group membership (CHI vs. children with orthopedic injuries) and measures representing premorbid cognitive or behavioral functioning as a predictor of recovery and eventual outcomes post-injury. Results: Among children with moderate to severe CHI, premorbid cognitive ability was not a significant moderator of neuropsychological outcomes. However, premorbid attention problems did moderate post-injury attentional disturbance, such that premorbid attention problems amplified the risk of long-term attention problems in children with severe CHI, whereas lower levels

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

mitigated that risk. Similarly, among children with mild CHI, premorbid cognitive ability moderated the occurrence of post-concussive symptoms (PCS), so that group differences in PCS were magnified among children with lower IQ and reduced among children with higher IQ. Conclusion: Reserve capacity appears to moderate some but not all outcomes following childhood CHI. The findings suggest that clinicians need to assess premorbid function in children, because premorbid status is not so much a confound of post-injury outcomes, as an actual moderator thereof. Future studies of brain reserve, as opposed to cognitive or behavioral reserve, will help to refine our understanding of reserve capacity.

Correspondence: *Maureen Dennis, Psychology, The Hospital for Sick Children, 555 University Avenue, Toronto, ON M5G 1X8, Canada. E-mail: maureen.dennis@sickkids,ca*

H. TAYLOR. Developmental Change Following Early Brain Insults: The Importance of the Environment .

Objective: This presentation examines the conjoint effects of brain insult and environmental factors on childrens development post insult. Few studies have followed children with early brain insults longitudinally to investigate effects on childrens development. Method/Participants: Two recently completed studies were designed to enhance knowledge of these effects across the school-age years. One study compared children who had sustained a moderate to severe traumatic brain injury (TBI) with children who had suffered orthopedic injuries only. The other study compared children with very low birth weight (VLBW, <1500 g) with term-born controls. Both studies assessed childrens cognitive, academic, and behavior outcomes, as well as the family environment. Growth modeling analysis was employed to examine the conjoint effects of brain insult and environmental factors on childrens development post insult. Results: Both TBI and VLBW had effects on development, but these effects frequently varied for children from advantaged vs. disadvantaged environments. Depending on environmental conditions and the degree of neurological risk, the gap between children with early brain insults and controls narrowed with advancing age for some outcomes but widened for other outcomes. Conclusion: While confirming a limited form of developmental plasticity, the findings suggest a special vulnerability of children with brain insults to environmental conditions. The clinical implications of these results are considerable. Consideration of environmental factors revealed developmental consequences that would not have been evident without taking these factors into account, suggested mechanisms of effect, and underscored the potential value of environmental treatments in improving long-term outcomes.

Correspondence: *Maureen Dennis, Psychology, The Hospital for Sick Children, 555 University Avenue, Toronto, ON M5G 1X8, Canada. E-mail: maureen.dennis@sickkids,ca*

S.H. LANDRY. Spina Bifida: School-Age Cognitive Abilities Moderated by Preschool Abilities and Parenting.

Objectives: Investigations of developmental functioning for school age children with spina bifida and hydrocephalus (SBH) report neurocognitive difficulties involving motor timing and control, motor learning, visual perception, and attentional regulation. These problems result in difficulties with rule-based problem solving, contextual language, and behavior regulation as well as academic deficits in math, reading comprehension and in adaptive behavior. To date, there is little research available to help us understand the early origins of these problems, how they play out over preschool development, and whether parenting moderates outcome. Methods/Participants: We studied cognitive development from 6 months to 3 years of age in children with spina bifida and typically developing age-matched control children. We applied longitudinal growth curves to model relationship among developmental change and parenting. Results: Three main results emerged from the growth curve modeling. Children with spina bifida have a set of core deficits that are apparent in infancy and continue into early childhood. These deficits have direct conceptual links with the types of problems described for school-aged children with SBH. Cognitive outcome is moderated both by concurrent child function and by parenting. Conclusion: In children with spina bifida, the developmental course of important cognitive skills is shaped by a set of core deficits that are evident in infancy, but that are also moderated by preschool abilities and parenting factors.

Correspondence: *Maureen Dennis, Psychology, The Hospital for Sick Children, 555 University Avenue, Toronto, ON M5G 1X8, Canada. E-mail: maureen.dennis@sickkids,ca*

Poster Session 11: Aging, Cognitive Intervention/3:00–4:30 p.m.

P.E. SPAAN. Episodic and Semantic Memory Functioning in Very Old Age: Explanations from Executive Functioning and Processing Speed Theories.

Normal ageing studies, comparing young vs. young-old adults, report a decline of episodic memory, while semantic memory remains stable. The current study investigated whether this pattern may be generalized to very old age (>75 years). Another question is whether episodic or semantic memory impairments are better explained by decline of executive functioning and/or processing speed, rather than in terms of memory components. 85 healthy elderly persons of 55-96 years old (mean: 71.3, SD 10.1), were administered a computerised test battery, including various tests of episodic and semantic memory, executive functioning and visual processing speed (without motor components). Effects of education, sex, depressive symptoms, alcohol consumption, memory complaints and intelligence were controlled for. In episodic memory as well as semantic memory multiple regression models, only tests sensitive to active retrieval processes and speed significantly explained age-related variance (i.e., free recall of unstructured word lists, category fluency and reaction time of naming objects: 34.4%). Specific tests of executive functioning did not significantly improve variance explained. However, age-related variance increased by the addition of a processing speed measure, at the expense of the semantic memory (speed related) measures (46%). Episodic as well as semantic memory functions, demanding active retrieval, decline in very old age. After controlling for processing speed, only episodic memory remained as a significant age-related factor. These data suggest that semantic memory decline is limited to slowed access to knowledge rather than by degraded knowledge perse. Also episodic memory decline might be best characterised by reduced processing speed at encoding.

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

V.J. BOURNE, H.C. FOX, I.J. DEARY & L.J. WHALLEY. Childhood Intelligence And Cognitive Decline In Later Life: Evidence For The Cognitive Reserve Hypothesis.

The cognitive reserve hypothesis suggests that adults of higher cognitive ability are more able to compensate for the effects of cognitive ageing. We have access to two samples that completed the same test of mental ability at age 11 years, one in 1932, the other in 1947. Participants were re-examined in a longitudinal follow up study in later life. Knowledge of cognitive ability in childhood and old age allows direct examination of the cognitive reserve hypothesis. All participants completed the Moray House Test of mental ability at 11 years. 157 completed this test in 1932 and were re-examined at ages 77-82 years. 306 completed this test in 1947 and were re-examined at ages 65-67 years. Cognitive ability in later life was assessed using Raven's progressive matrices. Change in cognitive performance was calculated by regressing performance across the waves of testing in later life and calculating the

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

standardised residuals. All participants with complete data for childhood mental ability and each wave of testing in later life were analysed. Linear regression revealed a significant relationship for both samples with childhood mental ability accounting for 6.9% of the variance in cognitive decline in the 1932 sample, and 3.7% in the 1947 sample. Participants of lower childhood ability declined more in later life. Participants of higher childhood ability suffered less cognitive decline in later life than those of lower childhood ability. This supports the cognitive reserve hypothesis and suggests that higher premorbid cognitive ability is protective against cognitive decline in later life.

