Final Program
The 2012 International Neuropsychological Society Mid-Year Meeting/11th Nordic Meeting in Neuropsychology
June 27-30, 2012
Oslo, Norway

WEDNESDAY, JUNE 27, 2012

8:30–10:00 AM — **Invited Symposium: Adult ADHD — a Multifaceted Approach to Assessment and Intervention**
Co-Chairs: Liisa Klenberg, Laura Hokkanen
København

1. HOKKANEN, L — Adult ADHD – a Multifaceted Approach to Assessment and Intervention
2. LAASONEN, M — Adult Dyslexia and ADHD in Finland – Project DyAdd
3. HELENIUS, P — Impaired Neural Activation of the Ventral Attentional Pathway in ADHD
4. WASSERSTEIN, J — Diagnosis of ADHD in Adults: Appropriate Symptom Threshold and the Role of Executive Function Measurement
5. WASSERSTEIN, J — Nonpharmacological Treatment of Executive Dysfunction in Adults with ADHD

8:30–10:00 AM — **Paper Session: Cognitive Intervention/Rehabilitation**
Telemark

1. COVRE, P — Reduction of Retroactive Interference may Improve Delayed Recall in Patients with Amnesia
2. ADLAM, AR — Neurocognitive Interventions For Executive Function In Children Who Have Survived A Brain Injury
3. STUBBERUD, J — Goal Management Training of Executive Functions in Patients with Spina Bifida
4. HERMANSEN GRUNEWALDT, K — Computerized Working Memory Training in Very Low Birth Weight Children at Preschool Age
5. HASLAM, C — Errorless Learning Enhances Memory in Children with Acquired Brain Injury

8:30–11:00 AM — **CE Workshop 1: Analysis of the Single Case in Clinical Practice: Quantitative Methods without Tears**
Presenter: John Crawford
Oslo

1. CRAWFORD, JR — Analysis of the single case in clinical practice: Quantitative methods without tears

8:30–11:00 AM — **CE Workshop 2: Evidence-Based Neuropsychological Assessment**
Presenter: Grant Iverson
Helsingfors

1. IVERSON, GL — Evidence-Based Neuropsychological Assessment

10:30 AM–12:00 PM — **Invited Symposium: Neuropsychological Studies in Autism from Denmark and Norway. Understanding Emotion in Music and Language, Metamemory and Characteristics of Children with Early Symptoms.**
Chair: Lennart Pedersen
København

1. PEDERSEN, L — Neuropsychological Studies in Autism from Denmark and Norway. Understanding Emotion in Music and Language, Metamemory and Characteristics of Children with Early Symptoms
2. GEBAUER, L — Understanding Emotions in Music and Language
3. STENBERG, N — Symptoms at 18 months and Autism Spectrum Disorder. A population based longitudinal study
4. ELMOSE, M — Being aware of own performance: Metamemory in autism spectrum disorder

10:30 AM–12:00 PM — **Paper Session: Aging**
Telemark

1. FOSTER, JK — Role of the ε4 Polymorphism of the APOE Gene in Cognitive Aging: A Statistical Mediation Analysis
2. SPAAN, PE — A Verbal Description Variant of the Boston Naming Test: Improved Detection of Word Finding Difficulties in Normal Aging
3. HOGSTROM, LJ — Age-Related Changes in Cortical Surface Area and Gyrification across the Adult Life-Span
4. LITERAKOVA, E — Clock Drawing Test as a Diagnostic Tool for Distinction between Patients with Alzheimer's Disease, Amnestic Mild Cognitive Impairment and Healthy Elderly: A Comparison of Three Scoring Systems
5. BOMBIN, I — Compensation and Substitution are more Effective than Restitution in Improving Functional Independence and Memory in Amnestic MCI elderly subjects

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11:30 AM–2:00 PM **CE Workshop 3: Unawareness of Deficit Following Various Brain Disorders: Implications for Assessment and Rehabilitation**
Presenter: George Prigatano
Oslo

1. PRIGATANO, G — Unawareness of Deficit Following Various Brain Disorders: Implications for Assessment and Rehabilitation

11:30 AM–2:00 PM **CE Workshop 4: BRIEF as a Diagnostic and Intervention Instrument in Clinical Neuropsychology**
Presenter: Gerard Gioia
Helsingfors

1. GIOIA, G — BRIEF as a Diagnostic and Intervention Instrument in Clinical Neuropsychology

12:30–2:00 PM **Paper Session: Psychopathology/Neuropsychiatry**
København

1. REINVALL, O — Psychiatric Symptoms in Children and Adolescents with Autism Spectrum Disorders (ASD)
2. BARDER, HE — Neurocognitive Development In First Episode Psychosis 5 year Follow-Up; How Do Relapses Affect The Course?
3. WOOD, SJ — Neurocognitive Markers of Psychosis Onset and Functional Outcome 2 to 14 years After Identification as Ultra-high Risk for Psychosis
4. LEGRIS, JM — Executive Function, Iowa Gambling Task Performance and Suicide Risk in Women with Borderline Personality Disorder
5. WHITTON, AE — Pathological Disgust and the Basal Ganglia: An Examination of Disgust Responding in Obsessive-Compulsive Disorder

12:30–2:00 PM **Paper Session: Assessment/Psychometrics/Methods**
Telemark

1. EGLE, J — Psychometric properties of a computerized version of the Tower of London: Using item response theory to evaluate its dimensionality and construct validity
2. BOSNES, O — Are US Norms with the WMS-III and WAIS-III Feasible in Norway?
3. SATCHI, N — The Clinical Utility of The Behavior Rating Inventory of Executive Function- Adult Version (BRIEF-A) in patients with psychological disorders
4. SCHNABEL, R — Neuropsychological Assessment of Distractibility in Mild Traumatic Brain Injury and Depression
5. HIETANEN, M — Cognitive Impairment is Highly Common after Stroke Despite "Good" Clinical Recovery

2:45–3:00 PM **Welcome Address**
Principal of the University of Oslo: Ole Petter Ottersen
President of The Norwegian Neuropsychological Society: Erik Hessen
University of Oslo Aula

3:00–3:45 PM **Invited Address: Brain Maps For Space**
Speaker: Edvard Moser
University of Oslo Aula

1. MOSER, E — Brain Maps For Space

4:00–5:00 PM **INS Presidential Address: Profiles Of Dementia: Neuropsychological, Neuroanatomical and Neuropathologic Phenotypes**
President of The International Neuropsychological Society: Sandra Weintraub
University of Oslo Aula

1. WEINTRAUB, S — Profiles Of Dementia: Neuropsychological, Neuroanatomical and Neuropathologic Phenotypes

6:00–6:45 PM **Reception**
Oslo City Hall

THURSDAY, JUNE 28, 2012

8:00–9:30 AM **Invited Symposium: Disorders of Consciousness - Ethical Issues, Diagnostic and Prognostic Considerations and Treatment Options**
Chair: Marianne Løvstad
Telemark

1. LØVSTAD, M — Disorders of Consciousness - Ethical Issues, Diagnostic and Prognostic Considerations and Treatment Options
2. SCHNAKERS, C — Pain Assessment and Pain Management in DOC Patients
3. FINS, JJ — Ethical Decision-Making on Behalf of Patients with Disorders of Consciousness
4. GIACINO, JT — A Systematic, Evidence-Based Approach to Diagnostic Assessment, Outcome Prediction and Rehabilitation in Patients with Disorders of Consciousness

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8:00–9:30 AM **Invited Symposium: Neurocognition in Psychotic Disorders: Change or Stability**
Co-Chairs: Merete G. Øie, Kjetil Sundet
Helsingfors

1. ØIE, MG — Neurocognition in Psychotic Disorders: Change or Stability
2. WOOD, SJ — Change Over Time in Neurocognitive Performance in a Sample at Ultra-high Risk for Psychosis
3. REICHENBERG, A — The First 10 Years: The Course of Neuropsychological Functioning in an Epidemiological Sample of First Episode Psychosis
4. HARVEY, PD — Course of Everyday Functioning in Older Community Dwelling People with Schizophrenia: The influence of Cognition, Functional Capacity, and Illness History

8:00–9:30 AM **Invited Symposium: Aging and Mild Cognitive Impairment**
Chair: Ivar Reinvang
Oslo

1. REINVANG, I — Aging and Mild Cognitive Impairment
2. FJELL, AM — Structural Brain Changes in Aging
3. ZIEGLER, D — Cognitive Control Networks in the Aging Brain
4. FALKENSTEIN, M — The Influence of Different Training Regimes on Executive Functions and Brain Activity in Healthy Old Adults
5. NYBERG, L — Association of MCI in Parkinson's Disease to Altered Fronto-striatal Functional Brain Activity

9:45–11:15 AM **Symposium: Neuropsychological Functioning and Pharmacological Treatment of College Students with ADHD**
Chair: Lisa Weyandt
Telemark

1. WEYANDT, L — Neuropsychological Functioning and Pharmacological Treatment of College Students with ADHD
2. WEYANDT, L — Executive Functions (EF) and Attention Deficit Hyperactivity Disorder (ADHD)
3. DUPAUL, GJ — Effects of Lisdexamfetamine Dimesylate (LDX) on the Psychological and Academic Functioning of College Students with Attention-Deficit/Hyperactivity Disorder (ADHD)
4. SWETOSKY, A — Executive Functioning in College Students with ADHD Symptomology
5. VERDI, GR — Effects of Lisdexamfetamine Dimesylate (LDX) on the Executive Functioning of College Students with Attention-Deficit/Hyperactivity Disorder (ADHD)

9:45–11:15 AM **Invited Symposium: Psychiatric Disorders following Traumatic Brain Injury**
Chair: Jennie Ponsford
Discussant: Teresa Ashman
Helsingfors

1. PONSFORD, J — Psychiatric Disorders following Traumatic Brain Injury
2. DIKMEN, S — The Natural History and Predictors of Depression following Civilian Traumatic Brain Injury
3. PONSFORD, J — Psychopathology in the First Three Years After Traumatic Brain Injury
4. SCHÖNBERGER, M — The Temporal Relationship Between Depression, Anxiety, and Functional Status after Traumatic Brain Injury: A Cross-lagged Analysis
5. MALEC, J — Building a Preliminary Model for Post-TBI Depression

9:45–11:15 AM **Invited Symposium: Risk Reduction Factors for Cognitive Decline in Older Adults**
Chair: Jennifer Manly
Oslo

1. MANLY, J — Risk Reduction Factors for Cognitive Decline in Older Adults
2. MANLY, J — Lifecourse Social Factors and Risk of Cognitive Decline among Older Adults
3. LUCHSINGER, J — Vascular factors and cognitive impairment
4. CHELUNE, G — The Slippery Slope: Preclinical Trajectories of Cognitive Performance and Risk of Cognitive Decline

10:15–11:45 AM **Poster Session 1: Cognitive Neuroscience, Electrophysiology/EEG/ERP, Visuospatial Functions/Neglect/Agnosia**
Norgessuitene

Cognitive Neuroscience

1. BARCELO, F — Time-frequency analysis of novel distractors and task-switch cues in a task-switching version of the Wisconsin Card Sorting Test
2. BELLO, A — How the Brain Represents the Body: Body Perception in Anorexia Nervosa
3. CRUZ, G — Effectiveness of Perceptual versus Conceptual Cues in Prompting Retrieval of Delayed Intentions
4. GORECKA, M — Effects of Walking on Dichotic Listening Performance Among Young Healthy Adults
5. KOLSKÅR, K — The Role Of The Middle Frontal Gyrus In Anticipatory Behavior
6. KOTANI, Y — Right Anterior Insular Cortex Modulates Anticipatory Attention Network via Anterior Cingulate Cortex
7. LOHAUGEN, GC — Cortical Surface Area and White Matter Microstructure Relate to IQ in Preterm Born Very-Low-Birth-Weight (VLBW) Young Adults
8. MATARÓ, M — Effects of Intracranial Pulsatility Index on Cognition and White Matter Integrity
9. MOBERGET, T — Modulation of cerebellar BOLD-signals by the semantic context - evidence for cerebellar internal models in language processing?

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10. MORADY, K	The Role of Working Memory in Auditory Selective Attention
11. MOTA, N	Alcohol Binge Drinking Trajectory and Neuropsychological Dysfunction in University Students
12. NAVANEEDHAN, C	Relationship between brain activity and solving puzzles leads to positive or negative results
13. OHGAMI, Y	Anticipatory Attention for Facial, Verbal, and Symbolic Feedback Stimuli: An ERP Study
14. ØSTGÅRD, HF	IQ and Intrauterine Growth Restriction in Young Adults Born Small-for-Gestational-Age at Term
15. PARK, C	A study on neuropsychological performances and personality traits of internet addiction
16. RACE, E	Reduced Coherence of Memory and Future Thought in Amnesia
17. RIMOL, LM	Brain activation in the cerebellum to asynchronous and isochronous visual stimuli
18. SADEGHI, M	The use of different lexicon (pronouns and adjectives) in styles of attachment and its relationship with cerebral Event-Related-Potentials
19. SERRA-GRABULOSA, J	Sustained attention and working memory networks revealed by a CPT task
20. SOLNTSEVA, E	Haloperidol Abolishes Donepezil-Induced Reversal of Long-Term Potentiation Impaired by Beta-Amyloid in Rat Hippocampus
21. TRAUPE, O	The Amygdala Shows Early and Late Responses to Facial Threat Signals
22. VANDBORG, SK	Memory and Executive Functions in Patients with Obsessive Compulsive Disorder and Outcome of Cognitive Behavioral Therapy
23. WADHAWAN, AN	Neuropsychological Disability Evaluation Trends in India: Past, Present & Future
24. ZHAVORONKOVA, L	Psychological, stabilographic and EEG markers of successful dual task performance in healthy persons
	Electrophysiology/EEG/ERP
25. BRUNNER, JF	Longterm test-retest reliability of visual event related potentials in a two stimulius Go/NoGo task
26. HAUGER, SL	Electrophysiological Indications of Working Memory Processes in High- but not Low-Level Minimally Conscious Patients – A Pilot Study
27. PEREZ-BOCOURT, V	Effects of Erythropoietin in the Executive Control in Parkinson Disease
	Visuopatial Functions/Neglect/Agnosia
28. DE HAAN, GA	Subjective Complaints in Patients Suffering from Hemianopia
29. GUTIÉRREZ, B	Visuospatial Deficits in Depressive Disordes: Common or Athypical Neuropsychological Impairment?
30. HARCIAREK, M	Putaminal Ipsilesional Neglect
31. HIROMITSU, K	Error patterns of the picture naming predict the brain lesion and unilateral neglect
32. LESNIAK, M	Pure Alexia After Right Fusiform Gyrus Hemorrhagic Stroke
33. NIJBOER, TC	Recovery of hemispatial neglect after stroke: a longitudinal cohort study
34. PALERMO, L	Is the Developmental Topographical Disorientation Just a Navigational Disorder? Mr L.A. (Lost Again!) Says Yes
35. PÉREZ MARTÍNEZ, S	Cognitive profile involved in architectural drawing in Down syndrome
36. ROSENQVIST, JE	Influence of TV, Computers, and Books on Visuospatial Processing and Visual Memory
37. SCHMIDT, L	Galvanic Vestibular Stimulation Modulates Impaired Arm Position Sense In Spatial Neglect
38. SUZUKI, K	Neuronal Bases of Texture Discrimination and Identification
39. TOBA, MN	Fronto-parietal white matter disconnection in right spatial neglect
40. TOBA, MN	Line bisection performances in apathy versus depression
41. TOBA, MN	Line bisection performances in depressives
42. VAN DER STOEP, N	Exploring Space: Dissociations and Interactions Between Neglect in Near and Far Regions of Space
43. VANCLEEF, K	Recovery from Extinction in Texture Segregation and Contour Integration

12:00–1:00 PM **Invited Address: Biological Mechanisms Underlying Late Recovery from the Minimally Conscious State: The Re-awakening of Terry Wallis After 19 Years.**
Speaker: Joseph Giacino
Scandinavia

1. GIACINO, JT	Biological Mechanisms Underlying Late Recovery from the Minimally Conscious State: The Re-awakening of Terry Wallis After 19 Years

12:00–1:30 PM **Invited Symposium: Methods of Assessing Cognitive Drug Effects in Epilepsy**
Chair: Arne Gramstad
Telemark

1. GRAMSTAD, A	Methods of Assessing Cognitive Drug Effects in Epilepsy
2. HESSEN, E	Neuropsychological assessment of antiepileptic drug effects in patients with epilepsy
3. HELMSTAEDTER, C	Monitoring neurocognitive side effects of antiepileptic drugs: Approaching the individual patient
4. ALDENKAMP, AP	Neuropsychological assessment of drug effects in epilepsy

12:45–2:15 PM **Poster Session 2: Aging, Dementia, Medical/Neurological Disorders**
Norgessuitene

	Aging
1. ANTONENKO, D	Grammar Learning In Older Adults Is Linked To White Matter Microstructure And Functional Connectivity
2. HAASE, L	Cognitive and emotional functioning in young, middle-aged, and older adults with metabolic syndrome
3. HATTA, T	Relation between daily living activity and cognitive function in late-adulthood: a report from Yakumo Study
4. IWAHARA, A	Not an Intellectual Activity but the Adoption of New Technology Acts as a Buffer of Cognitive Decline
5. LANDRÉ, L	Emotional Enhancement of Memory in Aging : A fMRI Study of Visual Recognition
6. MOHN, C	The MATRICS Consensus Cognitive Battery in older Norwegians
7. RUIZ-RIZZO, AL	Qualitative Measures Including Grammar In The Controlled Oral Word Association Test For Healthy Older Adults

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Multiple Sclerosis/ALS/Demyelinating Disorders

8. ALMKVIST, O — The Paced Auditory Serial Addition Test (PASAT) effectively detects cognitive dysfunction in Multiple Sclerosis: Data from the MS population-study in Nord-Trøndelag, Norway

Dementia (Alzheimers)

9. ALMKVIST, O — Alzheimer's Disease: the Contribution of Information on Strategies as Indicated by BQSS
10. AL SALMAN, A — Reliability of an Arabic Version of the Addenbrookes Cognitive Examination- Revised
11. GRAMBAITE, R — The Relationship between Memory and Depression Severity in Patients with Mild Cognitive Impairment
12. HAYASHI, A — Writing Impairments in Japanese Patients with Mild Cognitive Impairments and with Mild Alzheimer's Disease
13. IRVINE, K — Facial Emotion Recognition Deficits in Alzheimer's Patients
14. IRVINE, K — Sex Differences in the Cognitive Abilities of People with Alzheimer's Disease: a Meta Analysis
15. KIM, E — Neuropsychological performance and prediction of conversion to Alzheimer's disease in patients with early- versus late-onset amnestic cognitive impairment: CREDOS study
16. LANDRÉ, L — Effect of Emotion on Memory in Alzheimer's Disease and its Relationship to Mediotemporal Atrophy
17. NIKOLAI, T — Phonemic verbal fluency differentiates between normal aging, amnestic and non-amnestic mild cognitive impairment and Alzheimer's dementia
18. STRIJKERT, F — Is There a Relationship Between Recognizing Emotions and Behavioral Changes in Patients Suspect for Dementia?
19. VAN GELDORP, B — Precision of Working Memory Binding in Alzheimer's Disease

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

20. BOLCEKOVA, E — Hashimoto's Encephalopathy: A Case Study
21. CHI, C — Cognitive Recovery in Idiopathic Normal Pressure Hydrocephalus after Shunt Surgery: follow-up of a Case in Taiwan
22. GÓMEZ, CB — Frontotemporal Dementia: 2 Atypical Familiar Cases Associated with Mutations of the Gene Prp
23. LADAS, A — The Relationship Between Dopamine Activity and Cognitive Function in Mild Cognitive Impairment: Eye Blink Rate as a Reliable Measure of Brain Dopamine Activity
24. MIDORIKAWA, A — Getting a residual functions through eye-movement in a patient with severe frontotemporal lobar degeneration (FTLD)
25. MIRALBELL, J — Association between Markers of Inflammation, Endothelial Dysfunction and Thrombosis with Cognitive Impairment
26. NESSET, M — Conversion from Mild Cognitive Impairment to Dementia in a Clinical Population: Predictability from simple Cognitive Testing?
27. HARCIAREK, M — Is Phonemic Fluency Deficit A Good Marker Of FTDP-17 Onset And Progression? - Evidence From Patients With MAPT P301L Mutation