Correspondence: *Victoria J. Bourne, DPhil Psychology, Department of Mental Health, University of Aberdeen, Clinical Research Centre, Royal Cornhill Hospital, Aberdeen AB25 2ZH, United Kingdom. E-mail: v.bourne@abdn.ac.uk*

J. OOSTERMAN & E. SCHERDER. Blood Pressure: its Relation to Pain and Cognition.

Hypertension has frequently been associated with decreased pain experience and impaired cognitive functions, especially executive functions (EF) and memory. However, how pain and cognition are related to hypotension and the combination of diastolic (DBP) and systolic (SBP) blood pressure has never been clearly specified. More specifically, if blood pressure is related to both pain experience and cognition, then pain and cognition are possibly related as well. In our study, pain, EF and memory were examined in relation to blood pressure in the 'old old' (79 to 94 years of age, n=20). Based on the median, both the diastolic (DBP) and the systolic blood pressure (SBP) values were divided into two equal groups: low DBP (50 mm Hg - 66 mm Hg) and normal DBP (68 mm Hg - 88 mm Hg); normal SBP (106 mm Hg - 139 mm Hg) and high SBP (140 mm Hg -185 mm Hg). The analysis showed that both low DBP and low DBP combined with high SBP were associated with a decrease in pain report and an increase in EF performance. However, presence of high SBP together with normal DBP indicated an increase in pain report and decreased EF performance. The group that reported least pain showed superior EF performance, while lower EF performance accompanied an increase in pain report. This study emphasizes examining the influence of DBP and SBP together on pain report and cognition. Furthermore, a relation between reported pain and EF seems to exist.

Correspondence: *joukje Oosterman, clinical neuropsychology, Vrije Universiteit, van der Boechorststraat 1, Amsterdam 1081 BT, Netherlands. E-mail: jm.oosterman@psy.vu.nl*

L.K. LEJBAK, P. CORNEY, M. CROSSLEY & M. SHAW . Predictors of Subjective Memory Complaints in Young, Middle-Aged, and Older Adults.

Previous research has demonstrated that affective status, particularly anxious symptomatology, is a better predictor of subjective memory complaints than performance on objective memory measures (Derouesne et al., 1999). Shaw and Crossley (1997) examined predictors of subjective memory complaints in young, middle-aged, and older adults, and found that increasing age and low education were significant predictors. Contrary to previous research, however, affective status was not found to be a significant predictor. The present study employed similar methodology to Shaw and Crossley by investigating predictors of subjective memory complaints in a recent sample of young, middle-aged, and older adults (N=87). A sequential multiple regression was performed with age, years of education, and gender entered first, depressive symptomatology (Center for Epidemiology Studies-Depression scale) entered second, self-reported stress entered third, and a composite memory score entered last. Overall, the regression model accounted for 21% of the variance in subjective memory change. As expected, age, education, and gender contributed a significant amount of variance to the model ($p<.01$). Although depressive symptomatology did not add a significant amount of unique variance to the model, self-reported stress reliably improved the model ($p=.05$) and accounted for 4% of the unique variance. Consistent with past research, the composite objective memory score did not add a significant amount of unique variance to the model ($p=.11$). The results of this study highlight self-reported stress as a factor that may contribute to memory complaints, and demonstrate that objective memory measures are not reliable predictors of subjective memory complaints.

Correspondence: *Lisa K. Lejbak, Doctoral Candidate, Psychology, University of Saskatchewan, 9 Campus Drive, Saskatoon, SK S7H 5S5, Canada. E-mail: lisa.lejbak@usask.ca*

E.J. SCHERDER, J. VAN PAASSCHEN, J. DEIJEN, S. VAN DER KNOKKE, J.F. ORLEBEKE, I. BURGERS, P. DEVRIESE, D.F. SWAAB & J.A. SERGEANT. Physical Activity and Executive Functions in Older People with Mild Cognitive Impairment.

Aerobic physical activity such as intensive walking improves frontal executive control processes in adults aged 60-75. However, many individuals of a more advanced age are frail and unable to perform intense physical activity. The present study examined whether minor physical activity in older people with mild cognitive impairment (MCI) improved cognitive functioning in general or executive function (EF) in particular. The study also aimed to compare the effectiveness of two types of intervention, with varying intensities: walking and hand/face exercises. Forty-three frail older people subjects (mean age: 86 years) with MCI were randomly divided into three groups, a walking group (n=15), a group performing hand and face exercises (n=13), and a control group (n=15). All participants received individual treatment for 30 minutes a day, three times a week, for a period of six weeks. A neuropsychological test battery, administered directly after cessation of treatment, assessed cognitive functioning. Directly following treatment, the hand/face group demonstrates improvement in EF but not memory compared to the control group, whereas a trend towards this outcome is observed for the walking group. The findings suggest that physical activity, irrespective of its intensity and/or nature, may selectively improve EF in the oldest old with MCI. However, the results should be interpreted with caution. Firm conclusions about the effects of mild physical activity on EF in the oldest old can only be drawn after studies with larger number of subjects.

Correspondence: *J. van Paasschen, School of psychology, University of Wales, Bangor, Adeilad Brigantia, Bangor LL57 2AS, United Kingdom. E-mail: psp046@bangor.ac.uk*

G.J. KINSELLA, R. BROWN & B. ONG. Multi-Tasking and Prospective Remembering in Older Adults.

Prospective remembering is the ability to remember to perform an intended action in the future. The present study aimed to evaluate the conditions under which older adults may be expected to experience more difficulty with prospective remembering than younger adults. Specifically, we investigated age-related prospective remembering under varying conditions of executive attention (dual- and multi-tasking). The experimental prospective remembering task, a DVD supermarket shopping tour, was a quasi-naturalistic adaptation of the Einstein & McDaniel dual-task paradigm. The relative contribution of neuropsychological variables, including speed of information processing, episodic retrospective memory, and executive attention to successful ProR was also investigated. A sample of 80 adult community volunteers, (44 females, 36 males) participated and formed two age groups, 40 younger adults and 40 older adults. Younger adults outperformed older adults on the prospective remembering task, but there was also an interaction with attention condition so that the difference between younger and older adults was greater in the multi-task condition.. A series of regression analyses revealed that neuropsychological measures of speed of information processing, retrospective memory, and executive attention accounted for a significant proportion of age-related variance in prospective remembering. However, the contribution of executive attention did not

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

increase in the multi-tasking condition which was unexpected. A relationship was found between self-report of everyday memory performance and performance in the experimental task of prospective remembering under base-line dual-task condition but not under multi-task condition. The results are interpreted with reference to age-related decline in differential components of executive attention and the utility of multi-tasking as a paradigm for further investigation of prospective remembering

Correspondence: *Glynda J. Kinsella, PhD, Psychological Science, La Trobe University, Melbourne, Melbourne, VIC 3086, Australia. E-mail: g.kinsella@latrobe.edu.au*

E. ITO, T. HATTA & N. NAGAHARA. Influence of Leisure Activities on the Cognitive Maintenance in Normal Aging People.

Social,physical and intellectual activities are thought to facilitate cognitive performance. The porpose of this study was to investigate the relation between leisure activities and cognitive function, furthermore which leisure activities were important for cognitive maintenance in aged residents. five hundred and two residents in a rural area aged from 39 to 88 years old participated in this study. First, participants responded to a questionnaire concerning 28 leisure activities(e.g. walking, gardening, handicrafts and reading) and they rated frequency of commitment to these activities on the rating scales ranged from 1(almost never) to 5(more than once a week). Then cognitive examination was conducted individually with their agreement. Cognitive examination consisted of verbal retrieval(letterfluency tests), attention(digit cancellation tests) and memory (immidiate recall of a 25 word-sentence) that reflected prefrontal lobe function. Correlation analyses were conducted to examine the relations between leisure activities and cognitive functions. Focused the results on aged participants, the 60s who engaged in 'audio and visual activities (listening to music/watching videos)'and 'verbal and creative activities (reading/flower arranging etc)' performed higher scores in all cognitive tests than those who hardly ever did those activities. In their 70s commitment to 'physical activities (jogging/walking etc)' was significantly associated with better cognitive function in all tests. There was a significant correlation between 'verbal and creative activities' and verbal retrieval and memory and between 'planned and refreshment activities (traveling/visiting spa etc)' and attention and memory respectively. It is beneficial for aging people to engage in the above leisure activities (listening to music, reading,walking and traveling etc) in order to maintain their cognitive function and diminish their cognitive decline.

Correspondence: *Emi Ito, Nagoya University, 1-1-20, Daikominami, Higashi-ku, Nagoya 461-8673, Japan. E-mail: emiito@met.nagoya-u.ac.jp*

A.D. PEDERSEN. Age of Brain Injured Citizens Influences Staff Appraisal of Unsatisfied Needs.

Ageism is increasingly considered an issue in health care and social work. In neurorehabilitation the problem is rarely discussed, although the vast majority with brain injury are elderly. The present study investigated the relation between age of brain injured clients and staff estimation of unsatisfied needs. Local community health care professionals and social workers evaluated 411 brain injured citizens and their care in three Danish municipalities. Age was between 16-97 (M = 68,75, SD = 16,13). Causes of injury were strokes (74,5%), TBI (8,8%) and anoxia, benign tumours, infections or organic solvents (16,8%). The clients estimated to have unsatisfied needs were younger (M = 64,28, SD = 17,06) than clients suspected to have no unsatisfied needs (M = 71,54, SD = 14,46), ($t(337) = 4,41$, $p < 0,001$). Only 24,1% of clients 70 years or older was attributed with unsatisfied needs for rehabilitation, support in home and/or social activities. In younger clients the proportion was 37,0%, which was significantly higher ($t(401) = 3,58$, $p < 0,001$). The estimated relevance of actual service provided was associated with age ($r = 0,28$, $p < 0,001$), still significant (Beta = 0,27, $p < 0,005$) after controlling for gender, cause of injury, staff education, care burden and time since injury. Health care professionals and social workers are inclined to evaluate elderly persons with brain injury to have fewer unsatisfied needs for help and service than younger. This might indicate age-biased staff appraisals in brain injury health care and social work.

Correspondence: *Anders D. Pedersen, MSc, Dep. of Psychology, University of Aarhus, Jens Chr. Skous Vej 4, Aarhus DK-8000 C, Denmark. E-mail: adp@psy.au.dk*

W. MEIJER, M. VAN BOXTEL, P. VAN GERVEN & J. JOLLES. The Effects of Irrelevant Speech on Verbal Memory in Aging Individuals.

The purpose of the study was to assess whether older adults are able to inhibit irrelevant speech to the same extent as younger adults while learning new verbal information. Two studies have been conducted in which two samples were assessed, subdivided in 4 age groups (24-76 years). In Study 1 (N=230) the effects of irrelevant speech on a free recall task were examined. In Study 2 (N=226), the word-learning task was made more difficult by using both irrelevant speech and a short interstimulus interval (ISI) in one condition. Statistical analyses were performed using Analysis of Covariance. In Study 1, main effects of age and irrelevant speech were found: memory performance of older persons and persons in the speech condition was compromised. No age by speech interactions were found, which indicated that recall in young and older adults is generally affected when they are subjected to irrelevant speech. In study 2, an interaction between ISI and age was found, which indicated that the consolidation of the encoded words in the oldest adults is impaired in the condition with both irrelevant speech and short ISI. Results suggest that the negative effects of constraining learning conditions may be amplified when they occur simultaneously, especially in individuals older than 70 years. When extended outside the laboratory these findings imply that older adults experience more memory deficits in situations where maximal recruitment of attentional resources is needed, such as in noisy environments or when urgent information has to be processed rapidly.

Correspondence: *Willemien Meijer, University Maastricht, Dr. Tanslaan 10, Maastricht 6200 MD, Netherlands. E-mail: w.meijer@np.unimaas.nl*

P.J. ALHOLA, A. URRILA, M. KYLMALA, M. TALLUS, O. HUHDANKOSKI, R. PORTIN & P. POLO-KANTOLA. Attention During Sleep Deprivation After Menopause: Does Hormone Therapy Have an Effect?

The aim was to compare the effect of sleep deprivation on attention in postmenopausal and young women. The beneficial effect of hormone therapy (HT) on cognitive performance during sleep deprivation in postmenopausal women was also evaluated. Twenty-six postmenopausal women (age 58-72 years) participated: 16 HT-users and 10 non-users. Eleven young women (age 20-26 years) served as controls. All women spent four consecutive nights in the sleep laboratory. Cognitive tests were carried out after the baseline night, the sleep deprivation night and the rebound night. The cognitive measures included tests of several attentional domains (CogniSpeed©). During sleep deprivation attention was either impaired or the practice effect commonly occurring in repeated cognitive measures was blunted in all groups (p-values<0.05). Postmenopausal women performed generally slower than young controls (p-values<0.05). In Vigilance and 10-choice reaction time (10-CRT) tasks postmenopausal women made less errors and omissions than young controls (p-values<0.05). In simple RT and 10-CRT young and non-users maintained their performance during sleep deprivation, whereas HT-users showed impairment (p-values<0.01). In the Stroop incongruence task performance did not alter in any groups during sleep deprivation. However, in these tasks only the postmenopausal groups showed some recovery after one rebound night (p-values<0.05). In other measures