Medical/Neurological Disorders/Other (Adult)

28. HARCIAREK, M — Reno-Cerebrovascular Disease: A Model For Cognitive Decline In Patients Treated With Dialysis
29. HARCIAREK, M — Hypertension And Blood Urea Nitrogen Independently Predict Progression Of Executive Problems In Dialized Patients With End-Stage Renal Disease
30. AFSHAR, S — Facial Emotion Expressions in People with William's Syndrome and Down Syndrome
31. CAMPABADAL, A — Verbal Memory in Fibromyalgia and Chronic Pain
32. FERREIRA, D — Relationship between processing speed and clinical parameters in Friedreich ataxia
33. HUMAIDA, I — Relationship Between Stress And Psychosomatic Complaints Among Nurses In Tabarjal Hospital)
34. MELIKYAN, Z — Speed of Information Processing and Working Memory in Patients with Mild and Moderate TBI 1, 3 and 6 Months Post-injury
35. PECK, EA — Base Rate Data of Epworth Sleepiness Scale Scores in a Sample of US Adults Referred for Neuropsychological Assessment

Medical/Neurological Disorders/Other (Child)

36. HAAVISTO, AM — Visuomotor and Visuoconstructive Difficulties After Pediatric Solid Organ Transplantation
37. HASHIMOTO, K — Neuropsychological analysis by WISC-III/WAIS/III of congenitally hearing-impaired subjets with normal range verbal IQ
38. MUNCK, P — Cognitive and Neuropsychological Development of Children Born <32 Gestational Weeks at 2 and 5 Years of Age
39. SIFFREDI, V — Neuropsychological profile of agenesis of the corpus callosum – A systematic review

1:30–2:30 PM — **Invited Address: Frontal-Cerebellar Systems: How Closely do the Functions Map Together?**
Speaker: Donald Stuss
Scandinavia

1. STUSS, DT — Frontal-Cerebellar Systems: How Closely do the Functions Map Together?

1:45–3:15 PM — **Paper Session: ADHD/Attentional Functions**
Telemark

1. HOLTH SKOGAN, A — Working Memory and Inhibitory Control in Young Preschool Children at Risk for Attention Deficit Hyperactivity Disorder
2. EGELAND, J — Both sides now: Transfer effect of Working Memory Training
3. BAO, Y — Inhibitory Processing across Life Span: Evidence from Inhibition of Return
4. SÖDERLUND, G — Improving Cognitive Functions with Noise in Inattentive Children
5. GARCIA-BARRERA, MA — Neural Markers of ADHD: Is Larger Worst? Examining the Relationships between Subregional Brain Sizes, Behavior and Attentional Systems in a Pediatric ADHD Sample from Spain

2:30–3:30 PM — **Invited Address: Electrophysiology of Human Prefrontal Cortex**
Speaker: Robert Knight
Scandinavia

1. KNIGHT, RT — Electrophysiology of Human Prefrontal Cortex

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3:30–5:00 PM **Symposium: Investigation of Emotional and Social Cognitive Dimensions in Epilepsy and Mon-Pharmacological Approaches to Cognitive-Behavioral Problems**
Chair: Anna Rita Giovagnoli
Discussant: Arne Gramstad
Telemark

1. GIOVAGNOLI, A	Investigation of Emotional and Social Cognitive Dimensions in Epilepsy and Non-Pharmacological Approaches to Cognitive-Behavioral Problems
2. MELETTI, S	Recognition of Emotions from Faces and Voices in Medial Temporal Lobe Epilepsy
3. HESSEN, E	Behavioural Adjustment in Well Controlled Epilepsy Patients
4. GRAMSTAD, A	Self-Efficacy and Quality of Life in Epilepsy
5. RAGLIO, A	Music Therapy Effectiveness and Neuropsychological Research Perspectives
6. FARINA, E	An Evidence-Based Review of Cognitive Rehabilitation in Epilepsy
7. MARUSIC, P	Postoperative Changes in Emotional Recognition and Social Cognition in Temporal Lobe Epilepsy Patients
8. GIOVAGNOLI, A	Emotional-Behavioral Implications of Theory of Mind Impairment

2:30–4:00 PM **Poster Session 3: ADHD, Autism, Learning Disabilities, Language and Speech Functions, Hemispheric Asymmetry, HIV**
Norgessuitene

ADHD/Attentional Functions

1. ARNESEN, P	Retrospective cognitive perspective – an additional element in cognitive therapy
2. BORRANI, J	Analysis of the Components of Attention in Juvenile Delinquents
3. CASINI, L	Time stretches for adults with Attention Deficit Hyperactivity Disorder : can this explain their symptoms ?
4. GRANE, VA	Attention and Inhibitory Control in Adult Attention Deficit Hyperactivity Disorder
5. HARCIAREK, M	Language As A Moderator Of Memory Processing In Children With Attention Deficits Hyperactivity Disorder And Dyslexia Comorbidity
6. OGRIM, G	The QEEG Theta/beta Ratio in ADHD and Normal Controls: Sensitivity, Specificity, and Behavioral Correlates
7. OGRIM, G	Effects of Neurofeedback versus Stimulant Medication in ADHD. A Randomized Pilot Study
8. RAMÍREZ, C	Analysis of the Components of Attention in Children from 4 to 6 Years Old
9. ROSSI, AS	Hot and Cold Executive Functions in ADHD
10. SARI, C	Validation of the adult ADHD self-report scale in a Swedish sample - A pilot study
11. TÉLLEZ, GY	Cognitive Functions in Attention-Deficit/Hyperactivity Disorder in Hyperactive-Impulsive and Combined Types and its Relationship with Hyperactive-Impulsive Behavior in a Sample of Mexican Children
12. VALDEZ, P	Effects of the Simultaneous Performance of Two Tasks on the Components of Attention of Each Task
13. VAN DER ZEE, H	Detection of Malingering in Assessment of Adult Attention-Deficit/Hyperactivity Disorder
14. VIERIKKO, E	The Relationship Between Mothers' and Fathers' Parenting and Children's Attentional and Behavioral Problems
15. WAALER, E	Psychoeducation in Group for Adults With ADHD and Their Significant Others : a Pilot Study

Autism Spectrum Disorders

16. STEFANATOS, GA	Distinctive features of the natural history of regressive autism
17. SURÉN, P	Head Growth in Autism: A Population-Based Cohort Study

Learning Disabilities/Academic Skills

18. ARAÚJO, S	The Relationship Between Rapid Automatized Naming and Reading Performance: A Meta-analysis
19. NUKARI, J	How Does the Neuropsychological Performance Relate to the Difficulties Experienced by Adult Dyslexics?
20. ORRIOLS, B	Neuropsychological Profile in Children with Nonverbal Learning Disorder (NLD) and Asperger Syndrom (AS)
21. SERRA-GRABULOSA, J	Neuropsychological Profile of Mathematical Difficulties
22. TOLAR, TD	Cognitive Profiles of Mathematical Problem Solving Learning Disability (MPSD) for Different Definitions of Disability
23. VERCHE, E	Working Memory in Learning Disabled Adolescents

Language and Speech Functions/Aphasia

24. ANZAKI, F	Brain Activation during Different Recovery Stages in Patients with Pure Word Deafness using Functional Near-Infrared Spectroscopy
25. FRANCISCO, A	Interactions Between Vocabulary and Phonological Competences in Adulthood: a Correlational Study
26. HIGASHIKAWA, M	The Recovery Courses of Three Japanese Aphasics with Neologistic Jargon Speech
27. MATUTE, E	Language Development across the Preschool years
28. MEIRELLES, ED	Verbal Fluency in Teenagers from Rio de Janeiro – Brazil
29. POLANOWSKA, K	Recovery of Crossed Apraxia of Speech after Right Hemisphere Lesion
30. ROBINSON, G	An Investigation of Verbal Idea Generation: The Effect of Prompts on Narrative Speech
31. ROTH, C	Folic acid supplements in pregnancy and severe language delay in children
32. SAAR, V	Specific Language Impairment in Finnish children aged 2-6 years
33. SAITO, S	Sentence comprehension and short-term memory: consideration from patients with prefrontal lobe lesion
34. STARRFELT, R	How Low Can You Go: Spatial Frequency Sensitivity in Pure Alexia
35. UNO, Y	Impaired discourse after aneurysmal subarachnoid hemorrhage
36. UNO, Y	Impaired discourse after aneurysmal subarachnoid hemorrhage
37. VUGS, B	Working Memory Deficits in Preschool Children with SLI

Hemispheric Asymmetry/Laterality/Callosal Studies

38. SANT'ANNA, BA	Corpus Callosum's Malformations and the Impact of the Cognition Development: a Case-Control Study
39. VINGERHOETS, G	Atypical Language Dominance Predicts Atypical Praxis Dominance, an fMRI Study

HIV/AIDS/Infectious Disease

40. CALDWELL, JZ	Abnormalities in Neural Activity During Verbal Working Memory in the Context of HIV and Hepatitis C Infections

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4:00–5:00 PM **Birch Lecture: Primary Progressive Aphasia and the Language Network**
Speaker: Marsel Mesulam
Scandinavia

1. MESULAM, M — Primary Progressive Aphasia and the Language Network

5:00–5:30 PM **INS Awards Ceremony**
Scandinavia

5:30–6:00 PM **INS Business Meeting**
Scandinavia

FRIDAY, JUNE 29, 2012

8:00–9:30 AM **Invited Symposium: The Neuropsychology of Culturally-Dependent Cognition**
Presented by: The Federation of European Neuropsychological Societies
Telemark

1. DEMEYERE, N — The Neuropsychology of Culturally-Dependent Cognition
2. DEMEYERE, N — Disruptions to number bisection: A spatial numeric or working memory deficit?
3. TUCHA, O — Handwriting in Children with Attention Deficit Hyperactivity Disorder
4. CHECHLACZ, M — Distinct and Common Neural Correlates of Apraxia for Transitive and Intransitive Gestures: An investigation using Voxel-Based Morphometry (VBM)
5. VAN DER SCHOOT, M — How to bring together research on cognitive neuroscience and education?

8:00–9:30 AM **Invited Symposium: New Frontiers in Pediatric Traumatic Brain Injury: Working Together to Improve our Understanding of Child Outcomes**
Chair: Vicki Anderson
Helsingfors

1. ANDERSON, V — New Frontiers in Pediatric Traumatic Brain Injury: Working Together to Improve our Understanding of Child Outcomes
2. LEVIN, H — Social Cognition After Moderate to Severe Traumatic Brain Injury in Adolescents: Relation to Structural and Functional Brain Imaging
3. YEATES, KO — Using Reliable Change to Identify Post-Concussive Disorder in Children with Mild Traumatic Brain Injury
4. GIZA, C — Is Being Plastic Fantastic? Traumatic Brain Injury, Environment and Development

8:00–9:30 AM **Invited Symposium: Mechanisms of Plasticity and Change**
Chair: Kristine B. Walhovd
Oslo

1. WALHOVD, KB — Mechanisms of Plasticity and Change
2. JERNIGAN, T — The ontogeny of individuality: genes, brains, and behavior
3. ENGVIG, A — Memory training in patients with memory complaints –predictors and neural substrates of training effects
4. JOHANSEN-BERG, H — Brain plasticity with training and recovery from damage

8:00–9:30 AM **Poster Session 4: Assessment/Psychometrics, Executive Functions/Frontal Lobes**
Norgessuitene

Assessment/Psychometrics/Methods (Child)

1. BESPANSKAYA-PAWLENKO, K — Assessment of Development Level of The Leading Mental Functions of Children
2. CANCELLIERE, A — Boston Naming Test Norms for Ages 16 and 17: University or College Stream Matters
3. KULESZ, PA — Relations Between Attentional Structure and Attentional Function: Utilization of Alternative Statistical Approaches
4. RAHMANI, N — Assessment and Comparison of Self-Esteem and Depression in War Handicapped and Non-War Handicapped Children of Shahed Guidance Schools in Sari City 2011-12
5. ROSE, M — The Neuropsychology of Anorexia Nervosa - What The Ravello Profile Teaches Us

Assessment/Psychometrics/Methods (Adult)

6. ERDAL, K — Neuropsychological Testing for Sports-related Concussion: How Athletes Lowball their Baseline Testing without Detection
7. IVERSON, GL — Reliability and Validity of the British Columbia Cognitive Complaints Inventory in Depression
8. IVERSON, GL — How Often Do Healthy Older Adults Get Low Memory Test Scores?
9. KHALIL, MS — Neuropsychological & Executive Dysfunction In Sub-Groups Of Substance Abuse Patients in Saudi Arabia
10. KRAMSKA, L — Psychometric characteristic of the Czech National Adult Reading Test
11. LORENTZEN, E — The Changing Methods: Comparison between WAIS-III results with WAIS-IV results in patients with mild mental retardation
12. MILLER, HB — Comparison of the California Verbal Learning Test-II and the Selective Reminding Test in an Acquired Brain Injury Sample
13. MÖLLER, M — Assessment of Cognitive Fatigue in Mild Traumatic Brain Injury Patients with Persisting Complaints
14. NAGAI, C — Application of a novel clock drawing/reading test for investigating the constructive disabilities in a case of semantic dementia
15. RUIS, C — Symptom Checklist 90 Revised in Neurological Outpatients

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16. VANCLEEF, K	L-POST: A Screening Test for Assessing Perceptual Organization
17. WALVOORT, S	Neurocognitive dysfunctions implicated in alcohol use disorder: Rethinking MMPI-2 assessment
18. WINGBERMUHLE, E	Symptom Validity in a Neuropsychiatric Sample
	Executive Functions/Frontal Lobes
19. ALBEIN, N	Executive function in cocaine dependent individuals with comorbid personality disorders: Preliminary results
20. BOCHYNSKA, A	Executive functions and social skills. A case study of a patient with frontal lobes damage
21. BRITO, D	Influence of parenting style in executive functions of preschool age children
22. CONSTANTINIDOU, F	The Effects of Age and Education on Executive Functioning and Language Performance in Greek Cypriot Adults: Findings from the Neurocognitive Study on Aging
23. EASTVOLD, A	The Lack of Convergence Between Objective and Self-Report Measures of Executive Functions
24. ENNOK, M	Conceptual Analysis Errors in Patients with Parkinson's Disease
25. GARCÍA, A	Disorders of Prevision in a Traumatic Brain Injury Patient: a Case Study
26. GARCIA-BARRERA, MA	Theoretical Derivation and Empirical Validation of an Integrative Neuropsychological Theory of Executive-Related Abilities and Component Transactions (INTERACT)
27. GAROLERA, M	Morbid obesity but not mild-to-moderate obesity is associated with differences in prefrontal function: a case control study
28. HJELMERVIK, H	Intra-individual differences in cognitive control across the menstrual cycle assessed with the dichotic listening paradigm
29. HOVLAND, A	The Relationships among Heart Rate Variability, Executive Functions, and Panic-Related Variables in Patients with Panic Disorder
30. JANSARI, A	Towards a Novel Ecologically-Valid Assessment of Executive Functions in Children and Adolescents: Could Virtual Reality be the Answer?
31. KAFADAR, H	Mental Flexibility, Reasoning, Focused Attention, Planning and Fluid Intelligence: A Latent Variable Approach
32. KESSELS, RP	Ecological Validity and Reliability of a Modified Six Elements Test
33. MEGURO, Y	A Case of Nurturing Syndrome Caused by Bilateral Frontal Lobe Hypoperfusion after Subarachnoid Hemorrhage
34. MENON, CV	Executive Functioning as a Mediator of the Relation Between Reading Ability and Health Risk Behaviors in Rural-dwelling Cohort: A Project FRONTIER Study
35. ORTIZ, X	Cognitive Inhibition and Flexibility in Children and Adolescents
36. SIGURDARDOTTIR, S	Olfactory dysfunction in relation to set-shifting performance after severe traumatic brain injury: A Norwegian population-based study
37. SØRENSEN, K	Program Intensified Habilitation - Strenghtening Executive Functions In Preschool Children With Cerebral Palsy

9:45–11:15 AM **Symposium: Accelerated Long-term Forgetting in Patients with Epilepsy.**
Chair: Suncica S. Lah
Discussant: Laurie Miller
Telemark

1. LAH, SS	Accelerated Long-term Forgetting in Patients with Epilepsy
2. LAH, S	Accelerated Long-term Forgetting of Verbal Information in Patients with Temporal and Extratemporal Partial Epilepsy
3. THAYER, Z	Examining the Role of Epileptiform Activity and Sleep in Accelerated Long-term Forgetting
4. JANSARI, A	Attempting to Capture Accelerated Long-term Forgetting (ALF) within One Clinical Visit: Towards a New Assessment of ALF
5. MONICA, R	Considering the Impact of Stimulus Modality, Stimulus Type and Encoding Condition on Rate of Longer Term Forgetting in Patients with Epilepsy
6. GASCOIGNE, M	Accelerated Long-Term Forgetting in Children with Epilepsy

9:45–11:15 AM **Invited Symposium: Is There Any Hope: Rehabilitation and Brain Plasticity of Frontal Function**
Co-Chairs: Donald Stuss, Robert Knight
Helsingfors

1. STUSS, DT	Is There Any Hope: Rehabilitation and Brain Plasticity of Frontal Function
2. NYBERG, L	A frontal-lobe workout — effects on brain maps and neurotransmission
3. VOYTEK, B	The role of neocortical oscillations in coordinating prefrontal functions
4. TURNER, GR	Rehabilitation Of Executive Functioning Using Goal Management Training

9:45–11:15 AM **Invited Symposium: Pediatric Neurorehabilitation**
Co-Chairs: Lucia Braga, George Prigatano
Oslo

1. BRAGA, LW	Pediatric Neurorehabilitation
2. PRIGATANO, GP	The parent-child relationship after acquired brain injury: Implications for neuropsychological rehabilitation
3. BRAGA, L	Empowering preadolescents with ABI through the development of metacognition: Metacognitive Dimension

10:00–11:30 AM **Poster Session 5: Behavioral Neurology, Cross Cultural, Cancer, Toxin-Related Disorders, Emotional Processes, Genetic Disorders, Stroke/Aneurysm**
Norgessuitene

	Behavioral Neurology
1. ALDAVOOD, S	Anxiety Is Most Common Behavioral Problems In Dogs
2. SAVINA, N	Creativity and Delinquency
3. VAN DER STIGCHEL, S	Measuring Palinopsia: Characteristics of a Persevering Visual Sensation from Cerebral Pathology

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Cross Cultural

4. MATUTE, E — Age effect on Different Neuropsychological Domains in Mexican Preschoolers
5. NIELSEN, T — Cognitive Testing in Healthy, Elderly Turkish Immigrants
6. OKUBO, M — Leftward attentional biases in Framed-line Test among East Asians
7. PARANAWITHANA, CE — Cross Cultural Adaptation Of The Repeatable Battery For The Assessment Of Neuropsychological Status To A Sinhala Speaking Clinical Population In Sri Lanka
8. HESTAD, KA — Demographic Effects On Neuropsychological Test Performance In Zambia, Africa

Cancer

9. LOFSTAD, E — Neuropsychological Outcome in Children and Adolescents Treated for Acute Lymphoblastic Leukemia with Chemotherapy Only

Drug/Toxin-Related Disorders (Including Alcoholism)

10. LAARI, S — Executive Dysfunction in Heavy Social Drinkers after Cerebral Infarction
11. RAPELI, P — Medication Variables as Predictors of Reaction Time in Multiple Drug-treated Opioid-dependent Patients
12. SARI, C — Recovery of executive functioning among abstinent alcohol-dependent patients
13. WEINBORN, M — Time-based Prospective Memory and Risky Behavior amongst Substance Dependent Individuals in Treatment

Emotional Processes

14. BAKKE, LA — Effective Connectivity Within Core Cortical Network of Face Perception: Influence of Unconscious affective stimuli
15. CASTRO, SV — Dissociating Emotions in Speech and Music: Evidence from Parkinson's Disease
16. HOMAYOUNI, A — Investigated Relationship Between Sport Competitive Anxiety And Eating Disorders in Adolescence Athlete Students
17. ITOI, C — Emotional perceptions and Personality traits
18. SØLSNES, AE — The ability to self-evaluate own executive-function with BRIEF-A in very low birth weight (VLBW) preterm born adults

Genetics/Genetic Disorders

19. CALDÚ, X — Effects of COMT and DAT Genotypes on Brain Activation Related to Emotional Processing
20. EGGER, JI — Neuropsychology of four males from one kindred with Aarskog-Scott syndrome: Executive dysfunctions as part of the behavioural phenotype?
21. GAROLERA, M — ANKK1 genotype of the DRD2 gene modulates the relation between obesity and cognitive flexibility
22. HELMSTAEDTER, C — DRD2/ANKK1 TAQ1A polymorphism predisposes to negative psychotropic side-effects of Levetiracetam

Stroke/Aneurysm

23. ANDÚJAR, MF — Thalamic Anisotropy Indices and Cognitive Function in Stroke Patients
24. DACOSTA, R — Whole Brain Resting-State Analysis in Patients with First Ever Stroke: A Functional MRI Study with Independent Component Analysis (ICA)
25. DEMEYERE, N — A Multiplex Test of Attention: The Auditory Attention Test from BCoS
26. DONINGER, NA — Laterality Effects in Stroke Patients on the Brixton Spatial Anticipation Test
27. ESCARTIN, G — Decision-Making Impairment on the Iowa Gambling Task After Endovascular Coiling or Neurosurgical Clipping for Ruptured Anterior Communicating Artery Aneurysm
28. ESCARTIN, G — Olfactory dysfunction after subarachnoid hemorrhage secondary to aneurysms of the anterior communicating artery
29. JEHKONEN, M — Spontaneous Recovery of Memory Functions in Stroke Patients
30. NIINIKURU, R — The Relationship Between Mood and Memory Performance in Neuropsychological Rehabilitees After First-Ever Ischemic Stroke
31. SAMPANIS, D — Mirror Therapy Enhances Hand Function And Improves Motor Extinction in Chronic Stroke Patients
32. SAVOLAINEN, T — Symptom Awareness and Recovery of Memory Deficits After First-Ever Cerebral Infarction
33. SORIANO-RAYA, JJ — Microstructural White Matter Changes Related to Moderate Deep White Matter Lesions Predict Cognitive Performance in a Young Elderly Community Sample
34. STRALEN, HV — Somatosensory impairments after stroke
35. TURUNEN, K — Free and Cued Memory Recall in First-ever Ischemic Stroke Patients
36. VAN ZANDVOORT, M — Predictors for PTSD after SAH
37. VEENSTRA, WS — Long-term Cognitive, Emotional and Behavioral Consequences of Subarachnoid Haemorrhage
38. VIHAVAINEN, T — Cognitive Performance and Health Related Quality of Life 6 Months After First-Ever Cerebral Infarction

12:00–1:00 PM — **Invited Address: Plug It In and Turn It On: Connectivity and Activation after Pediatric Traumatic Brain Injury**
Speaker: Christopher Giza
Scandinavia

1. GIZA, CC — Plug It In and Turn It On: Connectivity and Activation after Pediatric Traumatic Brain Injury

12:00–1:30 PM — **Paper Session: Dementia**
Telemark

1. NORDLUND, A — Different Neuropsychological Profiles of Incipient AD and Vascular Cognitive Disorder
2. JOKINEN, H — Microstructural abnormalities in normal-appearing brain tissue predict longitudinal cognitive decline. The LADIS study
3. SÄRKÄMÖ, T — Therapeutic Use of Musical Leisure Activities in Mild-Moderate Dementia: Randomized Controlled Trial
4. MILLER, LA — Carer Burden in Dementia: Impact of Neuropsychological Impairments, Dementia Type and Demographic Factors
5. NÄÄTÄNEN, R — Cognitive decline in different neurological and neuropsychiatric disorders as indexed by the mismatch negativity (MMN)

12:00–1:30 PM — **Poster Session 6: Imaging, Memory Functions, Psychopathology/Neuropsychiatry**
Norgessuitene

Imaging (Functional)

1. GREEN, E — Energy Content Moderates the Relationship Between Adiposity and Hypothalamic Response to a Sweet Taste
2. HENDRIKS, M — Applicability of fMRI in the Assessment of Memory Functions for Epilepsy Surgery?

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3. OSNES, B	Stimulus expectations modulate temporal and posterior frontal areas in auditory speech perception
4. SIKVELAND, BF	Isolating the neuronal networks responsible for superficial muscle and support muscle control
5. SINNES, T	Emotional Stroop and CFS: An fMRI Study
6. STOJANOVIC-RADIC, J	Functional Magnetic Resonance Imaging (fMRI) and Near Infrared Spectroscopy (NIRS): Extent of Agreement Between Two Imaging Methods When Studying Brain Activation
7. TOBIA, MJ	Neural Representation of Mechanical Knowledge for Human Tool Use
	Imaging (Structural)
8. BANKS, SJ	Education protects against cognitive deficit in combat sports: the Professional Fighters Brain Health Study
9. BJØRNEBEKK, A	Characteristics of the neurotic brain: investigating the big five with structural neuroimaging parameters in a large healthy sample
10. CHECHLACZ, M	Acute versus Chronic Prognosis of Allocentric versus Egocentric Neglect Symptoms Based on Clinical Scans
11. DEMEYERE, N	A Lesion-Symptom Analysis of Multiple Components of Attention: A Voxel-Based Analysis of the Auditory Attention Test from BCoS
12. GAROLERA, M	Cortical Thickness Decreases in Healthy Participants with Obesity at Relatively Young Ages
	Memory Functions
13. CHEN, I	False Memory in Patients with Huntington's Disease
14. HIGUERAS, Y	False Memories: Do You Want More?
15. LI, J	More Familiarity-based Responses in Mild Cognitive Impairment Patients Makes the Absence of Emotional Enhancement in Recognition Memory
16. MARYNIAK, A	Lost Attachment. Teenage Girl with Post-Traumatic Loss of Autobiographical Memory
17. MCKNIGHT, SE	The Impact of Anxiety on Recognition Memory: A Potential Confound in Effort Testing?
18. METITIERI, T	Making Memories: The Development of Long-term Visual Knowledge in Children with Visual Agnosia
19. PARK, S	Strengthening memory formation by non-conscious encoding process
20. TOBA, MN	Prospective memory deficits in portable telephone users
21. TOBA, MN	Rumination in early versus late onset post-stroke depression
22. VERCHE, E	Figural Memory Performance in Children with Low Birth Weight
23. VERCHE, E	Neuropsychological Assessment of Visual and Verbal Learning and Memory in Adolescents with Obsessive Compulsive Disorder
	Psychopathology/Neuropsychiatry (Other)
24. BEDARD, M	Neuropsychological and psychiatric effects of capsulotomy in patients with severe obsessive-compulsive disorder: A repeated-measure study
25. DWAIRY, MA	A Two-layers Bio-psycho-social Model of Medicine and Psychotherapy
26. LIM, A	Relationship between Fatigue Severity and Psychopathological Symptoms in Patients with Major Depressive Disorder
27. MATHIASSEN, B	IQ as a Moderator of Outcome in Severity of Children's Mental Health Status
28. MEIRELLES, ED	The Changing Inside the Brain: The Glial Hypothesis for the Cognitive (Dys)Functions
29. PANTZAR, A	The APOE e4 Allele Does Not Further Exacerbate Cognitive Deficits in Depression
30. PARK, S	Depression, suicidal ideation, and Internet addiction in Korean adolescents
31. TIMPANO SPORTIELLO, MR	Executive functioning impairment in euthymic bipolar patients
32. WEIDER, S	Cognitive Profiles in Patients with Anorexia Nervosa and Bulimia Nervosa
	Psychopathology/Neuropsychiatry (Schizophrenia)
33. FERNANDEZ-GONZALO, S	Influence of the Neuropsychological Functions in Theory of Mind in Schizophrenia: The False-Belief/Deception Paradigm
34. FERREIRA, D	A qualitative analysis of verbal fluency impairment in schizophrenia
35. HELLE, S	Neuropsychological functions recover from acute phase to three months-follow up in patients with non-affective psychotic disorders
36. JOHANSEN, R	General Intelligence and Clinical Symptoms in Early Schizophrenia Spectrum Disorders – Association with Service Engagement
37. KIM, M	Neuropsychological correlates of P300 abnormalities in college students with schizotypal traits
38. TSOTSI, S	Attention processes related to facial emotion recognition in schizophrenia
39. TURON, M	Cognitive biases, Theory of Mind and neuropsychological measures related to positive symptoms in schizophrenia: a multivariate approach

1:15–2:30 PM **Invited Address: Developmental Social Neurosciences: Contributions to Clinical Practice**
Speaker: Vicki Anderson
Scandinavia

1. ANDERSON, V	Developmental Social Neurosciences: Contributions to Clinical Practice

1:45–3:15 PM **Symposium: Cognitive Behavioral Therapy for Depression Following Traumatic Brain Injury: A Randomized Controlled Trial**
Chair: Theodore Tsaousides
Telemark

1. TSAOUSIDES, T	Cognitive Behavioral Therapy for Depression Following Traumatic Brain Injury: A Randomized Controlled Trial
2. TSAOUSIDES, T	Treatment for Depression Following Traumatic Brain Injury
3. ASHMAN, T	Cognitive Behavioral Therapy for Depression Following Traumatic Brain Injury: Findings of a Randomized Controlled Trial
4. D'ANTONIO, E	A comparison of treatment responses to two psychotherapeutic treatment modalities targeting depression following traumatic brain injury

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2:00–3:30 PM **Poster Session 7: Cognitive Intervention/Rehabilitation, TBI, Epilepsy/Seizures, Forensic Neuropsychology**
Norgessuitene

Cognitive Intervention/Rehabilitation

1. HEUTINK, J — Spontaneous Recovery and Treatment Effects in Patients with Homonymous Visual Field Defects: A Meta-Analysis of Existing Literature in Terms of the ICF framework
2. KALLIO, E — Neuropsychological Interventions after Stroke - Timing Is Essential
3. KØHN, K — Improved Psychological Functioning Following Group-based Rehabilitation in a Sample of Chronic Acquired Brain Injury Patients
4. LESNIAK, M — Anodal Transcranial Direct Current Stimulation Does Not Improve Cognitive Functions in TBI Patients After Three-Week Therapy
5. MATHIEU, A — Stimulation Seeking according to Personality Traits in Video Games
6. MAURER-KARATTUP, PT — The Changing Brain - Neuropsychological Long-Term Outcome In Patients With Disorders Of Consciousness (DOCs)
7. PALSSON, S — Effects of Six-Weeks Computerized Cognitive Training in People with Multiple Sclerosis
8. POLANOWSKA, K — Anodal transcranial Direct Current Stimulation Can Enhance Verbal Repetition in Aphasic Patients with Subacute Stroke
9. ROIG-ROVIRA, T — Same Cognitive Impairment, Similar Rehabilitation Program, Different Outcomes
10. SALO, AM — Neuropsychological interventions support successful vocational reintegration
11. SAUNES, BK — Does computerized working memory training for children with ADHD work?
12. SCHIØRBECK, H — The Effect of Intervention Based on Doman Programs and on Ordinary Habilitation
13. SKEIDE, SM — Meditation and Neuroplasticity
14. STIGSDOTTER NEELY, A — Long-Term Effects after Working Memory Training in Young Adults
15. UIMONEN, J — Referral to Neuropsychological Rehabilitation – A Follow-up Study of Working Aged Stroke Patients
16. VOITA, D — Biofeedback method for possible correction of learning and reading disorders for children with decreased stress tolerance
17. WATANABE, S — Playing Catch Rehabilitates Constructional Apraxia
18. WILKINSON, D — Can Repeated Sessions of Galvanic Vestibular Stimulation Induce Lasting Recovery From Hemi-spatial Neglect?

TBI (Adult)

19. DOUGLAS, J — Social Communication Outcome Following Severe Traumatic Brain Injury: Comparing the Perspectives of Injured Adults and their Relatives at Different Stages of Recovery
20. EDGINTON, TL — Assessing and responding to the cognitive and psychosocial sequelae of Traumatic Brain Injury in a multi-disciplinary neurotrauma out-patient clinic
21. FEDIO, AA — Self-concept as a Motivator for Seeking Treatment following Traumatic Brain Injury: Patient and Family Contributions
22. FINNANGER, T — Association Between Global Outcome, Measures of Injury Severity and Concurrent Neuropsychological Function 12 Months After Traumatic Brain Injury
23. JOHANSSON, B — Mindfulness-Based Stress Reduction (MBSR) and an Advanced Program - a Promising Treatment for Long-Term Mental Fatigue After Traumatic Brain Injury or Stroke
24. JOHANSSON, B — The Monoaminergic Stabilizer OSU6162 Alleviates Long-Term Mental Fatigue and Associated Symptoms After Traumatic Brain Injury or Stroke
25. MATHIAS, JL — Prevalence of Sleep Disturbances, Disorders and Problems in Adults after a Traumatic Brain Injury, Compared to the General Population: A Meta-analysis
26. PADGETT, C — The Role of APOE Genotype in Recovery Following TBI: Is the e4 Allele Associated with Poorer Outcome?
27. SPITZ, G — The Association Between Cognitive Performance and Functional Outcome Following Traumatic Brain Injury: A Longitudinal Multilevel Examination
28. VALLS, C — Life-log technology increases effectiveness of executive training after brain injury
29. YANG, M — Effect of Theory of Mind on Social Interaction in Patients with Traumatic Brain Injury

TBI (Child)

30. CROWE, L — Comparing 3-year and 5-year IQ Outcomes After Early Traumatic Brain Injury
31. SERRA-GRABULOSA, J — Long-term White and Gray Matter Damage in Early Traumatic Brain Injury

Epilepsy/Seizures

32. BURKE, T — Cognitive Functioning in Individuals with Mesial Temporal Lobe Epilepsy with Hippocampal Sclerosis (MTLE+HS) Relative to Unaffected Same-Sex Siblings
33. RANTANEN, K — Neurocognitive Functions of Children with Early-onset Epilepsy – a Five-year Follow-up Study
34. TAVAKOLI, M — Neuropsychological assessment in patients with intractable temporal lobe epilepsy
35. VERCHE, E — Is there a Behavioral Profile in Children and Adolescents with Frontal Lobe Epilepsy? Evidences of Variability Assessing Behavior Problems
36. VERCHE, E — Assessment Of Executive Functions In Adults With Temporal Lobe Epilepsy Through Use Of CANTAB

2:30–3:30 PM **Invited Address: Fatigue and Sleep Disturbance following Traumatic Brain Injury- Creating an Evidence Base for the Development of Efficacious Treatments**
Speaker: Jennie Ponsford
Scandinavia

1. PONSFORD, J — Fatigue and Sleep Disturbance following Traumatic Brain Injury- Creating an Evidence Base for the Development of Efficacious Treatments

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3:30–6:00 PM **Student Workshop: Functional Neuroanatomy and Neuroimaging of Memory: A Primer**
Co-Presenters: Erin Bigler, Russell Bauer
Telemark

4:00–5:00 PM **Invited Address: Cognitive Enhancing Drugs: Prospects and Problems**
Speaker: Trevor Robbins
Scandinavia

1. ROBBINS, TW — Cognitive Enhancing Drugs: Prospects and Problems

5:00–6:00 PM **Norwegian Neuropsychological Society Annual Business Meeting**
Scandinavia

7:00–11:00 PM **Oslo Fjord Tour**
Leaves from Rådhusbrygge 3

SATURDAY, JUNE 30, 2012

9:30–11:00 AM **Symposium: Mechanisms of Psychological Adjustment to Acquired Brain Injury**
Chair: Jennie Ponsford
Discussant: James F. Malec
Telemark

1. SCHÖNBERGER, M — Mechanisms of Psychological Adjustment to Acquired Brain Injury
2. SCHÖNBERGER, M — Development and Correlates of Psychological Adjustment and Emotional Distress Following Traumatic Brain Injury
3. COETZER, R — Is the phenomenological experience of loss associated with anxiety and depression after Traumatic Brain Injury?
4. LONGWORTH, CE — Are executive functioning and coping style after acquired brain injury associated with depression and fatigue?
5. GRACEY, F — Towards an evidence-based cognitive-behavioural model of adjustment following brain injury
6. KÜNEMUND, A — Posttraumatic growth following acquired brain injury

9:30–11:00 AM **Invited Symposium: Sex Differences in Brain Function**
Chair: Ira R. Hebold Haraldsen
Helsingfors

1. HEBOLD HARALDSEN, IR — Sex Differences in Brain Function
2. KREITSCHMANN-ANDERMAHR, I — Visualizing the effect of sex hormones in the brain
3. PAUS, T — Sex-hormone genes and connectivity in the adolescent brain
4. MUELLER, S — Influence of sex hormones on brain development: evidence from pediatric endocrinology
5. NURRUDIN, S — Peripubertal GnRH agonist treatment involved in sex differences of brain development during puberty

9:30–11:00 AM **Invited Symposium: Challenges in Characterizing and Diagnosing Children and Adolescents with ADHD**
Chair: Astri Lundervold
Oslo

1. LUNDERVOLD, A — Challenges in Characterizing and Diagnosing Children and Adolescents with ADHD
2. TANNOCK, R — Challenges in characterizing and diagnosing children and adolescents with ADHD: A DSM-5 update
3. LUNDERVOLD, A — ADHD in the context of the Bergen Child Study
4. SØRENSEN, L — The impact of response inhibition and anxiety on motivational control in children with ADHD

11:15 AM–12:15 PM **A Memorial Tribute to Hallgrim Kløve**
Chair: Knut Dalen
Speakers: Anne-Lise Christensen, Jarl Risberg, Ritva Laaksonen
Telemark

11:15 AM–12:45 PM **Invited Symposium: Cognitive Neuropsychology - State of the Art and Future Perspectives.**
Chair: Randi Starrfelt
Helsingfors

1. STARRFELT, R — Cognitive Neuropsychology - State of the Art and Future Perspectives
2. CRAWFORD, JR — Testing for Dissociations in the Single-Case: Problems and Solutions
3. STARRFELT, R — Looking Back over Your Shoulder: Re-evaluating Data from Cognitive Neuropsychology
4. STUSS, DT — Advances, Advantages, and Limitations of Small Group Studies
5. LAMBON RALPH, MA — Semantic Cognition: New Insights from Neuropsychology, Computational Modelling, and Neuroimaging

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11:15 AM–12:45 PM **Invited Symposium: Mechanisms of Emotion Regulation and Cognitive Control in Affective Disorders**
Co-Chairs: Nils I. Landrø, Stein Andersson
Oslo

1. LANDRØ, NI	Mechanisms of Emotion Regulation and Cognitive Control in Affective Disorders
2. HARMER, C	Early Treatment Effects on Emotion Regulation for Anxiety
3. FURMARK, T	Neural mechanisms of anxiety relief: Changes in brain activity and connectivity patterns in patients with social anxiety disorder treated with SSRIs or placebo
4. ANDERSSON, S	Impulsivity, cognitive control, and decision making in bipolar disorder and borderline personality disorders
5. HAALAND, VØ	Association between affective responding and working memory and executive functioning in patients with borderline personality disorder
6. JONASSEN, R	The Serotonin Transporter Polymorphism in Cognition: Intermediate Phenotypes associated with Emotion Regulation and Brain Function

1:00–2:30 PM **Students of INS Symposium: Acquired Brain Injury**
Co-Chairs: Ingrid Funderud, Knut Kristian Kolskår
Telemark

1. VAN DER STOEP, N	Exploring Space: Dissociations and Interactions Between Neglect in Near and Far Regions of Space
2. CHECHLACZ, M	Acute versus Chronic Prognosis of Allocentric versus Egocentric Neglect Symptoms Based on Clinical Scans
3. KAURANEN, T	Association of diabetes mellitus 2 with cognitive deficits and their persistence after stroke
4. DACOSTA, R	Whole Brain Resting-State Analysis in Patients with First Ever Stroke: A Functional MRI Study with Independent Component Analysis (ICA)
5. ANDÚJAR, MF	Thalamic Anisotropy Indices and Cognitive Function in Stroke Patients

1:30–2:30 PM **Invited Address: A Cognitive Neuropsychological Model of Antidepressant Drug Action**
Speaker: Catherine Harmer
Scandinavia

1. HARMER, C	A Cognitive Neuropsychological Model of Antidepressant Drug Action

2:45–3:45 PM **Invited Address: Can Working Memory Be Improved In ADHD?**
Speaker: Rosemary Tannock
Helsingfors

1. TANNOCK, R	Can Working Memory Be Improved In ADHD?

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Abstracts Presented
The 2012 International Neuropsychological Society Mid-Year Meeting/11th Nordic Meeting in Neuropsychology
June 27-30, 2012
Oslo, Norway

WEDNESDAY MORNING, JUNE 27, 2012

Invited Symposium:
Adult ADHD — a Multifaceted Approach to Assessment and Intervention

Co-Chairs: Liisa Klenberg, Laura Hokkanen

8:30–10:00 a.m.