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

HT had no effect. Sleep deprivation impaired attention by hindering the practice effect or causing decline in all groups. Postmenopausal women were more likely to maintain accuracy at the expense of reaction speed whereas young women used an opposite strategy. Postmenopausal women also showed somewhat better recovery. HT had a minor effect.
Correspondence: *Paula Alhola, MA, Sleep Research Unit, University of Turku, Lemminkäisenkatu 2, Turku FI-20520, Finland. E-mail: paula.alhola@utu.fi*

A. BOLEWSKA & E. LOJEK. The Utility of Computer Supported Training in the Rehabilitation of Brain Damaged Patients with Attention and Memory Disorders . .
The aim of the study was to examine the utility of a computer supported program (the RehaCom) in the rehabilitation of brain damaged (BD) patients with attention and memory disorders. It was hypothesized that training would lead to improvement of attention and memory abilities as shown in the RehaCom tasks, a selection of independent neuropsychological (NP) tests and subjective ratings of everyday functioning made by the patients. A research program designed to reach that aim has been conducted since 2003. So far, seven BD patients have taken part in the program. The experimental procedure involves initial examination, a 10-week period of treatment, and a second assessment. The treatment consists of 20 one-hour sessions. The RehaCom programs for attention (AUFM) and memory (BILD) rehabilitation were applied. The NP tests used for the pre- and post-test included: the TMT (A, B), the RFFT, the Rey-Osterreith Complex Figure, the AVLT, and selected tests from the WAIS-R-PL. Patients were requested to subjectively assess the effects of the training on their everyday functioning. Seven healthy controls were also examined twice (with a one-month break) using the NP tests. Results revealed gradual improvement of the performance on the RehaCom tasks in all patients. Relatively less improvement was observed on the NP tests, taking into account the learning effect calculated on the basis of the control data. Subjective estimations of the effectiveness of the therapy varied from patient to patient. The present study provides support for the view that computer supported training of brain functions can be effective with respect to the rehabilitation of attention and memory. The main problem, however, is the effective transfer of the improved skills to other activities of everyday life.
Correspondence: *Anna Bolewska, Ph.D., Faculty of Psychology, Warsaw University, Stawki5/7, Warsaw 00-183, Poland. E-mail: abolew@engram.psych.uw.edu.pl*

L. JEAN & M. SIMARD. Errorless Learning and Spaced Retrieval Techniques in Mild Cognitive Impairment of the Amnestic Type : A Case Study. .
The efficacy of some cognitive stimulation/remediation techniques has been demonstrated over the past few years in patients with Alzheimer's disease (AD). However, the data regarding the efficacy of these techniques in subjects with mild cognitive impairment are badly lacking. Thus this study aims at determining the efficacy of the errorless learning and spaced retrieval techniques used together in mild cognitive impairment of the amnestic type (MCI-A). This is a case study with a 59-year-old man presenting with MCI-A. The cognitive stimulation program took place in 45-minute sessions, twice a week, during three weeks. The objective of the sessions was to re-learn the names of five famous personalities. Two follow-up evaluations took place one and five weeks following the end of the last training session. The proportion of names correctly recalled after the three-week intervention period increased by 80% compared to baseline. The best improvement occurred during the first week of the program (40%). The subject was able to recall respectively 100% and 80% of the material at one- and five-week follow-ups. Errorless learning and spaced retrieval techniques used in combination seem to be efficacious to re-learn memory material for individuals with MCI-A. More research on cognitive stimulation programs for this population is clearly needed.
Correspondence: *Leonie Jean, M.Ps., School of Psychology, Laval University, Pavillon F.-A.-Savard, Ste-Foy, QC G1K7P4, Canada. E-mail: Leonie.Jean.1@ulaval.ca*

A. BATEMAN. Single Case Study to Assess the Efficacy of "Neurotext"– a Memory and Alerting System using Text Messaging.
NeuroPage is an effective, nationally available resource for people with memory and planning difficulties. This pilot study investigated efficacy of new purpose-built automated software using mobile phone text messaging from a personal computer based at our rehabilitation centre. Potential benefits of using this newer technology include option for messages to take the form of text (as with pagers) but also of pictures, photos and even videos, enabling people with difficulties reading or understanding written text to benefit from reminder alerts. Our participant (female, 50 yrs), suffered myocardial infarction 3 years prior to the study, resulting in impaired memory (e.g. logical memory I and II both scale score 2). A single subject ABA experimental design was used over six weeks. Nine target behaviours were identified, around the themes of personal security (e.g. locking the doors at night) cooking (e.g., plan tomorrow's meal, turn off cooker) and medication. The primary outcome measure was achievement of target behaviours as recorded on a daily diary checklist completed for each day of the study. Baseline achievement rates were recorded over one week. Four weeks of prompting with text messages including partial withdrawal of messages in week 5, that was then followed by return to baseline (no messages) for a final week. Total achievement rate for all of the behaviours increased from 59% in the baseline to 97% in the final week of the treatment phase. This improvement was maintained at 98% during partial withdrawal and showed a slight decrease to 93% when the messages were removed altogether. Our participant showed improvement in remembering daily tasks, and appeared to show improved attention toward monitoring her memory slips using the diary. This pilot case provides the impetus for further development of this system. Some text messages were not delivered and radio-paging remains a more reliable platform at present.
Correspondence: *Andrew Bateman, PhD, Oliver Zangwill Centre, Princess of Wales Hospital, Ely, Cambs CB6 1DN, United Kingdom. E-mail: dr_a_bateman@hotmail.com*

F. GRACEY. No Room For Error? Identity, Cognitive Therapy and Rehabilitation of Executive Impairment. An Illustrative Single Case.
There is increasing evidence for the application of cognitive therapy for the treatment of emotional disorders following traumatic brain injury. However, the need for further case based evidence for the use of this approach has been called for. This poster will describe the cognitive therapy and rehabilitation of marked symptoms of anxiety, severely compromised sense of identity, and dysexecutive syndrome. A single case is reported, and interdisciplinary intervention involving cognitive therapy and rehabilitation is described. Assessment of outcomes based on attainment of functional goals, completion of standardised questionnaires of mood and affective symptoms, and client subjective ratings is reported. The client achieved the target functional goal regarding a specified functional activity. The client reduced ratings of target cognitions addressed through cognitive therapy. Changes on standardised measures of mood and affective disorders demonstrated little change. The client reported significant subjective change in her sense of identity. Further evidence for the use of cognitive therapy in neuro-rehabilitation following traumatic brain injury is presented. Cognitive therapy models can help to make sense of the traumatic impact of acute dysexecutive

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

symptoms on a client's identity, and their subsequent post-injury adjustment. Practical goal oriented neuro-rehabilitation can provide opportunities for harnessing change processes in cognitive therapy and developing compensatory strategies for cognitive deficits. Cognitive therapy can offer interventions for supporting post-injury identity change. Additional process and outcome studies are required.
Correspondence: *Fergus Gracey, DClinPsych, Oliver Zangwill Centre for Neuropsychological Rehabilitation, Princess of Wales Hospital, Lynn Road, Ely CB6 1DN, United Kingdom. E-mail: fergus.gracey@ozc.nhs.uk*

T. ROIG ROVIRA, R. SANCHEZ-CARRION ABASCAL & C. VIDAL. New Technology Applied in Neuropsychological Treatment Following TBI (EuroPaNet Project)...