L. HOKKANEN, M. LAASONEN, P. HELENIUS & J. WASSERSTEIN. Adult ADHD – a Multifaceted Approach to Assessment and Intervention.

Symposium Description: Attention deficit hyperactivity disorder (ADHD) is a developmental condition with first behavioral signs appearing in childhood and often continuing into adulthood. The problems of inattentiveness, over-activity and impulsivity are the defining features in current diagnostic manuals but a clear understanding of the core symptoms or their origin is still lacking. The symposium will include four talks that describe some of the current approaches to understanding and alleviating ADHD in adult life, combining research techniques and paradigms both from cognitive neuroscience and clinical neuropsychology.

First, Marja Laasonen from the University of Helsinki, Finland (contact marja.laasonen@helsinki.fi) will describe studies conducted within the project DyAdd, exploring the shared and differentiating characteristics between ADHD and normal subjects as well as ADHD and dyslexia. The presentation will concentrate on the cognitive level of analysis: visual attention, implicit learning, and classical conditioning.

Second, Päivi Helenius from Aalto University, Finland, (contact paivi@neuro.hut.fi) will share experiments testing the integrity of the ventral attention system in ADHD using combined magnetoencephalography (MEG) and event-related potential (ERP) measurements during a Go-NoGo task. The task performance itself did not differentiate the groups but the brain activation showed a defective pattern in ADHD.

Third, Jeanette Wasserstein from Mount Sinai Medical Center, New York, USA (contact jeanette.wasserstein@gmail.com) will discuss executive function measurement as well as treatment. Her first talk will offer a critical view on the current DSM criteria. The second talk will focus on results of a randomized controlled study on a Cognitive Behavioral/ Metacognitive Group Therapy program, showing a clear improvement especially in the executive functions.

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M. LAASONEN, J. KAUPPINEN, J. VÄRE, J. SALOMAA, S. LEPPÄMÄKI, P. TANI, H. HARNO, H. OKSANEN-HENNAH, E. POTHOS, A. CLEEREMANS, M. DYE, J. WIKGREN & L. HOKKANEN. Adult Dyslexia and ADHD in Finland – Project DyAdd.

Objective: In the project DyAdd, we have searched for the shared and differentiating characteristics of dyslexia and ADHD and how these relate to the difficulties defining dyslexia (phonological processing and achievement) and ADHD (attention and executive functions). The current presentation will concentrate on the cognitive level of analysis, that is, visual attention, implicit learning, and classical conditioning.

Participants and Methods: Altogether 119 18-55-year-old adults participated in the study. Visual attention was assessed with MOT, AB, and UFOV; implicit learning with SRTT and AGL; and classical eye-blink conditioning in delay and trace settings.

Results: First, the dyslexia group had difficulties in tasks of visual attention (AB, UFOV) and, in general, variation of visual attention had a role in phonological processing and reading ability (MOT, UFOV). Second, implicit learning difficulties in AGL associated with dyslexia, and possibly with ADHD. However, implicit learning was not related to the defining characteristics of dyslexia or ADHD. Instead, the resulting explicit knowledge in AGL associated with characteristics of dyslexia (phonological processing and reading). Third, the results of the classical conditioning experiment did not lend support to the cerebellar hypothesis of dyslexia. On the contrary, dyslexia in its pure form seemed to be related to a relative dysfunction of a larger network (trace setting). Further, larger responses in the ADHD group were suggested to result from their lowered responding threshold.

Conclusions: Dyslexia and ADHD shared impairment in implicit learning but we could not find characteristics that differentiated between the two groups. Only the dyslexia group was impaired in processing complex visual information, while those with ADHD were faster to respond. Phonological processing and reading ability were not related to the observed difficulties but, instead, correlated with the capacity and spatial distribution of visual attention and with the explicit knowledge for regularities.

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P. HELENIUS, M. LAASONEN, L. HOKKANEN, R. PAETAU & M. NIEMIVIRTA. Impaired Neural Activation of the Ventral Attentional Pathway in ADHD.

Objective: Focusing and reorienting attention recruits two anatomically and functionally segregated neural systems. Reorienting due to an unexpected but important event engages the ventral attention system. A positive event-related potential (ERP) component peaking 300-800 ms after stimulus onset (P3 or late positive component LPC) is modulated with respect to stimulus probability and is suggested to index the activation of the ventral attention network. Abnormal P3 responses have been reported in ADHD while the neural basis of this finding has remained unsettled.

Participants and Methods: In the current experiment, we explored the integrity of the ventral attention system in ADHD using combined magnetoencephalography (MEG) and ERP measurements. We followed the activation evoked by frequent Go and infrequent NoGo (17%) visual stimuli in 10 ADHD and 13 control adults.

Results: The behavioral task performance (speed/errors) during the MEG/EEG recording was not markedly deviant in adults with ADHD. In the ERP recordings, the infrequent NoGo pictures evoked a prominent positive deflection (LPC) in both subject groups. In ADHD participants the difference between the responses evoked by infrequent NoGo and frequent Go stimuli was significantly reduced compared to the control group during the LPC. The MEG signals revealed that the activation detected during the LPC was localized bilaterally in the posterior temporal cortex. Activation of the left and right temporal regions was enhanced after infrequent NoGo stimuli in both subject groups. In ADHD adults, however, the effect of stimulus frequency was less pronounced.

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Conclusions: We suggest that the activation in the superior temporal cortices during the LPC reflects the action of the ventral attention network. The engagement of this stimulus-driven reorienting system was defective in ADHD despite their unimpaired overall task performance. Neurophysiological markers can potentially complement behavioral measures and enhance our understanding of the neural basis of attentional deficits.
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J. WASSERSTEIN, M.V. SOLANTO, D.J. MARKS & K. MITCHELL. Diagnosis of ADHD in Adults: Appropriate Symptom Threshold and the Role of Executive Function Measurement.
Objective: ADHD is increasingly accepted as a neurodevelopmental syndrome often persisting into adulthood. Diagnostic standards are evolving as is understanding of appropriate neuropsychological assessments. This talk reviews dimensional data collected via a well-normed questionnaire to empirically identify appropriate symptom thresholds for adults. Executive function assessment is briefly considered.
Participants and Methods: Participants were 88 adults meeting current DSM-IV criteria for ADHD Combined or Primarily Inattentive subtypes, based on a structured DSM-IV diagnostic interview (CAADID). All completed the Conner's Adult ADHD Rating Scale (CAARS), a behavior rating scale which yields T-scores relative to the normal adult population. A T-score of at least 65 (+1.5 SD) was used to identify statistically elevated symptom severity (SSS). Given population parameters, only Hyperactive-Impulsive (HI) symptoms were analyzed. All participants were also given the Behavior Rating Inventory of Executive Function (BRIEF), providing T- scores.
Results: Forty-eight of 88 (55%) ADHD adults had a T-score of at least 65 on the CAARS DSM-IV HI scale. However, of these participants with SSS, only 25 (52%) met the current DSM-IV cutoff of 6 HI symptoms on the CAADID. Thus, roughly half reported significantly elevated HI complaints on the CAARS, but did not meet the current 6 symptoms DSM –IV cutoff on the CAADID. By contrast, an alternative cutoff of 4 HI symptoms on the CAADID captured 39 (81%) cases identified by the CAARS. Almost all of the participants had T-scores of at least 65 on the Metacognitive Index of the BRIEF.
Conclusions: As indexed via dimensional measures of ADHD and dysexecutive symptoms, the current DSM-IV mandate of 6 HI symptoms excludes a significant percentage of highly symptomatic adults. Dysexecutive behaviors, however, were almost universally reported. These data argue for further study regarding appropriate symptom thresholds and the role, and types, of executive function assessment in adult ADHD.
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J. WASSERSTEIN, M.V. SOLANTO & D.J. MARKS. Nonpharmacological Treatment of Executive Dysfunction in Adults with ADHD.
Objective: Executive dysfunction (EDF) can be especially disabling in adults with ADHD, leading to failure and frustration throughout life. Standard medication treatments help core inattentive and hyperactive/impulsive symptoms, but do little to ameliorate EDF. This talk briefly reviews emerging psychosocial treatments, but focuses on an evidence based approach developed at Mount Sinai Medical School in NYC.
Participants and Methods: Participants were 88 adults (mean age 42, mean education 16 years, mean IQ 117) meeting strict research criteria for ADHD. Both major ADHD subtypes were represented (1/3 Combined and 2/3 Inattentive), stratified vis-à-vis use of ADHD medications (roughly 50%), and then randomly assigned to treatment (T) or active control (AC) conditions. T consisted of a manualized Cognitive Behavioral/Metacognitive Group Therapy program, with sessions addressing targeted time-management and/or organization skills. AC consisted of weekly supportive group meeting, following specified guidelines. Therapeutic response (TR) was assessed via several pre and post-intervention measures: a blind evaluator using a structured interview (AISRS), as well as self-report and collateral informant ratings of DSM-IV inattentive symptoms (using standardized behavioral rating scales, i.e., CAARS).
Results: General linear modeling analysis was used to compare change from baseline between treatments. Statistically significant effects were seen on all three dependent measures. Dichotomous indices of TR indicated that a significantly greater proportion of the T vs AC groups improved. Logistic regression examining for group differences, controlling for baseline ADHD severity, revealed a robust effect of condition (odds ratio+5.41; 95%CI=1.77). Improvement was unrelated to medication status and most pronounced for the most impaired.
Conclusions: ADHD adults can benefit from treatments that are primarily psychological in nature, especially for EDF. Response may be independent of medication use and more robust for the more impaired.
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Paper Session: Cognitive Intervention/Rehabilitation

8:30–10:00 a.m.

P. COVRE, L. SIMONETTI, S. BOLOGNANI & O.A. BUENO. Reduction of Retroactive Interference may Improve Delayed Recall in Patients with Amnesia.
Objective: A few recent studies have suggested that the forgetting observed in amnesia can be partially explained by a high vulnerability to retroactive interference. In this work we investigated the ability of six patients with anterograde amnesia (due to head injury, stroke or encephalitis) to retain information presented only once when presentation was followed by a period with little or high interference.
Participants and Methods: Four 15-word lists were presented for each participant. All lists were to be recalled immediately and after a 6-minute delay. The retention interval before delayed recall was filled with a distracting activity for half of the trials (filled intervals – high interference) or unfilled (low interference) for the other half. On filled intervals, participants engaged in a visuospacial activity; on unfilled intervals, participants just sat down calmly in a quiet room.
Results: In both conditions, proportion recall was similar for immediate recall (unfilled = 28.3 + 6.2; filled = 27.2 + 9.3), but not for delayed recall (unfilled = 13.8 + 10.6; filled = 0.5 + 1.3). Despite the small sample size, retention of information (proportion of delayed recall divided by proportion of immediate recall) was significantly higher in the unfilled condition (unfilled = 0.50 + 0.39; filled = 0.01 + 0.03; t=3.03 p=0.03). It is important to notice that not all patients benefited from the noninterference condition: two patients retained less than 25% of the material on the unfilled condition. The other 4 patients, retained between 40% and 100% in the same condition. For filled intervals, 5 patients did not retain any of the material and the remaining patient retained 8%.
Conclusions: These preliminary results have both theoretical and clinical implications. The fact that some amnesic patients are able to retain information for much longer than expected under certain conditions may lead to the proposal of new cognitive rehabilitation techniques.
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A.R. ADLAM, R. ROUS, A. KRASNY-PACINI, N. MADSEN SJÖ, M. CHEVIGNARD & J. LIMOND. Neurocognitive Interventions For Executive Function In Children Who Have Survived A Brain Injury.
Objective: Impairments in executive function (EF) are frequently reported following paediatric acquired brain injury (ABI). Despite this, the evidence-base for neurocognitive interventions targeting EF is limited. This study aims to evaluate the feasibility and efficacy of three interventions for EF in children with ABI.
Participants and Methods: Study 1 used a single-case series design with randomised alternating treatments. Seven adolescents (12-17 years) with ABI engaged in a content-free cue intervention (received 'STOP' text messages: Stop, Think, Organise, Plan) to facilitate prospective memory (PM). Study 2 used a single-case experimental design with multiple-baseline. Four children (9-14 years) with ABI completed 15-weeks of Goal Management Training (GMT). Study 3 used a between-groups design. Fifteen children (9-17 years) engaged in 20-weeks of attention and memory training (Amsterdam Memory and Attention Training for Children) with either telephone (n = 8) or face-to-face (n = 7) support.

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Results: All interventions demonstrated feasibility. In Study 1, performance on a PM task was significantly better on cued relative to uncued days for the group. At the individual level, significant effects of cueing was found for four of the seven cases, with five participants reporting gains in real-life PM (generalisation). In Study 2, participants improved on measures of EF, however, evidence for transfer of skills was limited. In Study 3, participants demonstrated improvements on measures of EF, self-concept, and mood following training; and face-to-face training resulted in greater generalisation at home.
Conclusions: EF interventions are feasible and can be effective for children who have survived an ABI, improving performance on EF tasks and generalising skills to everyday situations. Future research comparing the efficacy of different interventions, using a wider range of functional outcome measures (e.g., increased classroom engagement, improved social participation) and randomised controlled designs, is recommended.
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J. STUBBERUD, D. LANGENBAHN, B. LEVINE, J. STANGHELLE & A. SCHANKE. Goal Management Training of Executive Functions in Patients with Spina Bifida.
Objective: Executive dysfunction is characterized by problems with higher order control of cognition, emotion and behaviour, and cause significant real-life disability for patients with Spina Bifida (SB). No research has been systematically directed towards amelioration of cognitive deficits amongst persons with SB. Goal Management Training (GMT) provides a structured approach aiming at improving executive functions and skills in order to achieve goals. GMT has received empirical support in studies of other patient groups. The objective of the present study was to determine the effectiveness of GMT in subjects with SB, hypothesizing that GMT would have beneficial effects for executive skills.
Participants and Methods: In this randomised controlled trial, 38 subjects with SB (58% female, mean age 32) were recruited from Sunnaas Rehabilitation Hospital. Inclusion was based upon the presence of executive functioning complaints. The subjects received 21 GMT sessions. Efficacy of GMT (n=24) was investigated as compared to a wait-list control condition (WL) (n=14). Measures administered at baseline, post-intervention, and at 6 months follow-up, included the Hotel test; desktop model of a real-life multitasking situation containing five subtasks.
Results: Data were analyzed using a 2 X 3 mixed-design ANOVA that treated Group (GMT, WL) as a between-subjects factor and Session (baseline, post-intervention, follow-up) as a within-subjects variable. Preliminary data showed significant GMT-related treatment effects on the Hotel test. There was a significant Group X Session interaction for total deviation time, $F\ (2, 34) = 9.04$, $p < .001$), $\eta p2 = .35$, due to a reduction in deviation from optimal time used on each subtask across sessions for the GMT group, $F\ (2, 34) = 12.58$, $p < .001$, $\eta p2 = .43$, but not the WL group.
Conclusions: The GMT group significantly improved their performance on a task that simulates real-life executive functioning. The findings give strong preliminary support to the efficacy of GMT for patients with SB.
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K. HERMANSEN GRUNEWALDT, J. SKRANES, A. BRUBAKK & G.C. LØHAUGEN. Computerized Working Memory Training in Very Low Birth Weight Children at Preschool Age.
Objective: Working memory (WM) is defined as the ability to retain and manipulate information online over short periods of time. Deficits in WM are frequently reported in preterm born children and are associated with cognitive, behavioural and academic problems. We wanted to evaluate if use of a software based computer program would improve different aspects of WM, learning/memory and behaviour in preterm born children at preschool age.
Participants and Methods: This prospective study included 20 preterm children, born at the St Olav University Hospital, Trondheim. Mean birth weight 1099g (SD 311), mean gestational age 28.8 weeks (SD 2,8). The children trained with CogmedJM for 10-15 minutes each day, 5 days a week for a 5-week period. The children were assessed before and 4 weeks after training. Effect on trained WM tasks were assessed by improvement measures included in the computer program. Non-trained WM and generalization effects were assessed by neuropsychological (NEPSY) tests. Parental questionnaires regarding ADHD symptoms were performed before and after completed training.
Results: The children improved significantly on trained WM tasks (Start index: mean 42.1; SD 6.3, max index 60,6; SD 5,7. p≤.01.). The group also improved on non-trained WM tasks and showed generalization effect on auditory attention (pre: 49.6, SD 28.8; post: 58.2, SD 30.4; p≤.01), phonological processing (pre: 9.3, SD 5.5; post: 12.6, SD 4.7; p≤.01), memory for faces (pre: 20.0, SD 6.2, post: 24.9, SD 5.7; p≤.01), narrative memory (pre: 12.9, SD 5.0, post: 17.5, SD 5.9; p≤.01) and sentence repetition (pre: 15.7, SD 4.3, post: 17.7, SD 4.1; p≤.01). A stepped wedge design showed that improvements in test results after training were not due to test-retest effects. There was a trend towards significantly reduced ADHD scores after training.
Conclusions: Computerized WM training in VLBW pre-schoolers have positive effects on trained and non-trained WM tasks and generalizing effects on auditory attention, phonological awareness, visual and verbal memory.
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C. HASLAM, C. BAZEN-PETERS & I. WRIGHT. Errorless Learning Enhances Memory in Children with Acquired Brain Injury.
Objective: The principle of errorless learning (EL) has proven efficacy in adults and older adults. Surprisingly few studies have investigated its efficacy in children, and the one comprehensive study investigating its potential concluded there was insufficient evidence to recommend its use. In this paper we report findings from a novel study investigating the effectiveness of EL in young people with acquired brain injury (ABI). Two versions of EL were compared—the established method in which the examiner provides responses during learning and a self-generation method in which learners produce their own responses.
Participants and Methods: 30 participants between the ages of 11-16 years took part in this study; 15 ABI and 15 controls. Participants were asked to learn different word lists under three conditions: standard EL, EL with self-generation, and trial-and-error. Memory for this information was tested after distraction and 20-minute delay.
Results: Controls performed significantly better than the ABI group ($F(1,28)=7.33$, $p=.01$), but equally in the three conditions. There was a significant group by learning condition interaction ($F(2,27)=4.64$ $p=.02$), which, when broken down, showed that memory performance in the ABI group was better under both errorless conditions relative to trial-and-error ($p<.001$ in both cases), with no difference between the examiner- and self-generation conditions.
Conclusions: In contrast to previous findings, the present results suggest that EL is a useful principle to aid learning in young people with ABI. The failure to find improved learning under self-generation conditions was unexpected, in light of findings from the adult literature, and requires further investigation. Nevertheless, demonstrating the effectiveness of EL in enhancing memory performance is an important first step in acknowledging its potential for rehabilitation in young people.
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CE Workshop 1: Analysis of the Single Case in Clinical Practice: Quantitative Methods without Tears

Presenter: John Crawford

8:30–11:00 a.m.

J.R. CRAWFORD. Analysis of the single case in clinical practice: Quantitative methods without tears.
The workshop will provide a largely non-technical guide to recently developed quantitative methods for the analysis of the single case with

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an emphasis on methods that are directly relevant to practice in clinical neuropsychology. Topics covered will include (1) the use of regression equations in clinical neuropsychological assessment. There is a large reservoir of published data in neuropsychology that could be used to build regression equations, which in turn could then be applied to assessment of the single case (examples include inferring change from the discrepancy between a case's predicted score at retest given their score at first testing). To encourage the use of these data, the present author and colleagues have developed methods and accompanying computer programs that (a) take summary data from a sample as inputs, (b) then builds an equation, and (c) applies it to a case, and (d) provides inferential statistics to aid clinical interpretation of the results. Also covered will be (2) the multiple base rate problem in neuropsychology. Neuropsychologists use multiple tests and so, although a single test score considered in isolation may be unusually low (or a single difference between a pair of tests unusually large), it will not be unusual to exhibit at least one such low score (or large score difference) from among the large number of tests administered. One solution to this problem is to estimate base rates for multiple tests using Monte Carlo simulation. Programs that perform such analyses will be illustrated (these programs are either tailored for use with particular neuropsychological test batteries or are generic in that neuropsychologists can use the methods with tests of their own choosing). Also covered will be the advantages of using the humble percentile rank in neuropsychological assessment as a supplement to the use of derived scores (some problems with percentile ranks will also be addressed). The computer programs referred to above are freely available over the Internet at www.abdn.ac.uk/~psy086/dept/psychom.htm

Learning objectives:

1. build regression equations from summary data and apply these to the assessment of the individual case
2. develop an appreciation of the multiple base rate problem and be able to apply solutions to it (using tailored computer programs)
3. develop an appreciation of the pros and cons surrounding the use of percentile ranks in neuropsychological assessment
4. apply various generic and tailored computer programs to assist in the assessment of the individual case

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CE Workshop 2: Evidence-Based Neuropsychological Assessment

Presenter: Grant Iverson

8:30–11:00 a.m.

G.L. IVERSON. Evidence-Based Neuropsychological Assessment. The accurate identification and quantification of cognitive impairment is the sine qua non of clinical and forensic neuropsychological assessment. However, comprehensive, psychometrically-sophisticated guidelines for identifying and quantifying cognitive impairment, across a battery of tests, are not clearly outlined in the neuropsychological literature. The purpose of this workshop is to provide clinicians and researchers with psychometrically sophisticated information that is designed to improve their accuracy for identifying cognitive problems in daily practice. Current definitions of cognitive impairment will be reviewed. Classification systems for conceptualizing cognitive impairment will be described. Five fundamental psychometric principles for interpreting a battery of test scores will be illustrated using analyses of standardization samples from co-normed batteries of tests (i.e., WAIS-III/WMS-III, WAIS-IV/WMS-IV, E-HRNB, and NAB). These fundamental principles are as follows: (1) Low scores are relatively common across all test batteries; (2) Low scores depend on where you set your cutoff score; (3) Low scores vary by the number of tests administered; (4) Low scores vary by demographic characteristics of the examinee; and (5) Low scores vary by level of intelligence. Data from patients with brain tumors, multiple sclerosis, and traumatic brain injury will be presented. New empirically-based, psychometrically-derived criteria for identifying mild cognitive impairment will be presented.

Learning Objectives:

1. apply definitions and classification systems for cognitive impairment to clinical practice.
2. use analyses from co-normed batteries to inform clinical decisions relating to whether combinations of low scores reflect acquired cognitive impairment.
3. explain how using different cut-off scores, and combinations of low scores, can improve the accuracy of identifying cognitive impairment in people with below average or above average intelligence.
4. design a more sophisticated approach for identifying cognitive decline in high functioning adults and older adults.

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Invited Symposium: Neuropsychological Studies in Autism from Denmark and Norway. Understanding Emotion in Music and Language, Metamemory and Characteristics of Children with Early Symptoms.

Chair: Lennart Pedersen

10:30 a.m.–12:00 p.m.

L. PEDERSEN, N. STENBERG, M. ELMOSE & L. GEBAUER. Neuropsychological Studies in Autism from Denmark and Norway. Understanding Emotion in Music and Language, Metamemory and Characteristics of Children with Early Symptoms.

Symposium Description: Autism is characterized of a set of core behavioral symptoms that can be reliable diagnosed although the heterogeneity of the spectrum is significant with varying degrees of symptom severity, cognitive levels etc. The variation in treatment programs offered is to day huge and the efficiency of these is not well documented. To develop more efficient intervention programs we must know more of the developmental trajectories and neuropsychological features of ASD. The development from early childhood into adulthood is varying in a broad range of adaptive functioning as well as autistic symptomatology but the prognostic factors are not well understood. In this symposium we present a longitudinal study that explores the relationship between early symptoms of ASD and later cognitive and behavioural outcomes (IQ, language level and symptom severity). If clinical and neuropsychological features are different for children with and without early symptoms it can help us to better understand the variations in the developmental trajectories of ASD and develop more efficient intervention programs. The symposium also presents two studies in some of the core neuropsychological features of autism: problems in metamemory and recognition of emotions. It is well documented that individuals with autism have problems in understanding others mind but we do not know much of what they understand of their own mind. The first study looks into this issue by investigating judgments and certainty of these judgments in individuals with ASD. We also know that individuals with ASD show difficulties recognizing emotions. The second study looks into this issue by looking at the understanding of emotions in music and language. A deeper understanding of the features of metacognition and emotion recognition could lead to more efficient intervention method into what is considered as one of the most important areas of autism intervention, which are the social skills.

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L. GEBAUER. Understanding Emotions in Music and Language. **Objective:** People with autism spectrum disorders (ASD) show difficulties recognizing emotions in a range of social situations, here among facial expression and emotional language. In addition to this they also tend to show different brain activations in response to emotional stimuli. However, it is suggested that music may have a special access to emotions in people with ASD, and music might also be capable of activating emotion-related structures in the midbrain, comparable to what

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is seen in typically developing individuals. Since emotion expression in music and language shares many psychoacoustic features such as pitch, pitch variation and tempo, music may be an instrumental tool in learning about emotions in general and specifically how emotions are expressed in language.
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N. STENBERG. Symptoms at 18 months and Autism Spectrum Disorder. A population based longitudinal study.
Objective: The aim of the current study is to investigate symptoms of Autism Spectrum Disorders (ASD) reported by parents at 18 months in children who were later diagnosed with ASD. We use data from the Norwegian Mother and Child Cohort (MoBa) and Autism Birth Cohort Study (ABC-study). MoBa is a large population based longitudinal study, and the ABC-study is a nested case-cohort in MoBa. Previous research suggests that symptoms of ASD can be detected between the age of 1 and 2. We compare data from a clinical assessment at age 3 years or older to questionnaire data from MoBa at 18 months. We compare children with ASD with and without early symptoms reported by parents on measures of IQ, language and symptom severity at the time of clinical assessment.
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M. ELMOSE. Being aware of own performance: Metamemory in autism spectrum disorder.
Objective: Do people with autism spectrum disorders (ASD) know their own minds? This provocative question follows from a well-established cognitive account of these neurodevelopmental disorders, the idea that people with ASD have impaired 'theory of mind'. Initially, most research has focused on the ability to understand other minds but recently the interest in how persons with ASD understand their own mind has increased both empirically and theoretically. 'Insight' is an important phenomenon for understanding aspects of learning and development and thereby planning effective interventions.
One part of knowing one's own mind is knowing about one's own performance. So far no studies have looked at the judgments of performance or the certainty of these judgments in children with ASD. A study investigating judgments and certainty of these judgments are presented.
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Paper Session: Aging

10:30 a.m.–12:00 p.m.

M.A. ALBRECHT, K. ELLIS, D. AMES, C. MASTERS, G. SAVAGE & J.K. FOSTER. Role of the ε4 Polymorphism of the APOE Gene in Cognitive Aging: A Statistical Mediation Analysis.
Objective: The relationship between aging, dementia, cognitive functioning and the possession of the ε4 polymorphism of the APOE gene has been controversial in the neuropsychological literature to date. Specifically, because possession of the ε4 allele confers an increased risk of the diagnosis of dementia, it has proven problematic in older individuals to dissociate the influence of ε4 on cognitive capacity as distinct from its influence on clinical diagnostic status.
Participants and Methods: In this paper, we report a statistical approach which attempts to partial out the influence of diagnostic group membership (Alzheimer's disease [AD], Mild Cognitive Impairment [MCI], Healthy Aging [HA]) from the influence of ε4 genetic status on cognitive functioning. Neuropsychological testing was administered across a range of cognitive domains to members of the AIBL cohort (n = 1083).
Results: The presence of one or two ε4 alleles increased the risk of membership of the MCI or AD category (odds ratios: ε4 heterozygotes = 3.25, 95% CI 2.44-4.34, ε4 homozygotes = 8.40, 95% CI 5.12-13.80), replicating previous findings. Furthermore, the ε4 allele was associated with reductions in cognitive performance across all of the neuropsychological domains examined, namely: verbal and non-verbal episodic learning and memory, working memory, attention/concentration, visuospatial capacity and language ($p < 0.018$ to $p < 0.0001$). However, mediation analysis indicated that the relationship between possession of the ε4 allele and neuropsychological performance in the AIBL cohort was subserved, almost entirely, by the ε4 allele conferring an increased risk of categorisation into the MCI or AD groups (with concomitant cognitive impairment).
Conclusions: The findings indicate that the influence of the 'at risk' ε4 APOE polymorphism on cognitive aging is conferred by increased risk of clinical diagnosis, suggesting that the impact of ε4 on age-related cognitive capacity should be interpreted only with respect to its overall pathophysiological context.
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P.E. SPAAN. A Verbal Description Variant of the Boston Naming Test: Improved Detection of Word Finding Difficulties in Normal Aging.
Objective: Word finding complaints are highly common in normal aging and early Alzheimer's disease (AD). The Boston Naming Test (BNT) is by far most often used in clinical practice to investigate these complaints. However, Hamberger and Seidel (2003) hypothesized that naming in response to verbal definitions of words is more representative of word finding complaints in auditory based discourse in daily life than visual object naming (as in the BNT). Thus, a verbal naming test may be more sensitive to word finding difficulties in early AD than a visual naming test. However, we found the opposite pattern in a previous study: 80 early AD patients were better differentiated from non-demented matched controls by a visual naming test consisting of BNT items than by a verbal naming test using Hamberger and Seidel's items. This may be explained by the higher level of difficulty of the BNT stimuli. We therefore re-investigated whether verbal naming is more difficult than visual naming when tests consist of identical items.
Participants and Methods: In order to systematically compare performance on a visual and a verbal naming test, we constructed verbal descriptions of the BNT items. To control for practice and sequence effects, the resulting visual and verbal naming tests were both split in two halves. These four naming subtests were administered according to an ABBA design to 20 non-demented participants of 58-87 years old. In 20 age-, education-, and gender-matched controls, the order of naming subtests was reversed.
Results: GLM ANOVA showed a main effect for type of test: verbal naming performance was significantly and consistently worse than visual naming performance ($p<.001$). This could not be explained by practice or sequence effects.
Conclusions: Naming to verbal definitions may be more representative of word finding ability than picture naming (e.g., BNT). The selection of items of lower lexical frequency seems crucial to increase test sensitivity. This may also improve the assessment of semantic memory problems in early AD.
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L.J. HOGSTROM, L. WESTLYE, K. WALHOVD & A. FJELL. Age-Related Changes in Cortical Surface Area and Gyrification across the Adult Life-Span.
Objective: Between birth and early adulthood the human brain is known to expand by approximately 2-4 times its initial surface area. The total cortical surface area in older adults is also known to undergo age-related changes, but the regional distribution of these changes is poorly defined. The current study explores the age-related changes in cortical surface area that occur throughout the adult lifespan. Here we compare regional surface area to other morphometric traits including cortical thickness and gyrification.
Participants and Methods: Cortical surface models were constructed from the MRI scans of 322 subjects using FreeSurfer. The research was approved by the Regional Ethical Committee of South Norway and all participants gave written informed consent. Subjects were healthy right-handed, native Norwegian speakers and were age 20-85 years (mean age 51.3 years, 43% female). Point-by-point maps of areal expansion/compression were completed for each subject by recording the local distortions needed to fit a subject's brain to a standardized atlas.

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Results: Brain imaging data were analyzed with a series of general linear models (GLMs). After adjusting for total WM volume, age-related surface area compression was identified as strongest in the temporal lobe, dorsal medial prefrontal cortex (DMPFC), and lateral orbitofrontal lobe. Results from per-vertex regression models showed a positive relationship between cortical surface area and gyrification as well as a negative relationship between cortical thickness and gyrification complexity.
Conclusions: These findings document regional age-related differences in cortical surface area. Gyrification and cortical arealization patterns in our sample suggest that some brain regions are differentially affected by developmental processes such as neurodegeneration and experience-related reshapening during the course of aging. The results highlight the use of cortical surface area and gyrification as potential biomarkers to study healthy aging and dementia.
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E. LITERAKOVA, H. MARKOVA, K. SIFFELOVA, T. NIKOLAI, M. VYHNALEK & J. HORT. Clock Drawing Test as a Diagnostic Tool for Distinction between Patients with Alzheimer's Disease, Amnestic Mild Cognitive Impairment and Healthy Elderly: A Comparison of Three Scoring Systems.
Objective: Early diagnosis of cognitive impairment in elderly is crucial for efficient treatment and Clock drawing test (CDT) with different approaches to its evaluation is broadly used as a screening tool. The aim of the study is to examine the reliability and discriminative power of three scoring systems of CDT in healthy aging and early stage of cognitive impairment.
Participants and Methods: Thirty–five patients with probable mild Alzheimer's disease (AD), 48 with amnestic mild cognitive impairment (aMCI) and 26 healthy elderly (HE) have undergone CDT with a pre–drawn clock face, which were scored with 3 different scoring systems (Babins et.al., 2008, 18–points; Cohen, 2000, 18–points; Shulman, 2000, 5–points) by three blind independent raters.
Results: The interrater reliability was high (.91, .89 and .80, ** = $p < .001$) for the Babins et al, Cohen and Shulman scoring systems, respectively. Intercorrelations among the systems were high ($r = .84 – .87$, ** = $p < .001$). Logistic regression indicated Babins et al. system being superior in distinguishing between patients with AD and aMCI, explaining 19% of the variance (odds ratio = 1.28, $p = .001$, 95% CI [1.10, 1.50]) and Cohen system in distinguishing between patients with aMCI and HE, explaining 19% of the variance (odds ratio = 1.53, $p = .004$, 95% CI [1.14, 2.05]). Neither age nor gender proved significant in these analyses. Sensitivities and especially the specificities were relatively low in distinction between patients with aMCI and HE for Babins et al. and Shulman systems (86 and 33 %, 81 and 56 %), higher for the Cohen system (85 and 64 %). The estimated area under receiver operating curve was highest for the Cohen scoring system, .71.
Conclusions: The three scoring systems are closely correlated. Cohen system of scoring CDT seems to be the most effective for early and accurate diagnosis of aMCI in elderly.
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I. BOMBIN, E.M. VEGA-GONZALEZ, A. CIFUENTES, A. CARACUEL, S. SANTIAGO-RAMAJO & J. BOBES. Compensation and Substitution are more Effective than Restitution in Improving Functional Independence and Memory in Amnestic MCI elderly subjects.
Objective: Recent studies have reported significant functional impairments in MCI elderly subjects, especially in WHO ICF Activity and Participation dimensions (higher order ADL). We aimed to test the ability of two neuropsychological rehabilitation approaches to improve cognitive functioning and functional independence in a sample of amnestic MCI who showed impaired functioning in comparison to age-matched healthy subjects.
Participants and Methods: We conducted a double-blind randomized clinical trial (RCT), with a 12-month follow-up and two treatment arms: Restitution (R) and Compensation and Substitution (S+C). Our a priori hypothesis was that C+S would be more effective than R in improving independent functioning. Outcome measures included comprehensive measures of attention, working memory, memory, and executive functions; functional independence (WHO-DAS II; CHART), quality of life (Q-LES-Q), subjective memory complaints (MFE), and anxiety/depression symptoms (GDS).
Results: Both treatment groups showed no significant differences at baseline. After 12-month follow-up, R-group (n=33) improved only in working memory ($p=0.0018$; effect size Cohen's $d= 0.43$); whereas de S+C group (n=32) improved in objective (HVLT; $p=0.022$; effect size Cohen's $d= 0.46$) and subjective (MFE; $p=0.002$; Cohen's $d= 0.59$) memory measures, as well as in functional independence as measured with the CHART ($p=0.048$; Cohen's $d= 0.43$), specially in the Occupational domain ($p=0.013$; Cohen's $d= 0.58$).
Conclusions: To our knowledge, this is the first study reporting Class I evidence (RCT) supporting the ability of neuropsychological rehabilitation to improve functional independence in MCI. Moreover, effect size of functional improvement was medium, but only when compensation, substitution and metacognition techniques were combined. Evidence of higher efficacy of these approaches over restitution on cognitive functioning has been already reported (Jean et al, 2010; Stott & Spector, 2011).
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CE Workshop 3: Unawareness of Deficit Following Various Brain Disorders: Implications for Assessment and Rehabilitation

Presenter: George Prigatano

11:30 a.m.–2:00 p.m.

G. PRIGATANO. Unawareness of Deficit Following Various Brain Disorders: Implications for Assessment and Rehabilitation.
Patients with various brain disorders have reduced self-awareness of residual neurological and neuropsychological impairments that can negatively impact their care (e.g., patients with severe traumatic brain injury, patients with large CVAs, patients with Huntington's disease, Parkinson's disease, frontotemporal dementia, and dementia of the Alzheimer's type). Understanding how these various neurological conditions may impact self-awareness has important theoretical, clinical, and research implications. This workshop will review our present understanding of impaired self-awareness (ISA), anosognosia, and related disturbances of phenomenological experience in various patient groups. It will review methods for assessing ISA and anosognosia in different clinical conditions, and how that information may be used for patient diagnosis, management, and rehabilitation. Suggestions also will be made regarding how to talk to patients that have ISA and possibly denial of disability (DD) in order to obtain maximum patient compliance when reviewing neuropsychological test findings or engaging the patient in the rehabilitation process.
Learning Objectives:
1. Describe various forms of impaired self-awareness (ISA) and anosognosia following severe traumatic brain injury (TBI), unilateral cerebrovascular accidents, and dementia of the Alzheimer's type.
2. Create an approach to neuropsychological assessment that includes interview techniques and psychometric measures that help separate denial of disability (DD) from impaired self-awareness (ISA) in persons who have a history of severe TBI.
3. Describe the impact of ISA and early anosognosia for hemiplegia on the process and outcome of neurorehabilitation for these patient groups.
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CE Workshop 4: BRIEF as a Diagnostic and Intervention Instrument in Clinical Neuropsychology

Presenter: Gerard Gioia

11:30 a.m.–2:00 p.m.

G. GIOIA. BRIEF as a Diagnostic and Intervention Instrument in Clinical Neuropsychology.
This workshop focuses on a model of executive function that emphasizes real-world application in neuropsychological assessment and intervention. Executive function is unique among neuropsychological constructs in its focus on the overarching execution and regulation of cognitive and behavioral action. Executive dysfunction manifests in unique ways that are frequently context dependent, presenting a challenge for clinical assessment and treatment. These complex and dynamic control processes are often less amenable to measurement with narrowband, static tools that are removed from context. It is important to consider assessments that capture the individual's everyday functioning and interventions that address executive dysfunction in the context of real-world demands. This workshop reviews the development and application of the Behavior Rating Inventory of Executive Function (BRIEF) as an assessment methodology that taps into the everyday, real-world domains of executive functions, defining the individual's profile of strengths and weaknesses. The BRIEF's demonstrated sensitivity to deficits in numerous clinical groups with developmental and acquired neurological deficits will be reviewed. While the past decade has seen an explosion of interest in assessing executive functions, more recent attention has been directed to developing interventions for executive deficits. In developing context-sensitive, collaborative, real-world intervention programs, identifying the key executive control behavioral strengths and challenges in the home and school contexts and measuring changes through intervention are essential. Viewing assessment as an ongoing part of intervention will be discussed - first targeting key executive function domains to be treated, and then serving to monitor the progress of intervention programming. Illustrative case examples will be provided.
Learning Objectives:
1. Identify the various types of executive function profiles manifested in different clinical groups.
2. Describe the varying methods of assessing the executive functions, including their strengths and weaknesses
3. Describe an approach to executive function intervention, using the BRIEF as a progress/ recovery monitoring tool in treatment.
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WEDNESDAY AFTERNOON, JUNE 27, 2012

Paper Session: Psychopathology/Neuropsychiatry

12:30–2:00 p.m.