Telerehabilitation is the application of Information Society Technologies to provide distant support, assessment and treatment to disabled persons (Ricker et al, 2002). Neuropsychological impairment following TBI has a great impact on patients and their families. Due to its persistence on time (longer than physical deficits) its necessary to prolong neuropsychological treatment after discharge from neurorehabilitation hospital, in the reinsertion phase. We present results of 18-month long EuroPaNet project, a teleassistance European platform for people with brain injury. Fifteen patients who had suffered severe TBI constitute sample. Mean duration of coma was 26,1 days (SD=13,9) and post-traumatic amnesia (PTA) 145,5 days (SD=73,6). Mean age was 27,3 years (SD=11,2) and educational level 9,8 years (SD=1,7). Through videoconferences and e-mail exchange, we have provided neuropsychological treatment (cognitive, behavioural and emotional) in an ecological setting (patients home). Neuropsychological state was assessed before and after each trial. Neuropsychological rehabilitation through videoconference has improved cognitive functioning (attention, verbal and visual memory, word fluency and planning; $p<0,05$), and turns out to be a very motivating tool. An important majority of the participants (92,3%) in this trial became satisfied or very satisfied with the quality of treatment received through telerehabilitation. This new methodology of neuropsychological treatment allows a very good family-team interaction, providing support and rehabilitation with all those problems that can emerge during social and familiar reinsertion phase. Telerehabilitation has proved to be a valuable tool to provide ecological neuropsychological treatment, which makes it available also for those patients who live away from the neurorehabilitation hospital.
Correspondence: *Rocio Sanchez-Carrion Abascal, Neuropsicologia, Institut Guttmann, Cami de Can Ruti s/n, Badalona 08916, Spain. E-mail: neuropsicologia@guttmann.com*

M. GENETTI & F. COLOMBO-THUILLARD. The Coded Diary of an Amnesic.

Compensatory memory devices appear to be one of the most effective approaches for the rehabilitation of severe memory disorders. The introduction of a memory aid (MA) needs to be structured and trained, and implies residual executive, procedural and episodic abilities. Could the use of an MA become obsessive and hinder the patients' independence in everyday life? AF, a 30 years old right-handed woman, developed a traumatic brain injury at the age of 14, victim of a traffic accident. The brain imaging revealed hemorrhagic lesions mainly involving the frontal lobe (left and right), the left temporal lobe and the occipital lobe. The first neuropsychological assessment (Feb 1989) primarily highlighted an amnesic syndrome associated with executive impairments. The outcome was favourable, but the amnesic syndrome and the executive impairments still remained (Oct 2003). A few years after the injury, a diary was introduced by AF's family. Recently, the family worried about AF's behaviour (lack of initiative, sudden mood switches) and her diary (full of redundant information) which she seemed to spend hours every day on. AF tended to obsessively write down all her activities and personal habits, and to code them as well. Our work was to try for 6 months to simplify her diary and to improve her independence. As expected, modifying this 15 years old routine was a difficult task. However, while the assessment of ecological executive functions was still severely impaired, a slight improvement in AF's autonomy was observed. Our conclusions agree with the current recommendations concerning the use of MA: it requires preserved executive functions and needs to be introduced by rehabilitation professionals.
Correspondence: *Francoise Colombo-Thuillard, Neuropsychology, Hopital cantonal, Hopital cantonal, Fribourg 1708, Switzerland. E-mail: olombof@hopcantfr.ch*

A. STIGSDOTTER NEELY. Collaborative Intervention in Pathological Aging . .

The purpose was to examine the effectiveness of a collaborative approach to support memory and every-day activities in dementia. 30 older couples, where one of the spouses were diagnosed with dementia, were randomly assigned to one of three conditions. In the collaborative program, both the care-giver and the person with dementia received instruction and training in two strategies (e.g. spaced-retrieval and hierarchical cues) to support memory and every-day activities. This program was compared to a more traditional approach of providing training only to the person with dementia as well as to a control group receiving no training. Both training programs were identical in strategies taught and consisted of 10 sessions at 60 min each. Performance was measured before, immediately after as well as eight months after training on a number of transfer tasks not encountered during training. Results indicated that collaborative training had benefits for both the care-giver and the demented spouse. The care-giver improved at providing cognitive support in a collaborative recall task and as a consequence recall performance for the demented person improved. Most importantly, this was demonstrated in a task not trained. A collaborative approach, where both care-giver and person with dementia in collaboration acquire strategies to support memory and every-day activities do have implication for every-day life.
Correspondence: *Anna Stigsdotter Neely, PhD, Department of psychology, Umeå University, Umeå 901 87, Sweden. E-mail: anna.neely@psy.umu.se*

R.L. TATE, L. TOGHER, M. PERDICES, S. MCDONALD & A. MOSELEY. Determining the Methodological Quality of Single-case Experimental Designs in Neuropsychological Rehabilitation Research.

Traditionally, group studies, and particularly randomised controlled trials (RCTs), have been seen as the essential (and in some quarters, the only legitimate) methodology that can contribute to evidence-based clinical practice. Nonetheless, empirical studies reported in the literature, including RCTs, vary widely in terms of methodological calibre. A survey of the methodological quality ratings of 2,376 RCTs on the Physiotherapy Evidence Database, PEDro, found that just over half the trials obtained ratings indicating moderate to high internal validity, with scores of the trials spanning the entire range of the rating scale from 0-10 (Moseley et al., 2002). Other methodologies, such as single-case experimental designs (SCED) and "n of 1" trials can also be used to determine treatment efficacy. Indeed, it has been argued that SCED are more adequate and appropriate to determine treatment efficacy for language, cognitive and behavioural impairments. Some 35% of the trials listed on the Psychological Database of Brain Impairment Treatment Efficacy (PsycBITE, Tate et al., in press) are SCED, as are approximately 60% of the treatment studies published in recent years in the specialty journal, Neuropsychological Rehabilitation. Despite their frequency, SCED and "n of 1" trials have yet to be incorporated into hierarchies of levels of evidence. Moreover, at present there is no established rating

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

scale by which to measure the methodological quality of these research designs. This paper presents a review of constructs used in single case methodology, their suitability for inclusion in a rating scale measuring methodological quality of SCED, and their appolication to published research reports. (see above) (see above) (see above)
Correspondence: *Robyn L. Tate, PhD, Rehabilitation Studies Unit, Faculty of Medicine, University of Sydney, Rehabilitation Studies Unit, PO Box 6, RYDE, NSW 1680, Australia. E-mail: rtate@med.usyd.edu.au*