O. REINVALL, A.L. MOISIO, A. VOUTILAINEN, T. KUJALA & M. KORKMAN. Psychiatric Symptoms in Children and Adolescents with Autism Spectrum Disorders (ASD).
Objective: To investigate psychiatric symptoms in higher functioning children and adolescents with autism spectrum disorders (ASD).
Participants and Methods: Sixty children and adolescents aged 6–16 years who had been diagnosed with ASD participated in the study and underwent further assessments. Cognitive capacity was evaluated with eight subtests of the Wechsler Intelligence Scales third edition (WISC-III). The ASD diagnoses were confirmed using the Autism Diagnostic Interview Revised (ADI-R). Psychiatric symptoms were assessed by interviewing parents with the Developmental and Well-Being Assessment (DAWBA). Diagnoses according to DSM-IV were assigned by an experienced child psychiatrist on the basis of the DAWBA results.
Results: Forty-one children and adolescents with ASD (68%) had additional psychiatric diagnoses.
Anxiety disorders (33%), attention deficit and other disruptive behaviour disorders (31%) and tic-disorders (18%) were the most common co-morbid diagnoses. Specific phobia (20%) and generalized anxiety disorder (10%) were the most frequent anxiety disorders. Attention deficit hyperactivity disorder (ADHD) combined subtype (10%), ADHD inattentive subtype (8%) and oppositional defiant disorder (8%) were the most common disorders among attention deficit and other disruptive behaviour disorders. Tic disorders not otherwise specified (10%) and Tourette's disorder (5%) were the most frequent tic disorders.
Conclusions: The results indicate that parents commonly report symptoms of additional psychiatric disorders in higher functioning children and adolescents with ASD. Particularly symptoms of anxiety, attention deficit and other disruptive behaviour and tic disorders were frequent.
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H.E. BARDER, K. SUNDET, U. HAAR, I. JOA, J. JOHANNESSEN, T. LARSEN, I. MELLE, S. OPJORDSMOEN, J. RØSSBERG, B.R. RUND, E. SIMONSEN, P. VAGLUM, T. MCGLASHAN & S. FRIIS. Neurocognitive Development In First Episode Psychosis 5 year Follow-Up; How Do Relapses Affect The Course?
Objective: Cognitive deficits are a core feature of psychotic illness. Still, the longitudinal development of cognitive function is not yet fully understood. The present study aims to examine the longitudinal development of neurocognitive function in a five year follow-up of first-episode psychosis (FEP). We aim to identify how neurocognition is related to the presence of relapses. The study is an extension of previous findings from the TIPS project (Rund et al., 2007), reporting a stabilizing trend over the first two post-onset years
Participants and Methods: Sixty-four patients (52% male, age 28±9 years) with FEP were examined on a broad neuropsychological test battery at baseline, 1-, 2-, and 5 years follow-up. The 64 patients included in this study were representative of the total TIPS-sample of 301 patients. The test battery was divided into five neurocognitive indices; Verbal Learning, Executive Function, Impulsivity, Motor Speed, and Working Memory. The sample was split in two by total number of relapses (one episode only vs. two or more episodes) in order to investigate if relapses and neurocognition covary over time. Data were analyzed using repeated measures ANOVA
Results: No change was found for Executive Function and Verbal Learning over five years. Impulsivity improved significantly in the first two years, followed by a stabilizing trend over the next three years. Working Memory had a continuing improvement, whereas Motor Speed decreased significantly from two to five years.
Total number of relapses was significantly related to Verbal Learning and Working Memory, shown by a small decrease/ a weaker improvement in patients with more than one episode (ie 2-6 episodes)
Conclusions: The results revealed an overall stabilizing trend, possibly taking place in somewhat different pace over the five years. Further, a significant relation to relapses was found. Extended follow-ups are needed to conclude on the long term relation between psychosis and neurocognition, and on the direction of this relationship
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A. LIN, A.R. YUNG, B. NELSON, W.J. BREWER, C. PANTELIS & S.J. WOOD. Neurocognitive Markers of Psychosis Onset and Functional Outcome 2 to 14 years After Identification as Ultra-high Risk for Psychosis.
Objective: By combining known state and trait risk factors for psychotic illness, researchers have defined a group of young people thought to be at ultra-high risk (UHR) for the onset of psychosis. Neurocognitive performance has been investigated as a potential marker of transition to psychosis. That is, poor performance in specific domains may

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help accurately detect which of the individuals meeting these criteria will actually develop frank psychotic illness. In this longitudinal study, we investigated neurocognitive markers of transition to psychosis and poor functional outcome in an Australian cohort identified as UHR 2-14 years prior.
Participants and Methods: Baseline neurocognitive data was collected from 346 participants identified as UHR from 1993-2006. At follow-up, psychopathology and functional outcome data was collected.
Results: Transition to psychosis was associated with poorer performance on tasks requiring the ability to process and manipulate visual stimuli, and those of attention and psychomotor speed. Within the group that transitioned, better psychomotor speed was associated with more rapid transition to psychosis. Neurocognitive performance was not related to current psychiatric symptoms.
The best predictor of poor functional outcome was poorer baseline performance on a verbal memory task. This was a better predictor than baseline symptom scores. A Verbal Memory Index score ≤ 85 at baseline was associated with an eight-fold increase in the likelihood of poor functioning at follow-up. Less than two thirds of participants with the worst functional outcome had transitioned to psychosis.
Conclusions: In this UHR cohort, the onset of frank psychosis was not synonymous with poor functional outcome, and the neurocognitive predictors of each differed considerably. The detection of individuals with poor functioning at follow-up, on a background of previously identified risk factors for psychotic disorder, may yield a valid group in which to study biomarkers and treatment of schizophrenia.
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J.M. LEGRIS, P. LINKS, R. VAN REEKUM & R. TANNOCK. Executive Function, Iowa Gambling Task Performance and Suicide Risk in Women with Borderline Personality Disorder.
Objective: 1) To compare associations of "cool " EF and "hot" Iowa Gambling Task Performance in women with BPD and healthy controls and 2) to explore the associations of hot and cool EF and suicide risk in women with Borderline Personality Disorder.
Participants and Methods: Forty two outpatient women with BPD were compared to 41 age related healthy female controls on their working memory (Digit Span), interference control (Stroop), motor inhibitory control (SSRT) and IQ (Raven's Matrices) performance. Clinical measures assessed current BPD status, depression, anxiety, attention/impulsivity and suicide risk (Suicide Behaviour Questionnaire - Revised; Osman, 1998). Experimental tasks preceded all behavioural measures and were administered individually in a single 4 hr session.
Results: Normal "cool " EF and IQ in BPD women did not explain their disadvantageous IGT decisions relative to controls (Cohen's d = 0.72), despite significant group differences in depression, anxiety, attention, impulsivity, education, psychotropics and prior substance abuse. Only IGT deficits distinguished BPD women from healthy controls. Contrary to expectations, IGT deficits did not predict any suicidal risk in women with BPD. Interference control was as sensitive to suicide risk as self reported depression in explaining 34% of the adjusted variance in overall suicide risk.
Conclusions: IGT performance appears separable from cool EF. While IGT decision making may be a marker for BPD, Stroop interference is more sensitive to suicide risk than IGT decision making and may represent a vulnerability for suicide that exists beyond diagnosis. IGT deficits may reflect the affective dysregulation of BPD that is resistent to remission, whereas suicide risk may be earlier to remit. Different neural regions and their connections subserving IGT decision and suicidal risk in BPD are implicated. These preliminary results may have implications for more targeted assessments and treatments of BPD.
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A.E. WHITTON, J.D. HENRY, J.R. GRISHAM & P.G. RENDELL. Pathological Disgust and the Basal Ganglia: An Examination of Disgust Responding in Obsessive-Compulsive Disorder.
Objective: Increasing emphasis has been placed on neuropsychological models of obsessive-compulsive disorder (OCD), in which the core behavioral manifestations are regarded as symptoms of underlying brain pathology. The basal ganglia are one of the key brain regions affected in OCD and neuroimaging studies point to the importance of the orbitofrontal basal ganglia thalamocortical circuit in the pathogenesis of obsessive-compulsive symptoms.
The basal ganglia have also been implicated in the processing of emotion, particularly disgust. Abnormalities in the recognition of facial expressions of disgust have been found in OCD, as well as Huntington's disease – a neuropsychiatric disorder with prominent basal ganglia dysfunction. Given the purposed role of the basal ganglia in disgust processing, it is unsurprising that a common symptom of OCD, contamination fear, is suggestive of abnormal disgust processing.
Previous studies have investigated contamination fear in OCD using behavioral tasks and self-report, revealing marked avoidance of disgusting stimuli, as well as a heightened subjective experience of disgust. However, no research to date has examined whether heightened disgust responding in this population also extends to psychophysiological disgust responses. Therefore, the current research aimed to investigate whether individuals with OCD display psychophysiological disgust responses that can be distinguished from those observed in the healthy population.
Participants and Methods: Individuals with OCD (n = 25) and healthy controls (n = 25) had their physiological responses monitored while engaging in a variety of tasks designed to elicit disgust. Facial affect was monitored using facial electromyography, while galvanic skin responses and heart rate variability were also assessed.
Results: Results reveal a unique profile of psychophysiological disgust responding in individuals with OCD compared to healthy controls.
Conclusions: This provides further evidence for the role of the basal ganglia in processing disgust.
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Paper Session: Assessment/Psychometrics/Methods

12:30–2:00 p.m.

R. DEBELAK, J. EGLE, M. SOMMER & C. KALLER. Psychometric properties of a computerized version of the Tower of London: Using item response theory to evaluate its dimensionality and construct validity.
Objective: The Tower of London task is commonly regarded as a standard measure for planning abilities in clinical settings. In classic versions of the Tower of London task processing-relevant structural problem parameters were not systematically varied, which complicated the evaluation of their construct validity. The "Tower of London - Freiburg Version (TOL-F)" has been constructed to overcome this limitation. The present study evaluated the dimensionality, measurement fairness and construct validity of this new version.
Participants and Methods: The TOL-F was administered to N=269 healthy subjects (48% male, 52% female; age mean=45.9, sd=18.4). Item response theory was used to evaluate the dimensionality, measurement fairness and to model the item difficulties in terms of processing-relevant structural problem parameters. A subset of the sample was also assessed with measures of working memory capacity (n-back tasks) and reasoning ability (SPM) to provide further evidence on the construct validity of TOL-F.
Results: The results revealed a satisfactory internal consistency and a good fit of the Rasch model. Furthermore, the item parameters generalized across gender and age hence corroborating the dimensionality and measurement fairness of the TOL-F. Item response theory modeling indicated that processing-relevant structural problem parameters (e.g. search depth, goal hierarchy and minimal number of moves to an optimal solution) significantly affect the item parameters. This finding is in line with previous studies on the impact of structural problem parameters on planning. Additional correlation analyses further confirmed the construct validity of the TOL-F.

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Conclusions: Taken together, our findings argue for the dimensionality, measurement fairness and construct validity of the TOL-F. Regarding an appropriate and psychometrically sound assessment of planning ability, the present approach highlights the importance of accounting for differences in task demands that are imposed by specific item characteristics.
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O. BOSNES & K. TROLAND. Are US Norms with the WMS-III and WAIS-III Feasible in Norway?
Objective: Evaluate if US norms with the WAIS-III/WMS-III may be used safely in Norway.
Participants and Methods: A sample of 122 healthy Norwegians(NO) aged 55 – 89 years (52.5 % female), recruited from the Nord-Trøndelag Health Study (HUNT3), completed the WAIS-III and the WMS-III. Mean age and education was 74.2 (SD=8.8) and 10.7 (SD=3.2) years respectively.
Results: Mean FSIQ and PIQ of the NO sample did not differ significantly from US means. Mean VIQ, however, was significantly below ($p<.001$) the US mean, mainly due to lower scores on working memory subtests. VCI of the NO sample did not deviate significantly from US mean, whereas mean POI was significantly above US norm ($p=.008$). WMI and PSI were significantly below the US means ($p<.001$). All effect sizes except WMI, which showed moderate size, were small.
Mean General Memory Index (GMI) of the NO sample was significantly above ($p = .008$) the US mean, while mean Immediate Memory Index (IMI) and Working Memory Index (WMI) did not differ from the US mean. All effect sizes were small.
Analyses of the WAIS-III –WMS-III correspondence, demonstrated that mean GMI score was significantly better than predicted from IQ ($p<.05$). For IMI and WMI there were no significant differences between observed and predicted scores. On the WM indices of WAIS-III and WMS-III, presumed to be interchangeable, subjects had far better scores on WMS-III, due mainly to the poorer-than-expected scores on the Digit span subtest, appearing only in WAIS-III.
Conclusions: The study indicates that US norms may be used in clinical practice in Norway. Care should be taken, however, evaluating delayed memory with the WMS-III and working memory with the WAIS-III.
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N. SATCHI. The Clinical Utility of The Behavior Rating Inventory of Executive Function- Adult Version (BRIEF-A) in patients with psychological disorders.
Objective: The aim of this study has been to investigate whether the adult version of the Behavior Rating Inventory of Executive Function (BRIEF-A) can be a useful clinical instrument for assessing executive function in patients with psychological disorders.
Participants and Methods: This was examined by investigating the relationship between two types of measures of executive functions; performance based neuropsychological test measures and self-report using the previously mentioned BRIEF-A. Additionally, measures of psychological symptoms and distress using the Symptom CheckList (SCL-90-R) and the Hospital Anxiety and Depression scale (HAD) were examined. Seventy-six adult patients from an outpatient psychiatric clinic were administered several neuropsychological tests covering different domains of cognitive functioning: processing speed, working memory, verbal and visual memory, verbal and performance IQ, and executive functions in addition the BRIEF-A, SCL-90-R and HAD questionnaires.
Results: No significant relationships were found between index scores on the BRIEF-A and the test performance on different cognitive domains. Furthermore, the results indicated few relationships between BRIEF-A and the clinical scales included in this study. Overall, the results indicate that BRIEF-A is measuring qualitatively different aspects of executive functions compared to the performance-based tests and clinical scales included in this study.
Conclusions: The BRIEF-A can be a useful tool for identifying executive dysfunctions experiences in everyday life situations in patients with psychological disorders which is currently not recognized by traditional neuropsychological methods. Results are discussed with respect to previous research of the BRIEF and existing literature of executive difficulties related to different psychological disorders
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R. SCHNABEL & R. KYDD. Neuropsychological Assessment of Distractibility in Mild Traumatic Brain Injury and Depression.
Objective: Traditional Neuropsychological Assessments are conducted exclusively in a quiet, distraction-free environment (Lezak, Howieson, & Loring, 2004); clients' abilities to operate under busy and distracting conditions remain untested. Environmental distractions, however, are typical for a multitude of real life situations and present a challenge to clients with frontal-temporal brain injury. In an effort to improve ecological validity, an extension of the traditional Neuropsychological Assessment was developed, comprising a standardised distraction-condition, which allows cognitive functions to be tested both in the traditional setting and, additionally, with exposure to a normative audio-visual distraction.
Participants and Methods: The present study (n=240) investigated performances of clients with mild Traumatic Brain Injury (mTBI) (n=80), Major Depression (MDE) (n=80), and a healthy control sample (n=80) on sub-tests of the Wechsler Batteries (WAIS-IV: DSF, DST, LNS; WMS-IV: LM-I) both in the standard and the distraction condition. Test effort was controlled.
Results: ANOVA and mixed model analysis documented significant deterioration of performance in the distraction setting for clients with mTBI . In contrast, the performance of a healthy control sample remained unchanged. Significant improvement of performance in the distraction setting was documented for clients with MDE. Contrary to their improved performance, depressed clients experienced the distraction setting as more distressing than the control and mTBI group.
Conclusions: A normative, replicable environmental distraction procedure is herewith available for clinical practice and further research, highlighting specific incapacities in mTBI populations and demonstrating value for differential diagnosis.
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M. HIETANEN, H. JOKINEN, R. YLIKOSKI, M. KASTE & T. ERKINJUNTTI. Cognitive Impairment is Highly Common after Stroke Despite "Good" Clinical Recovery.
Objective: The aim of our study was to 1) study the frequency and nature of cognitive dysfunctions in a large cohort of patients with ischemic stroke and 2) examine the cognitive outcome of a subgroup ot patients with good clinical recovery.
Participants and Methods: In Helsinki Stroke Aging (SAM) study, 409 consecutive patients aged 55-85 years (70.7+7.7, mean+SD) were evaluated with a comprehensive neuropsychological test battery three months after an ischemic stroke. The following cognitive domains were assessed: attention and executive functions, memory, visuoconstructive and spatial functions, abstract thinking, aphasia, neglect, agnosia, calculation, reading and writing. Abnormality in each domain was judged with the use of norms based on the healthy Finnish population.The modified Rankin Scale (mRS) was used to evaluate the degree of clinical disability and dependence in the daily activities.
Results: Only 70 patients (17.1%) of the total of 409 patients did not show deficits in any of the cognitive domains studied. Impairment in at least one cognitive domain was found in 339 patients (82.9%). The majority of patients had impairments in memory (59.9%), visuoconstructional and spatial abilities (54.7%) and executive functions and attention (48.9%). Patients with good clinical and functional recovery (mRS 1-2, N=255) frequently showed cognitive deficits, especially in memory (52.8%), visuoconstructional and spatial functions (41.6%), executive functions and attention (36%).
Conclusions: Cognitive impairment is highly commin after stroke, with memory and visuoconstructional and spatial dysfunctions being the most frequent. Patients with good clinical recovery still show considerable cognitive deficits referring to the importance of evaluating poststroke cognition, especially in relation to the management of rehabilitation and return to work.
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Invited Address: Brain Maps For Space

Speaker: Edvard Moser

3:00–3:45 p.m.

E. MOSER. Brain Maps For Space.
This talk will focus on the neural substrate of our 'sense' of space. I will show how the entorhinal cortex and hippocampus of the mammalian brain forms a continusously updated map of external space that includes both present and past information. Research from my lab has demonstrated that cells in the entorhinal cortex are part of a universally applicable map for space, consisting of multiple functionally specialized cell types entangled in a complex neural network. Particular attention will be given to the grid cell – a cell type that we discovered in entorhinal cortex in 2005. Grid cells fire selectively at regularly spaced positions in the environment such that, for each cell, activity is observed only when the animal is at places that together define a repeating triangular pattern tiling the entire environment covered by the animal, much like the holes of a Chinese checkerboard. The spatially periodic activity pattern provides the brain with a metric for distance as well as direction. I will show that grid cells co-localize with head-direction cells and border cells – cell types that signal directions and geometric boundaries, respectively – and that output from grid cells and border cells form the basis for more specific place signals downstream in the hippocampus. Collectively this network of specialized space cells generates a dynamically updated map of current location that may be used when we try to find our way from one place to the next.
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INS Presidential Address: Profiles Of Dementia: Neuropsychological, Neuroanatomical and Neuropathologic Phenotypes

President of The International Neuropsychological Society: Sandra Weintraub

4:00–5:00 p.m.

S. WEINTRAUB. Profiles Of Dementia: Neuropsychological, Neuroanatomical and Neuropathologic Phenotypes.
At the end of the 1970's, "neurodegenerative dementia" denoted generalized cognitive impairment and widespread neuronal dysfunction. This notion, however, was based on observations of late stage disease. Over the years, concepts have radically changed. The growing public health menace of Alzheimer's disease (AD) has led to increased awareness and early detection of illness. In early stages, AD and other neurodegenerative diseases are astonishingly focal, both in their distribution in the brain and in their initial clinical presentation. The location of the earliest pathologic lesions is determined not by vascular territories, as it is in stroke, but rather by neuroanatomical network connectivity patterns and, as yet undetermined, factors influencing regional neuronal vulnerability to disease. The earliest clinical neuropsychological profiles are similarly focal. The syndromes of Progressive Amnesia, Primary Progressive Aphasia, Progressive Visuospatial Dysfunction, and Progressive Comportmental/ Executive Dysfunction have been linked to early abnormalities in the large-scale neuroanatomical networks that support memory, language, visuospatial, and social/executive functions, respectively. Structural and functional neuroimaging has shown distinctive patterns associated with each profile according to established principles of brain-behavior relationships. Furthermore, although each of these profiles is associated with more than one neuropathologic diagnosis (e.g., Alzheimer's disease, cortical Lewy body disease, TDP-43 proteinopathy), each can predict the frequency with which a particular pathology will occur. This presentation reviews the neuropsychological features, neuroanatomical signatures, neuropathologic correlates, and genetic affiliations of these profiles and demonstrates how the neuropsychological profile approach to the classification of dementia has: 1) improved in vivo diagnosis of diseases for which there are currently no reliable biomarkers; 2) furthered our understanding of brain-behavior principles through a model of progressive, selective neuronal dissolution, and 3) promoted translation of clinical findings into practical education and management tailored to the individual patient's salient cognitive and behavioral deficits.
Learning Objectives:
1. Describe four clinical dementia syndromes due to neurodegenerative disease on the basis of their neuropsychological profiles: progressive amnesia, primary progressive aphasia, progressive visuospatial dysfunction, and progressive comportmental/executive dysfunction.
2. Explain the differences among three types of classification for dementia syndromes, namely clinical, neuroanatomical network and neuropathologic tissue diagnosis
3. Use the neuropsychological profile to predict neuroanatomical network dysfunction and post mortem tissue diagnosis.
4. Apply a neuropsychological profile approach to guide recommendations for treatment and management
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THURSDAY MORNING, JUNE 28, 2012

Invited Symposium: Disorders of Consciousness - Ethical Issues, Diagnostic and Prognostic Considerations and Treatment Options

Chair: Marianne Løvstad

8:00–9:30 a.m.

M. LØVSTAD. Disorders of Consciousness - Ethical Issues, Diagnostic and Prognostic Considerations and Treatment Options.
Symposium Description: The establishment of clear diagnostic criteria for disorders of consciousness (DOC) after acquired brain injury has had tremendous impact on refining the clinical features of the vegetative (VS) and minimally conscious states (MCS). Over the past decade, new knowledge has been gained about the neurological basis for consciousness, diagnostic tools have improved, and brain imaging techniques have emerged as potential supplements to behaviorally based diagnostic methods. However, clinical guidelines for diagnostic assessment, outcome prediction and rehabilitation efforts in patients with DOC have not yet been established. Additionally, clinicians face a range of clinical challenges when working with DOC patients. The assessment and treatment of pain, difficult to identify in non-communicative patients, is one such challenge. Patients with DOC are vulnerable in that they are unable to communicate their own thoughts and feelings. Surrogates must make decisions about ongoing care and at times its withdrawal. This presents an array of ethical challenges further complicated by the uncertainty often present about the patient's actual cognitive capacity and future prognosis. In this symposium, Dr. Giacino will present a systematic, evidence-based approach to the assessment and rehabilitation of individuals with DOC. Dr. Schnakers will discuss the assessment of pain in non-communicative patients using behaviorally based methods. Finally, Dr. Fins will discuss ethical dilemmas for patients and families coping with DOC and suggest decision-making procedures that can help surrogates make choices on behalf of their wards.
Learning Objectives:
1. Describe diagnostic criteria and clinical features of patients in the Vegetative (VS) and the Minimally Conscious State (MCS).
2. Describe the current evidence base for various treatment options.
3. Discuss ethical concerns typically faced by care-givers of patients with disorders of consciousness.

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4. Describe ways health practitioners can help surrogates make ethically sound decisions on behalf of the patient.
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C. SCHNAKERS. Pain Assessment and Pain Management in DOC Patients.
Objective: Detecting pain in severely brain-injured patients recovering from coma represents a real challenge. Patients with disorders of consciousness are unable to consistently or reliably communicate their feelings and potential perception of pain. Recent studies suggest, however, that patients in a minimally conscious state can experience pain at some extent. Pain monitoring in these patients is hence of medical and ethical importance. During our talk, we will focus on the possible use of behavioral scales for the assessment and detection of pain in non-communicative patients.
Correspondence: *Caroline Schnakers, Cyclotron Research Centre, University of LIEGE, Sart Tilman-B30, Liege 4000, Belgium. E-mail: c.schnakers@ulg.ac.be*

J.J. FINS. Ethical Decision-Making on Behalf of Patients with Disorders of Consciousness.
Objective: By its nature, care decisions for patients with severe disorders of consciousness must involve surrogates. Patients, have lost their decision-making capacity and the ability to direct their own care. Surrogates family members, friends or other intimates -must make decisions about ongoing care or its withdrawal. This is becoming increasingly difficult for surrogates of patients with severe brain injury as emerging scientific findings about disorders of consciousness are calling into question prevailing clinical practices and perceptions about diagnosis and treatment. In this talk, I will review ethical dimensions of decisions for patients and families with disorders of consciousness and cover the spectrum of issues related to Brain Death, VS, MCS, emergence from MCS. I will address how to assist families with decisions and the inherent prognostic uncertainty that attend disorders that remain syndromic and not diagnostically grounded and offer the method of Time de-Limited Prognostication as a useful heuristic for incremental decision making. I will review North American ethical norms for decision-making capacity, surrogate decision making, do-not-resuscitate (DNR) orders, Withdrawals of life-sustaining therapy and the use of advance directives and will look forward to their applicability to the Norwegian medical context. I will consider how nascent neuroprosthetic devices may complicate decision making between patients, surrogates and physicians and suggest that moving forward we will need to consider mosaic decisionmaking to accommodate the emerging voice of the patient treated with neuroprosthetic interventions that reestablish variable degrees of functional communication. This can help aid the surrogate through the range of choices they will confront in acute and chronic care and also help them make choices about enrollment in clinical research designed to better elucidate these conditions and evaluate emerging diagnostic and therapeutic interventions.
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J.T. GIACINO. A Systematic, Evidence-Based Approach to Diagnostic Assessment, Outcome Prediction and Rehabilitation in Patients with Disorders of Consciousness.
Objective: A significant minority of persons who survive severe acquired brain injury fail to fully recover self and environmental awareness and experience prolonged disorders of consciousness (DoC), including the vegetative state (VS), minimally conscious state (MCS) and post-traumatic confusional state (PTCS). These conditions are characterized by global impairments in arousal, drive and response consistency, severely limiting command-following, communication and basic self-care activities. As patients recover over time, assessment and treatment needs change, and clinical services must be adjusted to match current levels of cognition and behavioral control. Despite overwhelming need, there are currently no standards of care to guide the approach to diagnostic assessment, outcome prediction or rehabilitation efforts in patients with DoC. This presentation will describe a systematic approach to rehabilitative management that relies on a three-tiered framework in which assessment procedures and treatment interventions are tied to specific phases of recovery. Level I focuses on individuals who have not yet recovered consciousness, Level II on those who have recovered consciousness but are not able to communicate reliably and Level III on individuals who can communicate but remain confused and require assistance for self-care activities. Operationally-defined rehabilitation procedures are implemented in accord with a clinical "care map", weekly progress is monitored using standardized metrics that address cognitive, linguistic, physical and functional status and changes in care are guided by pre-established clinical benchmarks. The primary objective of this session is to review the program infrastructure necessary to accomplish these aims. Case studies will be presented to illustrate implementation of the program model.
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Invited Symposium: Neurocognition in Psychotic Disorders: Change or Stability

Co-Chairs: Merete G. Øie, Kjetil Sundet

8:00–9:30 a.m.

M.G. ØIE, K. SUNDET, S.J. WOOD, A. REICHENBERG & P.D. HARVEY. Neurocognition in Psychotic Disorders: Change or Stability.
Symposium Description: While cognitive deficits are frequently reported in psychotic disorders, less is known regarding the course of such deficits across the lifespan and at various stages of the illness. Some studies suggest two distinct neurocognitive trajectories during the lifespan in patients with schizophrenia that may represent manifestations of distinct pathophysiological mechanisms of the illness during different phases of the disease. In the symposium, three well-known and widely cited researchers in the field of schizophrenia and cognition are invited. In the symposium the talks will focus on the course of cognition in a sample with ultra-high risk for psychosis, an epidemiological sample of first episode psychosis, and finally in individuals in the late stages of the illness. The symposium will end with a general discussion.
The speakers and the title of the talks at the symposium:
The first speaker will be dr. Stephen J. Wood from Melbourne Neuropsychiatry Centre, Department of Psychiatry, University of Melbourne and Melbourne Health, Australia. His talk will have focus on change over time in neurocognitive performance in a sample at ultra-high risk for psychosis. The second speaker will be dr. Abraham (Avi) Reichenberg from Department of Psychosis Studies, Institute of Psychiatry, King's Health Partners, King's College, London, UK. The topic of his talk will be: The first 10 Years: The course of neuropsychological functioning in an epidemiological sample of first episode psychosis. The last and third speaker will be dr. Philip D. Harvey from the Division of psychology at Miller School of Medicine, University of Miami, USA. The title of his talk: Course of Everyday Functioning in Older Community Dwelling People with Schizophrenia: The influence of Cognition, Functional Capacity, and Illness History.
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S.J. WOOD. Change Over Time in Neurocognitive Performance in a Sample at Ultra-high Risk for Psychosis.
Objective: It remains unclear whether the onset of frank psychosis is associated with deterioration in cognitive performance. The few longitudinal studies following ultra-high risk samples over transition to psychosis suggest little or no impact on neurocognitive ability, but larger samples with longer follow-up periods are required.
Participants and Methods: To determine the course of neurocognitive performance over the transition from ultra-high risk to frank psychosis, and in relation to functional outcome, we assessed consecutive admissions to PACE (a clinic for young people at ultra-high risk for psychosis) between 1993 and 2006 (N=221). They were followed-up an average of seven years later.

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Results: There were no significant Group x Time interaction terms when examining transition to psychosis. When comparing poor and good functional outcome groups, the Group x Time interaction terms were significant for verbal (p=0.03) and full-scale (p=0.007) IQ scores, Vocabulary (p=0.001) and the Trail Making Test (p=0.01). On these tasks, the good outcome group improved over time, while the performance of the poor outcome group either deteriorated or remained stable over the follow-up period.The onset of psychosis was not associated with deterioration in cognitive ability. However, poor functional outcome was associated with differential change in performance.
Conclusions: The course and timing of neurocognitive impairment in psychosis requires further investigation and functional outcome requires greater attention.
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A. REICHENBERG. The First 10 Years: The Course of Neuropsychological Functioning in an Epidemiological Sample of First Episode Psychosis.
Objective: Evidence suggests that compromised neuropsychological function in schizophrenia remains relatively stable through the early years of illness. Neurocognitive dysfunction has often been reported in other psychotic disorders, yet little is known about the longitudinal course. In the context of three distinct diagnostic groups, we compared trajectories of neuropsychological performance among patients followed since their first psychotic episode.
Participants and Methods: Data were derived from a population-based, case-control study of patients with first-episode psychosis. A neuropsychological test battery was administered to patients (N=100) with a diagnosis of schizophrenia, bipolar disorder or mania, or depressive psychosis following index presentation, as well as to healthy comparison subjects (N=100). Both patients and controls were followed up 10 years after their first assessment and administered the same test battery. The course of specific and generalized cognitive deficits was examined.
Results: Initial analysis showed that there were no differences between patients and controls in degree of change over the follow up time in IQ. However, there was evidence for an increase in the difference in performance between patients and controls in verbal intellectual functioning and executive working memory. This was more pronounced in the affective psychotic groups.
Conclusions: In the largest longitudinal study to date of cognitive functioning in first episode psychosis there was evidence for relative stability in neuropsychological functions over a 10-year period after onset. Most cognitive change takes place early in the psychotic illness, prior to the first hospitalization, but its exact timing still remains unknown.
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P.D. HARVEY. Course of Everyday Functioning in Older Community Dwelling People with Schizophrenia: The influence of Cognition, Functional Capacity, and Illness History.
Objective: Some older patients with schizophrenia who were previously institutionalized show evidence of changes in cognitive ability and functional capacity over a 3-5 year followup. The current study examined changes in real-world functioning in a sample of people with schizophrenia who varied in their history of long-term institutionalization and related changes in real world functioning to changes in cognition and functional capacity over the followup period.
Participants and Methods: Older patients with schizophrenia (n=111) were examined with assessments of cognitive functioning, functional capacity, clinical symptoms, and everyday functioning. They were then followed up to 45 months and rexamined up to two times. A mixed-model repeated- measures model (MMRM) was used to examine changes in real world functioning in social, everyday living, and vocational domains over the followup period and identify potential predictors of change.
Results: Everyday functioning was found to worsen in all three domains. Although length of longest hospitalization predicted worsening, this influence was eliminated when the course of functional capacity was used to predict the course of everyday functioning. For both vocational and everyday living domains, as well as the composite score on functional status, worsening in performance based measures of everyday functioning and social competence predicted worsening in real world functioning. Changes in negative symptoms further predicted worsening in the everyday living domain.
Conclusions: Worsening in everyday functioning is found in older people with schizophrenia and those with a history of greater chronicity and severity of illness seem more affected. These influences seem to be expressed through worsening in the ability to perform everyday functional skills. Potential causes of these changes and implications for reducing these impairments are discussed.
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Invited Symposium: Aging and Mild Cognitive Impairment

Chair: Ivar Reinvang

8:00–9:30 a.m.

I. REINVANG, A.M. FJELL, D. ZIEGLER, M. FALKENSTEIN & L. NYBERG. Aging and Mild Cognitive Impairment.
Symposium Description: The symposium will review changes in brain structure during the adult life span and correlations with change in neuropsychological functions. Data from functional imaging can further illuminate mechanisms of cognitive control and brain plasticity in the aging brain. Mild cognitive impairment in Parkinson's Disease is linked to fronto-striatal dysfunction.
Correspondence: *Ivar Reinvang, Ph.D, University of Oslo, Box 1094 Blindern, Oslo 0317, Norway. E-mail: ivar.reinvang@psykologi.uio.no*

A.M. FJELL. Structural Brain Changes in Aging.
Objective: The brains of elderly are different than the brains of younger. However, the effects of age on brain structure are highly heterogeneous, and age is affecting some areas of the brain much more than others. Also, various structural brain traits are affected to different degrees, in terms of e.g. white vs. grey matter and micro vs. macrostructure. The advent of advanced neuroimaging methods has greatly enhanced our knowledge about normal changes in brain structure throughout the lifespan, but fundamental questions are still unsettled. Especially, the questions of when brain aging starts, which brain areas and traits that are most vulnerable and which are more resistant to the influence of normal aging, and what are the borders between normal and pathological age-changes remain to be fully answered. Also, recent research has suggested the intriguing possibility of using cognitive training to partly counteract normal age-changes in the brain, but the potential and limits of brain plasticity in aging remain to be established. The talk will address and review critically these topics.
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D. ZIEGLER. Cognitive Control Networks in the Aging Brain.
Objective: Healthy aging is characterized by functional declines across multiple cognitive domains, including attention, memory, and most strikingly, cognitive control. I will present findings from a series of imaging experiments that extend our understanding how healthy aging affects the integrity of neural circuits that support cognitive control processes. Our structural MRI results showed that the integrity of anterior white matter regions was decreased in healthy older adults and predicted performance on cognitive control tasks (Ziegler et al., 2010). Building on these structural findings, I will describe a multimodal neuroimaging study that harnessed magnetoencephalography (MEG) and diffusion tensor imaging (DTI) to illustrate how altered oscillatory dynamics underlie diminished top-down processing in older adults.

Conclusions: This study provides the first evidence that age-related changes in the integrity of frontoparietal white matter tracts disrupt modulation of neural rhythms that control attention.

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M. FALKENSTEIN & P. GAJEWSKI. The Influence of Different Training Regimes on Executive Functions and Brain Activity in Healthy Old Adults.

Objective: The present study examines the impact of different types of guided training on cognitive, especially executive, functions and event-related potentials (ERP) in old people.

Participants and Methods: 142 healthy older participants (mean age 70 years) were randomly assigned to one of four groups: physical training, cognitive training, stretching and relaxation (social control group) and a no-contact group. Training sessions took place twice a week for 90 minutes over 4 months.

Results: The results showed improvements of performance and changes in ERP components particularly in the cognitive training group. In a task switching paradigm this benefit occurred primarily in mixing costs, indexing activation and maintenance of multiple task-sets in working memory. In the ERPs more efficient response-selection (N2) and an enhanced task updating (P3b) was observed. Finally, a substantial reduction of the error rates was associated with an increased error negativity (Ne) indexing error monitoring.

Conclusions: These findings suggest that formal cognitive training may help to preserve and improve critical cognitive functions in aging, which can be assessed by ERP measures. Our results are in line with the idea that plasticity in brain functions exists in older age and illustrate the usefulness of systematic mental training which should in turn improve behaviour in everyday life situations.

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L. NYBERG. Association of MCI in Parkinson's Disease to Altered Fronto-striatal Functional Brain Activity.

Objective: Cognitive dysfunction in Parkinson's disease (PD) is frequently reported and a large proportion of PD patients suffer from mild cognitive impairment (MCI). Deficits in executive processing and working-memory (WM) indicate dysfunctional fronto-striatal brain circuitry.

Participants and Methods: We examined WM-related brain responses in a large-scale population-based cohort of newly diagnosed drug-naïve PD-patients with and without MCI. Analyses were conducted on PD-patients (n=77) in comparison with healthy controls (n=24). The included participants underwent a rigorous diagnostic procedure assessing MCI, where the cutoff was less than 1.5 standard deviation below the population mean in at least one cognitive domain. Seventeen PD-patients were diagnosed with MCI and they were compared with 37 matched PD-patients without cognitive decline. Functional magnetic resonance imaging (fMRI) was conducted during a verbal 2-back WM-task

Results: Compared to healthy controls, PD-patients demonstrated under-recruitment in an extensive brain network including bilateral striatal and frontal regions. PD-patients with MCI demonstrated additional under-recruitment in right striatum and left anterior cingulate cortex (ACC).

Conclusions: The observed functional alterations link cognitive impairment in PD to fronto-striatal dysfunction.

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Symposium: Neuropsychological Functioning and Pharmacological Treatment of College Students with ADHD

Chair: Lisa Weyandt

9:45–11:15 a.m.

L. WEYANDT, L. WEYANDT, G. DUPAUL, G. VERDI & A. SWENTOSKY. Neuropsychological Functioning and Pharmacological Treatment of College Students with ADHD.

Symposium Description: The purpose of this symposium is to present recent research findings concerning the neuropsychological performance of college students with and without ADHD. The symposium will begin with a review of research findings concerning executive functions and ADHD, and will include a critical analysis of whether executive functions are characteristic of, and unique to ADHD. This review will be followed by a presentation of a recent study that used a latent variable approach to exploring the construct of executive function in college students. Findings from this study have important implications for our current understanding of the construct of executive functions. The third presentation will describe the results of a study comparing neuropsychological, academic, and psychosocial functioning of college students with and without ADHD. The final presentation will cover findings from the first double-blind placebo controlled study to investigate the effectiveness of a prodrug stimulant, lisdexamfetamine dimesylate, at improving neuropsychological performance of college students with ADHD. Implications for clinical practice and future research will be discussed.

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L. WEYANDT. Executive Functions (EF) and Attention Deficit Hyperactivity Disorder (ADHD).

Objective: The purpose of this segment of the symposium is to address whether EF deficits are characteristic of and unique to ADHD.

Participants and Methods: Research findings exploring whether EF deficits are characteristic of ADHD will be reviewed.Emphasis will be placed on studies that a) have found impairments in EF in individuals with ADHD, b) have not found impairments, and c) have found EF impairments in other clinical disorders. This presentation is not meant to be an exhaustive review but rather a selective review with the intent to raise critical questions regarding the issue of EF and ADHD.

Results: Despite the assertion that ADHD is characterized by EF deficts, the literature does not consistently support this perspective. Although a large number of studies have reported differences in EF performance between children, adolescents, and adults with ADHD relative to controls, others have not found these impairments. In addition, it is critical to note that EF deficits have been found in numerous clinical disorders including children with internalizing and externalizing disorders and adults with a wide range of clinical disorders. Given the ubiquitous nature of EF deficits in clinical populations, it is important to question what can be deduced from the literature concerning EF and ADHD specifically.

Conclusions: What can be concluded about EF and ADHD based on a selective review of the literature? First, it is clear that results across studies have been inconsistent with some reporting EF deficits while others do not. Second, when impairments are found they are often found on some, but not all EF measures. This raises the question whether specific components of EF are compromised in ADHD but findings have been equivocal. A third conclusion is that executive function deficits are not unique to ADHD. Fourth, methodological problems are typical of many of the executive function studies and likely contribute to the inconsistent findings across studies. Implications will be discussed.

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G.J. DUPAUL, L.L. WEYANDT, J.S. ROSSI, B.R. VILARDO, S.M. O'DELL, K.M. CARSON, G.R. VERDI, A.J. SWENTOSKI & S.M. DELUCA. Effects of Lisdexamfetamine Dimesylate (LDX) on the Psychological and Academic Functioning of College Students with Attention-Deficit/Hyperactivity Disorder (ADHD).

Objective: The purpose of this segment of the symposium is to report the results of a controlled investigation of lisdexamfetamine dimesylate (LDX), a central nervous stimulant, on the psychological, academic, and social functioning of college students with ADHD.