G. STEFANATOS, W. JOE & S. EYNON. Activational effects of a neuropharmacologic treatment in aphasia.
Neuropharmacologic studies of acquired aphasia have suggested that the outcome of speech/language therapy, the primary form of rehabilitation for aphasia, can be enhanced by adjuvant treatment with low doses of dextroamphetamine (DEX). The nature of the effect and its physiological basis are unclear. Utilizing a double-blind placebo-controlled crossover design, we compared the influence of 20 mg of DEX and placebo on neurophysiological responses recorded during attentive and non-attentive auditory processing in 10 subjects with nonfluent aphasia. Utilizing an auditory "oddball" paradigm, we evaluated event-related potentials (ERPs) to both speech (consonant-vowels and vowels) and non-speech sounds (complex tones). Responses to non-target stimuli were virtually identical in the placebo and DEX conditions, indicating that DEX did not have a general activational effect. By contrast, a large difference was evident in the amplitude of a late ERP component (P300) in response to targets, suggesting that DEX augmented late stage processing of attended stimuli. This difference was proportionally greater in response to CV syllables compared to the complex tones. Comparisons of topographic amplitude maps across the two treatment conditions revealed some enhancement of activation in the left cerebral hemisphere, particularly during processing of CV syllables. These findings suggest that DEX may potentiate attentive processing of speech, which is a likely nexus point for interactions between attentional and language systems. We propose that this may be an important contributory factor to its positive effects when used as an adjuvant treatment to speech\language therapy.
Correspondence: *Gerry Stefanatos, D.Phil., Albert Einstein Medical Center, 1200 West Tabor Road, Philladelphia, PA 19141. E-mail: stefanag@einstein.edu*

J.C. ARANGO, Y. GOVEROVER, F.G. HILLARY, N. CHIARAVALLOTI & J. DELUCA. Using the spacing effect to improve memory of everyday activities in individuals with neurological impairments.
The presentations of repeated information at spaced intervals results in increased learning and memory relative to massed presentations. This spacing effect has been observed on explicit memory tasks such a free recall and recognition of lists of words or pictures. However, the utility of the spacing effect to improve memory and learning in tasks that are related to everyday activities has not been well documented. The objective of the present study was to determine whether the benefits of spacing effect can be applied to tasks of everyday activities by individuals with neurological impairments Participants consisted of individuals with MS and TBI, who were divided in two groups according their CVLT score (impaired vs. not impaired). All participants were required to complete four tasks (two paragraph learning tasks and two route learning tasks). One task in each area was presented in the "spaced" condition while the other task was presented in a "massed" condition, each for 3 trials. Recall and recognition was obtained immediately, and 30 minutes following initial learning. Results showed that for Paragraph Learning, the spaced condition enhanced memory recall relative to the massed condition for both groups (impaired and non-impaired). However, this effect was not demonstrated in the route-learning task Thus, the spacing effect can be beneficial to enhance recall and performance of activities of daily living for individuals who have cognitive impairments related to memory. However, task-specific benefits may limit the effectiveness of this intervention.
Correspondence: *Juan C. Arango, Ph.D, Physical Medicine and Rehabilitation, UMDNJ, 1199 Pleasant Valley Way, West Orange, New, NJ Jersey 07052. E-mail: jcarango@kmrrec.org*

L. PENKMAN & L. SCOTT-LANE. Case Study: Prophylactic Academic Intervention for Children Treated with Cranial Radiation Therapy.
This single case design study investigated the feasibility and efficacy of a prophylactic intervention for improving academic skills in a child with a brain tumour deemed high risk for cognitive delay and academic failure because of cranial radiation treatment (CRT) and young age. An eight year old boy with medulloblastoma participated in a 12 week home and hospital-based tutoring program focused on academic skill development. The Wechsler Individual Achievement Test Second Edition (WIAT-II) and measures of single word and grapheme knowledge were administered at pre- and post-intervention. A follow-up assessment took place eight months post-intervention. Neuropsychological data was collected at pre-test and at follow-up. The child showed significant improvement on reading and spelling subtests (9 and 16 scaled score points) and in single word and grapheme knowledge. There was no improvement on math subtests. At follow-up, gains were maintained or improved for reading but math and spelling performance declined. Overall, his neuropsychological test performance showed decreased performance. The intervention proved effective for improving basic reading but not math skills. It is not clear whether improvements in math skills could not be detected by the WIAT-II or whether math skills are less amenable to intervention. The gains in reading scores were made in the context of an overall decline in neuropsychological functioning suggesting that the focused intervention helped to preserve specific reading skills and may be protective against difficulty with skill acquisition. An important addition is that this is the first reported prophylactic academic intervention delivered concurrently with intensive medical treatment.
Correspondence: *Louise Penkman, Argosy University, 400 ASB Tower, 1001 Bishop Street, Honolulu, HI 96813. E-mail: lpenkman@argosyu.edu*

E.W. TWAMLEY, D.I. SITZER, J.M. NARVAEZ & D.V. JESTE. Cognitive Training to Address the Neuropsychological Impairments of Schizophrenia.
Most individuals with schizophrenia experience impairments in multiple cognitive domains. Numerous psychosocial interventions have been developed to address these impairments, which may be even more disabling than the positive and negative symptoms of the illness. We report the initial findings of a trial comparing a Cognitive Training (CT) intervention to Standard Pharmacotherapy (SP) alone. The CT intervention is a manualized, 12-week, 2-hour per week class focusing on compensatory strategies to improve prospective memory, conversational and task vigilance, learning and memory, and problem-solving/cognitive flexibility. We hypothesized that, compared with the SP group, participants receiving CT would exhibit more improvement from pretest to immediate posttest in the domains of vigilance, learning and memory, and executive functioning. 25 outpatients with schizophrenia or a primary psychotic disorder were enrolled (64% male, 68% Caucasian, mean age=50, mean years of education=13) in the 6-month randomized controlled trial. Measures, administered at baseline, 3 months, and 6 months, included neuropsychological performance, severity of psychiatric symptoms, quality of life, healthcare adherence, everyday functioning capacity, and performance of social skills. Outcome data (Cohen's d effect sizes) for the first 10 completers indicated some positive effects of the CT intervention on the Continuous Performance Test

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

(d=.70), WMS-III Logical Memory learning (d=.69) and percent retention (d=.41), and correct responses on the Wisconsin Card Sorting Test (d=.49). These results, in combination with those from other studies, suggest that individuals with schizophrenia-spectrum disorders can benefit from CT. Expanded results to be discussed will include a larger sample and all domains of outcome assessment.
Correspondence: *Elizabeth W. Twamley, Ph.D., Psychiatry, University of California San Diego, 140 Arbor Drive, San Diego, CA 92103. E-mail: etwamley@ucsd.edu*

Symposium 11/3:20–4:40 p.m.

Innovative Methodologies for the Exploration of Language Breakdown in Dementia

Chair: Judit Druks

J. DRUKS, L. CLARE, J. DRUKS, E. CARROLL, E. FUNNELL & P. GARRARD. Innovative methodologies for the exploration of language breakdown in dementia.
The symposium consists of four papers, selected because they introduce novel methodologies to the study of language in dementia. Two of the papers examine aspects of narrative construction, one in Alzheimers dementia and the other in semantic dementia. Garrard et al. present a textual analysis in which they compare the structural complexity and use of vocabulary in Iris Murdochs writings at different stages of her life, the last being just prior to the onset of Alzheimers disease. Funnell employs narrative recall and reconstruction in order to distinguish between two hypotheses concerning the inability to acquire new knowledge from external sources, such as radio and television, by patients with semantic dementia. Carroll and Garrard examine the degredation of semantic feature knowledge in semantic dementia using nonverbal feature reality tasks as an alternative to existing verbal and non-verbal assessments. Finally, Druks et al. use a new test of picture naming to address the currently topical issue of noun-verb differences in dementia and other language impaired populations.
Correspondence: *Judit Druks, PhD, Human Communication Sciences, University College London, Chandler House, 2 Wakefield Street, London WC1N 1PF, United Kingdom. E-mail: j.druks@ucl.ac.uk*

J. DRUKS, J. MASTERSON, L. CLARE, M. KOPELMAN & S. HART. Naming of Actions and Objects in Alzheimers disease.
The evidence concerning action-naming performance in comparison to object naming in the early and moderate stages of Alzheimers disease (AD) is currently contradictory. Some studies suggest an action naming advantage (e.g., Williamson et al, 1998; Robinson et al, 1999) and others an advantage for object naming (e.g., Cappa et al, 1998; White-Devine et al, 1996). We suggest that one of the reasons for the inconsistent results is the lack of suitable and well-matched materials. The present study compares action and object naming in 35 AD patients. Materials were The Object and Action Naming Battery (Druks and Masterson, 2000), which consists of 100 line drawings of actions and of 100 objects matched for age of acquisition. The results were compared with those from an age and education level matched control group. Latencies and errors are reported. We found that the patients were generally slower and more error-prone than the controls. Both as a group and individually the AD patients were more impaired in action than object naming, although the difference, while significant, was not pronounced. The findings are related to the anatomical location of the atrophy in the AD sample. The action-naming disadvantage is discussed in relation to imageability differences between nouns and verbs (e.g., Bird et al, 2000). We propose an alternative hypothesis in terms of the unequal relationship of verbal labels and pictorial representations for depictions of objects and actions.
Correspondence: *Judit Druks, PhD, Human Communication Sciences, University College London, Chandler House, 2 Wakefield Street, London WC1N 1PF, United Kingdom. E-mail: j.druks@ucl.ac.uk*

E. CARROLL & P. GARRARD. Non-verbal Assessment of Semantic Feature Knowledge in Semantic Dementia.
Semantic dementia is associated with progressive atrophy of the inferolateral temporal lobes, particularly marked in the left hemisphere. This results in a relatively isolated and uniform semantic impairment, without the concomitant visuospatial problems often found in other populations such as herpes encephalitis patients. Verbal tests of semantic memory, such as naming and picture-word matching, are largely unsuitable for SD patients due to the severe breakdown of language. Existing non-verbal tests (e.g., Pyramids and Palm Trees, Camel and Cactus) are more appropriate but they test knowledge of a large number of (uncontrolled for) semantic associations. A further problem is that in these tests knowledge of more than one concept is required. This makes it difficult to determine where the degradation lies. For the purposes of the present study, a series of feature reality tests were constructed to assess patients knowledge of the semantic features of colour, sound, context and motion associated with a variety of animate and inanimate concepts. The tests were administered to 12 SD patients and 23 age-matched controls. Patients performed significantly worse than controls. Performance on each of the features correlated strongly with each other, and with scores on standard verbal and nonverbal tests. A few patients showed better performance with some features compared to others. The feature reality tests were shown to be useful in assessing semantic feature knowledge, and sensitive to individual differences in patients knowledge of features that make up concepts.
Correspondence: *Judit Druks, PhD, Human Communication Sciences, University College London, Chandler House, 2 Wakefield Street, London WC1N 1PF, United Kingdom. E-mail: j.druks@ucl.ac.uk*

P. GARRARD, L.M. MALONEY, J.R. HODGES & K. PATTERSON. The Effects of Very Early Alzheimers Disease on the Characterisitcs of Writing by a Renowned Author .
Iris Murdoch (IM) was among the most celebrated British writers of the post-war era. Her final novel, however, received a less than enthusiastic critical response on its publication in 1995. Not long afterwards, IM began to show signs of insidious cognitive decline, and received a diagnosis of Alzheimers disease (AD), which was histologically confirmed after her death in 1999. Anecdotal evidence, as well as the natural history of the condition, would suggest that the changes of AD were already established in IM while she was writing her final work. The end product was unlikely, however, to have been influenced by the compensatory use of dictionaries or thesauri, let alone by later editorial interference. These facts present a unique opportunity to examine the effects of the early stages of AD on spontaneous written output from an individual with exceptional expertise in this area. Techniques of automated textual analysis were used to obtain detailed comparisons among three of her novels: her first published work, a work written during the prime of her creative life, and the final novel. Whilst there were few disparities at the levels of overall structure and syntax, measures of lexical diversity, and the lexical characteristics of these three texts varied markedly and in a consistent fashion. This unique set of findings is discussed in the context of the debate as to whether syntax and semantics decline separately or in parallel in patients with AD.
Correspondence: *Judit Druks, PhD, Human Communication Sciences, University College London, Chandler House, 2 Wakefield Street, London WC1N 1PF, United Kingdom. E-mail: j.druks@ucl.ac.uk*

E. FUNNELL & C. GARLEY. Story Processing in Semantic Dementia.
Many studies have investigated the breakdown of single word meaning in people with semantic dementia, but very little is known about other aspects of their language performance, such as the comprehension of stories. One intriguing aspect of semantic dementia is that those afflicted appear to learn little from external sources, such as radio and television, but can nevertheless continue to learn from their own experience. This paper investigated story processing of two people with semantic dementia. Idioms, jokes and inferences were not understood, and memory for text was problematic: stories were recalled as lists rather than script; connections between items in the script could not be identified reliably; and scrambled stories could not be re-ordered. Creation of new stories was based on personal experience. It is argued that problems with the comprehension of text, as well as the breakdown of word meaning, contribute to the dependence of people with semantic dementia on situations in which they play a principle role.
Correspondence: *Judit Druks, PhD, Human Communication Sciences, University College London, Chandler House, 2 Wakefield Street, London WC1N 1PF, United Kingdom. E-mail: j.druks@ucl.ac.uk*

Paper Session 5/3:20–4:40 p.m.

Assessment

Chair: Robin Green

J.R. CRAWFORD, D. MARTIN, K. ALNER, A. LAMB, J.S. SIMONS, M. JAFFRAY, L. CIPOLOTTI, A.D. BADDELEY, S.A. SIMPSON & S. DAVID. Estimation of Premorbid WAIS-III IQs and Indexes Using a Revised Spot-The-Word Test and the NART.
To evaluate the Spot-the-Word Test (STW) as a measure of premorbid ability, specifically: A) To perform an item analysis on STW to yield a revised version that avoids items with zero variance, B) to estimate the reliability of the revised version and (C) compare it with the NART in terms of its correlation with IQ. Finally,(D) examine the robustness of STW and NART performance in clinical samples. A sample of 156 healthy participants, broadly matched to the census in terms of demographics was employed for item analysis, reliability and criterion validity. Four clinical samples (Ns ranged from 19 to 31)were also recruited (DAT, head injury, schizophrenia and Huntington's Disease)together with matched controls. Equations for estimating premorbid performance on the WAIS-III were built in a further large healthy sample. Examination of the individual STW items revealed that many had zero- or near-zero variance. A new version of STW (STW-C) consisting of 60 items drawn from versions A and B had a reliability comparable to the full 120 item version version and as high a correlation with Wechsler IQ. Significance testing and effect size analysis indicated that performance on STW-C was as robust,or more robust, than the NART in the four clinical conditions. The NART and STW-C are both useful measures of premorbid ability. Until now their utility has been limited by the lack of equatiions for estimating premorbid performance on the WAIS-III. Computer programs are made available; these implement the equations and methods for analysing the discrepancies between estimated premorbid IQs and obtained IQs.
Correspondence: *John R. Crawford, Psychology, University of Aberdeen, University of Aberdeen, Aberdeen AB24 2UB, United Kingdom. E-mail: j.crawford@abdn.ac.uk*

S. DAWES, G. SENIOR, R. LANGE & G. CHELUNE. The Clinical Utility of a Cluster Method for Analyzing Neuropsychological Test Data.
The belief that certain disorders will produce specific patterns of cognitive strengths and weaknesses on psychological testing pervades clinical neuropsychological assessment. This is most apparent in the use of clinical group studies to inform clinicians as to expected patterns of test performance in individuals with particular diagnoses. This is in spite of little support in the literature for such an approach. To the contrary, studies examining patterns of cognitive performance in different clinical samples find, without exception, more than one pattern of test scores. The current study presents a method for categorizing individual cases as members of one of five cognitive profiles identified through cluster analysis of 420 clinical cases. The cognitive profiles consist of tests measuring six underlying constructs: verbal comprehension; executive functioning; visual organization; verbal memory; visual memory; and processing speed/working memory. The method employs Mahalanobis Distance to compute the multivariate distance between each case and the five cognitive profiles and then equations derived from a discriminant function analysis to match each case with a specific cognitive profile. The level of accuracy achieved in classification by the use of the Mahalanobis distance was 88%. The method will be illustrated with three cases of the same age, educational level, and diagnosis that reveal different patterns of cognitive test performance. The implications of being able to accurately allocate cases to profiles of cognitive test performance will be discussed and raise the intriguing possibility of developing a typology based on cognitive ability or psychological diagnosis rather than medical nosology.
Correspondence: *Sharron Dawes, PhD, Psychiatry, UCSD, 150 W Washington St, San Diego, CA 92103. E-mail: sedawes@ucsd.edu*

R.W. SKELTON, J.R. PRICE & M.J. JOSCHKO. Psychometric Validation of the Functional Outcome Profile (FOP) For Use in Rehabilitation After Acquired Brain Injury (ABI).
The purpose of this study was to evaluate the psychometric properties and clinical utility of the Functional Outcome Profile (FOP), a 90-minute, 63-item interview questionnaire that comprehensively examines the frequency and impact of everyday problems in functioning after acquired brain injury. Participants were survivors of moderate or severe acquired brain injury (n = 100) of varied etiology plus a sample of their significant others (n = 35). Participants were interviewed by their rehabilitation therapists at the start and end of their therapy (3 months modal duration) and by a researcher approximately 3 months post therapy. To assess test-retest reliability, a sample of clients (n=25) was interviewed twice in 2 weeks. To assess inter-rater reliability, significant others were interviewed within 2 weeks of the client's interview. To assess concurrent convergent validity, a sample (n=25) was rated using the Mayo-Portland Adaptability Inventory (MPAI-4). To assess sensitivity to change, scores were compared from start to end of therapy and from there to the post therapy interview. To assess clinical utility, the therapists (n=15) were asked to complete an 11-item clinical utility questionnaire. Preliminary analysis of the data indicates that the FOP has 1) good item characteristics, 2) good test-retest reliability, 3) good inter-rater reliability, 4) good internal consistency (Cronbach's alpha), 5) good convergence with the MPAI-4, and 6) good clinical utility for rehabilitation therapists. The FOP appears to be valid for guiding therapy and evaluating its effectiveness in a clinic targeted to the rehabilitation of clients with acquired brain injury.
Correspondence: *Ronald W. Skelton, Ph.D., Psychology, University of Victoria, Box 3050, Victoria, BC V8W 3P5, Canada. E-mail: skelton@UVic.ca*

J.C. FREELAND & T. CORKER. Reliability and validity of the BIRT Aggression Rating Scale .
Aggressive behaviour is among the most serious neurobehavioural consequences of acquired brain injury (ABI). Most assessment devices for

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press

aggression used in ABI were developed primarily with general psychiatric populations. The BIRT Aggression Rating Scale (BARS) was developed specifically for persons with ABI. The underlying structure of the scale was based upon forensic distinctions in aggression with three ordinal ratings within two categories. The use of rating scales in clinical practice is best facilitated with validated systematic training procedures. The BARS has an integral computer delivered, video-based training package and video-based rater assessments developed specifically to train direct care staff working in the care and rehabilitation of persons with ABI. A validation sample using 115 staff from six neurorehabilitation units was used to establish the reliability of the BARS. The staff / rater assessment protocol consisted of ten video vignettes especially scripted to depict prototypical aggressive behaviours observed in persons with ABI. The ratings of 115 staff were analysed for interrater reliability using an intraclass correlation technique. A one-way random effects model generated an average interrater reliability of 0.92. In order to assess validity a factor analysis approach was used with 106 staff who rated each of the ten vignettes. As will be demonstrated in the paper, the factor structure apportioned the variance consistently with concepts inherent to the scale. This paper demonstrates the BARS to be a reliable and valid means of measuring aggression in persons with ABI.
Correspondence: *John C. Freeland, PhD, York House, Brain INjury Rehabilitation Trust, The Retreat, 107 Heslington Road, York YO10 3AY, United Kingdom. E-mail: sailinginparadise@yahoo.com*

https://doi.org/10.1017/S1355617705059941 Published online by Cambridge University Press