Participants and Methods: Participants included 24 college students with ADHD and 26 college students without psychopathology. LDX was examined for ADHD participants over five weekly phases (no-drug baseline, placebo, 30, 50, & 70-mg LDX per day) in the context of a double-blind, placebo-controlled, crossover design. Self-report rating scales of functioning including executive functions, and direct assessment of ADHD symptoms, verbal learning/memory, and adverse side-effects were collected (baseline only for control students).

Results: LDX was associated with large reductions in ADHD symptoms and significant improvement in psychosocial functioning. Reduction in

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ADHD symptoms was found for 86.4% of participants during at least one LDX dosage condition. No significant increases in adverse side-effects for LDX relative to placebo were found at the group level and only 2 of 24 (8.3%) ADHD participants dropped out of the study due to side-effects.
Conclusions: LDX is a safe, efficacious treatment for symptom relief in college students with ADHD. Further, LDX was associated with significant improvements of moderate to large magnitude in organizational and study skills. Unfortunately, large differences in functioning relative to non-ADHD controls remained even during LDX conditions. Research documenting medication effects on academic functioning and evaluating psychosocial/educational interventions is needed.
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A. SWETOSKY. Executive Functioning in College Students with ADHD Symptomology.
Objective: The purpose of this segment of the symposium is to discuss the results of a study that attempted to address the methodological limitations of executive functioning measurement. In addition, the study examined the relationship between executive functioning and ADHD symptomology in a college student sample.
Participants and Methods: The current findings regarding the unity and diversity of the EF construct, as well as the corresponding methodological limitations associated with measuring this nebulous construct will be presented. In addition, findings concerning whether EF deficits are associated with ADHD symptomology in a college student sample will be presented.
Results: Exploratory factor analysis was used in order to explore the unity and diversity of the executive function construct. Although 18 different variables were used from 12 different tests purported to measure executive functioning, the correlations between individual tests were minimal. Consequently, a clear and comprehensible factor structure did not result. In addition, there were no significant correlations between the individual executive function variables and ADHD symptomology.
Conclusions: Based on the present findings it appears that the ill-defined nature of the executive function construct likely results in methodological limitations that significantly influence the executive function literature. Within the existing research literature executive functioning is assessed using a wide range of neuropsychological and behavioral measures, however the results from this study indicate that the correlations between these measures do not appear to be robust as one would predict. Therefore, examining the executive functioning abilities of different clinical or subclinical populations (i.e., children with ADHD or college students with ADHD symptomology) is a challenging endeavor due to the psychometric limitations of tests of executive function.
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G.R. VERDI, G.J. DUPAUL, L.L. WEYANDT, J.S. ROSSI, B.M. VILARDO, S.M. O'DELL, K.M. CARSON, A.J. SWENTOSKI & S.M. DELUCA. Effects of Lisdexamfetamine Dimesylate (LDX) on the Executive Functioning of College Students with Attention-Deficit/Hyperactivity Disorder (ADHD).
Objective: The purpose of this segment of the symposium is to report the results of a controlled investigation of lisdexamfetamine dimesylate (LDX), a central nervous stimulant, on executive functioning performance of college students with ADHD.
Participants and Methods: Participants included 24 college students with ADHD and 26 college students without psychopathology. LDX was examined for ADHD participants over five weekly phases (no-drug baseline, placebo, 30, 50, & 70-mg LDX per day) in the context of a double-blind, placebo-controlled, crossover design. Self-report rating scales of functioning and direct assessment of ADHD symptoms, verbal learning/memory, and adverse side-effects were collected (baseline only for control students).
Results: LDX was associated with large reductions in ADHD symptoms and significant improvement in executive functioning. Significant improvement in self-reported executive functioning was found for 72.7% of participants during at least one LDX dosage condition. No significant increases in adverse side-effects for LDX relative to placebo were found at the group level and only 2 of 24 (8.3%) ADHD participants dropped out of the study due to side-effects. Despite positive LDX effects, large differences in executive functioning remained relative to non-ADHD controls.
Conclusions: LDX was associated with significant improvements of moderate to large magnitude in executive functioning among college students with ADHD. Still, large differences in functioning relative to non-ADHD controls remained, even during LDX conditions. Additional research documenting medication effects on specific aspects of executive functioning is needed.
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Invited Symposium: Psychiatric Disorders following Traumatic Brain Injury

Chair: Jennie Ponsford

Discussant: Teresa Ashman

9:45–11:15 a.m.

J. PONSFORD, T. ASHMAN, S. DIKMEN, J. PONSFORD, M. SCHÖNBERGER & J. MALEC. Psychiatric Disorders following Traumatic Brain Injury.
Symposium Description: This symposium will examine the nature, time course and predictors of psychiatric disorders following traumatic brain injury (TBI), including data from 3 major prospective studies. Sureyya Dikmen will present findings showing that more than 50 percent of people with moderate to severe TBI experience major depressive disorder in the first year after injury with highest frequency at one month after injury, and predictive factors including depression prior to injury, gender, age, education and substance abuse disorder. However 20 percent of cases occurred for the first time after injury. Depression appeared to follow the experience of functional disability. Based on another prospective study, the second paper by Jennie Ponsford will take a longer term perspective on all DSM-IV Axis 1 disorders, showing that both anxiety and major depressive disorders persist over at least three years after injury, with substance use disorders occurring at lower frequency than pre-injury. Pre-injury psychiatric history is a risk factor for development of disorders early after injury. Novel disorders tend to develop over longer periods. Findings from a cross-lagged analysis in the same cohort presented by Michael Schönberger confirm that anxiety and depression appear to occur in response to the experience of functional disability. James Malec will present findings from a third study conducted over one year post-injury, modelling predictive factors. One year outcome was associated with depression, external appraisal of post-TBI ability, and TBI severity. Exploratory analyses suggested that self-appraisal may mediate the relationship between pre- and post-TBI depression. These findings have important implications for the management of psychiatric disorders following TBI. They suggest that some individuals may benefit from cognitive behaviour therapy which assists in adaptation to disability and thereby facilitates more positive self-appraisal. Teresa Ashman will act as a discussant.
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S. DIKMEN, C. BOMBARDIER, J. FANN & N. TEMKIN. The Natural History and Predictors of Depression following Civilian Traumatic Brain Injury.
Objective: Describe natural history, rates, predictors and outcomes following civilian traumatic brain injuries. Additionally, report findings on causal relationship between depression and functional limitations.
Participants and Methods: The two studies that will be reported included a large number, prospectively studied, adult representative cases of TBI with broad spectrum of TBI severity seen at a Level 1 trauma center.

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Results: In one of the two studies, about 50% of 559 patients met criteria for major depressive disorder (MDD) at least once over the follow-up period of one year. The highest incidence of new cases of MDD occurred at one month post injury. The results of the second study based on 283 cases using the CES-D suggested that in addition to somatic symptoms, both depressed affect and lack of positive affect contribute to elevated depression scores. Predictors in both studies included pre-injury history of depression, depression at the time of injury, and several demographic factors including gender, age, education and substance abuse disorder. Although pre-injury depression was a predictor of depression after injury, about 20% experienced depression for the first time after injury. Depression was associated with poorer functional outcomes and quality of life after controlling for relevant other variables. Based on the second study cohort, the causal relationship between functional limitations and depression was investigated., The results suggested the functional limitations precede depression rather than depression leading people to report more functional limitation.
Conclusions: The results indicate that depression after TBI is highly prevalent and is associated with additional disability and reduced quality of life. The results of the natural history of recovery and predictors of depression provide avenues for intervention studies to reduce depression and added disabilities.
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J. PONSFORD, Y. ALWAY, S. MCGUIGAN, K. GOULD, L. JOHNSTON & G. SPITZ. Psychopathology in the First Three Years After Traumatic Brain Injury.
Objective: This study aimed to prospectively examine the frequency, timing of onset, and predictors of psychiatric disorders over the first three years following traumatic brain injury (TBI).
Participants and Methods: Participants were 210 individuals (78.6% male) with predominately moderate to severe TBI (3% mild, 30.7% moderate, 62.3% severe). Psychiatric disorders were assessed using the Structured Clinical Interview for DSM Disorders (SCID-I). Participants were assessed for pre-injury and current disorders soon after injury, and prospectively re-assessed at 3, 6, 12, 24 and 36 months post-injury. Survival analysis was used to examine the timing of onset and predictors of disorders over the three-year period.
Results: The majority of participants (55.7%) had one or more pre-injury psychiatric disorders, with substance use (39.5%), anxiety (18.1%), and mood (17.1%) disorders most common. Over one quarter of participants had one or more active psychiatric disorder at initial assessment, 44.2% at one year, 53.8% at two years, and 43.5% at three years post-injury. At all time-points, anxiety disorders were the most common post-injury diagnoses, with 12.2% at initial, 23.7% at one year, 21.4% at two years, and 22.4% at three years post-injury meeting one or more DSM-IV anxiety disorder diagnosis. Post-injury mood disorders were also common, with frequencies of 6.8% at initial, 19.5% at one-year, 19.7% at two, and 21.4% at three years post-injury. Rates of substance use disorders varied, with a frequency of 9.7% at initial, 7.2% at one, 19.8% at two, and 10.7% at three years post-injury. Results of a Survival Analysis of the timing of onset and predictors of Axis 1 disorders will be presented.
Conclusions: Anxiety and depressive disorders are common and persistent problems for individuals with TBI, which do not diminish significantly over the first three years post-injury. Pre-injury psychiatric disorders remain a significant risk factor for persisting psychiatric problems following TBI.
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M. SCHÖNBERGER, J. PONSFORD, K. GOULD & L. JOHNSTON. The Temporal Relationship Between Depression, Anxiety, and Functional Status after Traumatic Brain Injury: A Cross-lagged Analysis.
Objective: Poor functional status and high rates of anxiety and depression have been reported in individuals who have sustained a traumatic brain injury (TBI). However, it is unclear whether psychiatric disorders after TBI are a cause or a consequence of functional limitations. The current study aimed to investigate the temporal relationship between anxiety, depression and functional impairment following TBI.
Participants and Methods: The study has a prospective, longitudinal single-group design. Anxiety and depression, assessed using the Structured Clinical Interview for DSM-IV, and functional changes, assessed with the Glasgow Outcome Scale—Extended, were measured six and 12 months post-injury in 122 individuals who had sustained a TBI (79% male, mean age 35 years, mean duration of post-traumatic amnesia 24 days, mean Glasgow Coma Scale score 9.2). Cross-lagged analyses were conducted within a structural equation modelling framework.
Results: Functional changes six months post-injury predicted depression and anxiety one year after the injury. Anxiety and depression, in turn, were not predictive of later functional status.
Conclusions: This study adds to our understanding of the temporal relationship between depression, anxiety and functional status after TBI. The results indicate the importance of supporting brain injured individuals in coping with the functional consequences of their injury in order promote psychological well-being.
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J. MALEC. Building a Preliminary Model for Post-TBI Depression.
Objective: Although the majority of individuals with traumatic brain injury (TBI) experience depression in the first two years after injury, the nature of post-TBI depression is not well understood. The aim of research described here was to develop a model for post-TBI depression.
Participants and Methods: 158 consecutive patients with moderate-severe TBI were rated by a Nurse Specialist on the Mayo-Portland Adaptability Inventory (MPAI-4) Ability Index and additional questionnaires. Patient self-appraisal of post-TBI ability and depression were reported on the Awareness Questionnaire and Beck Depression Inventory-II. Outcomes one year post-injury were assessed with the MPAI-4 Participation Index. Education, TBI severity (duration of PTA), and pre-injury depression, were obtained via interview or medical records. The relationships among these variables were examined using Structural Equation Modeling (SEM).
Results: Successive SEM resulted in a well fitting and parsimonious model. A moderately strong association between self-appraisal of post-TBI ability and depression was apparent, consistent with our prior studies. Injury severity was not significantly associated with post-TBI depression. One year outcome was associated with depression, external appraisal of post-TBI ability, and TBI severity. Exploratory analyses suggested that self-appraisal may mediate the relationship between pre- and post-TBI depression.
Conclusions: The strong association between self-appraisal of post-TBI ability and post-TBI depression and the possible mediating relationship with pre-injury depression are consistent with the cognitive-behavioral model of depression. These results recommend consideration of cognitive-behavioral therapy for post-TBI depression. The lack of association between TBI severity and depression may represent the indirect and proxy nature of current measures of TBI severity. More definitive study of neuronal mechanisms in post-TBI depression may await development of molecular imaging techniques.
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Invited Symposium: Risk Reduction Factors for Cognitive Decline in Older Adults

Chair: Jennifer Manly

9:45–11:15 a.m.

J. MANLY, J. MANLY, J. LUCHSINGER & G. CHELUNE. Risk Reduction Factors for Cognitive Decline in Older Adults.
Symposium Description: This symposium will present current research about factors that relate to maintenance of cognitive function or risk of cognitive decline among older adults. An update of research will be presented that reveals multiple cognitive, cardiovascular, socioeconomic,

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and genetic factors that are relevant to cognitive function, the development and maintenance of cognitive skills, cognitive aging and the onset and expression of neurodegenerative diseases. Several modifiable risk factors, both social and cardiovascular, have been related to reduced risk of cognitive decline, and emerging information from clinical trials has begun to influence research directions, policy, and the marketplace. Critical issues in methodology, including collection of early life data, community-based cohorts and longitudinal data, and use of ethnically and educationally diverse samples will be discussed. New findings on the earliest indicators of cognitive decline, including cognitive testing methods and neuroimaging markers, will be presented.
Learning Objectives:
1. Recognize vascular factors that are associated with cognitive decline or maintenance of cognitive function in aging
2. Explain how serial assessment can inform clinical decision making in older adults
3. Summarize the early life socioeconomic factors that are associated with trajectories of cognitive function as people age
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J. MANLY & M. GLYMOUR. Lifecourse Social Factors and Risk of Cognitive Decline among Older Adults.
Objective: Early life environmental conditions and adult social circumstances have a significant impact on cognitive aging and risk for dementia among older adults. Not only can these factors explain ethnic/racial group disparities in cognition, but also that the collective impact of these factors is greater than that of known genetic risks for cognitive decline. This has relevance for clinical and research settings, but also social policy.
Participants and Methods: The research reviewed in this presentation comes from large-scale epidemiological cohorts and will focus on US blacks, Hispanics/Latinos, and Asians, as well as cross-national studies.
Results: There is a significant influence of both broad social patterns such as migration and educational policy, as well as cognitive engagement and social activity, on later life cognitive test performance and cognitive function. Measurement quality of cognitive tests may be compromised across demographic/exposure groups, but use of modern psychometric methodology and longitudinal study designs can mitigate this challenge. Data suggest that neurocognitive health may have already begun to diverge by childhood and that early life conditions may become physiologically embedded in ways that directly influence old-age cognitive risk, or indirectly influence cognition by changing the trajectory of exposures experienced later in life.
Conclusions: Cognitive function is a developmental trajectory, and harmful exposures may influence the likelihood of impairment in old age by derailing the maturation trajectory, promoting pathological processes, or restricting compensation or resilience after pathological events. Consideration of only years of education and adult or old age risk factors underestimates the influence of social and socioeconomic factors on cognitive aging.
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J. LUCHSINGER. Vascular factors and cognitive impairment.
Objective: This presentation will review current knowledge about the relationship of modifiable risk factors with cognitive impairment. Modifiable risk factors covered will include vascular risk factors and lifestyle risk factors (diet and exercise).
Participants and Methods: Most of the data presented will come for a prospective study of aging in Northern Manhattan, New York City, in the United States. Data from Clinical Trials will be presented when available.
Results: Modifiable risk factors, such as adiposity, vascular risk factors, diabetes, hypertension, dyslipidemia, diet, and physical exercise, are associated with amnestic and/or non-amnestic forms of cognitive impairment. These associations may be explained by vascular or neurodegenerative mechanisms. The implication of these findings is that cognitive impairment may be delayed or prevented.
Conclusions: Interventions addressing modifiable risk factors may prevent or delay cognitive impairment.
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G. CHELUNE. The Slippery Slope: Preclinical Trajectories of Cognitive Performance and Risk of Cognitive Decline.
Objective: The capacity to acquire new knowledge and skills and to prospectively apply this information in future situations has inherent survival value for a species. Among humans, this capacity to learn or benefit from practice is dependent on the integrity of the brain, and has been shown to decrease in the face of neurodegenerative disease. However, because cognitive decline, like neurodegenerative disease, is a dynamic process that evolves over time, it is best conceptualized as a "trajectory" of change rather than as a change in absolute level of performance.
Participants and Methods: Selective review of recent research demonstrates that early changes in the expected slope of performance over time precede the appearance of frank deficits and has both diagnostic and prognostic value.
Results: In one population-based study, relative to time of diagnosis, the preclinical cognitive trajectories of individuals subsequently diagnosed with vascular dementia or Alzheimer's disease (AD) began to deviate from the normal aging curve on average 6 to 9 years before diagnosis. In a longitudinal cohort study of over 1000 normal persons, three subgroups with distinct rates of cognitive decline on repeated testing were identified, and these trajectories were associated with differential levels of amyloid plaques and neurofibrillary tangles at autopsy. Distinct cognitive profiles and rates of decline have also been found in more select samples of autopsy-confirmed patients with frontotemporal dementia and AD. Explicit studies of short-term "practice effects" have found that the slope of test-retest performance had both diagnostic and prognostic value.
Conclusions: Serial assessments provide an ideal opportunity to quantify the slope or trajectory of change over time in a way that can inform clinical decision making.
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Poster Session 1: Cognitive Neuroscience, Electrophysiology/EEG/ERP, Visuospatial Functions/Neglect/Agnosia

10:15–11:45 a.m.

Cognitive Neuroscience

L. PRADA & F. BARCELO. Time-frequency analysis of novel distractors and task-switch cues in a task-switching version of the Wisconsin Card Sorting Test.
Objective: The novelty P3 component of the brain event-related potential (ERP) is often taken to indicate that a novel distracter has captured attention and is most likely within the focus of mind. However, recent studies suggest that repetitive contextual cues that announce a switch to a novel task, also activate the same neural network implicated in processing novel distracters. In these studies both task-switch cues and novel distracters elicited endogenous P300 brain potentials with a similar morphology, latency and frontal-central distribution. However, since ERPs do not fully capture single-trial brain dynamics, we studied the oscillatory basis of novelty P3 using time-frequency analyses.
Participants and Methods: The electroencephalogram (EEG) was recorded while 15 healthy young subjects performed a computer version of the Wisconsin Card Sorting test with only two sorting rules (colour or shape). Each card was preceded by a familiar tone cueing the subject either to switch or to repeat the previous rule. Novel sound distracters were interspersed in one of two blocks of trials. We studied power changes (Event-related spectral perturbation, ERSP) and phase resetting (Inter-trial coherence, ITC) of brain rhythms involved in the generation of the novelty P3 component induced by tonal task cues and novel distracters.

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Results: Enhanced novelty P3 amplitudes were observed both to task-switch cues and novel distracters with regard to auditory task-repeat cues at central and parietal electrodes. These increased novelty P3 potentials were associated with corresponding increases in delta spectral power and by an additional contribution from delta phase alignment. Novel sounds, but not switch cues, were systematically synchronized to stimulus onset across trials also for theta and alpha rhythms.
Conclusions: We conclude that the processing of contextual novelty, in both task-relevant and task-irrelevant stimuli, generates delta power changes at the P3 latency range necessary for cognitive control.
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A. BELLO, G. SPITONI, A. SERINO, A. COTUGNO, F. MANCINI & L. PIZZAMIGLIO. How the Brain Represents the Body: Body Perception in Anorexia Nervosa.
Objective: Patients with Anorexia Nervosa (AN) are characterized by a denial of their extreme thinness and by an intense fear of gaining weight. Recent studies on body image focused on the relationship between primary perception and the cognitive processing needed for a correct body representation. Serino and Haggard (2009) proposed an interesting model of the mental body representation. The authors showed that the perception of tactile stimuli on the skin is affected by the subjects mental representation of the stimulate body part and, such a body representation is affected by perception. Specifically, authors suggested that to perform a distance tactile discrimination test, the tactile stimuli must be re-scaled in respect to a pre-existing body model.
The aim of this study was to investigate whether the body misperceptions in anorexics can be assessed through tactile stimulations.
Participants and Methods: 10 patients with AN and a control group composed by 25 healthy subjects. Both groups underwent different experimental conditions: a distance tactile discrimination test over the thigh and the belly as target body district compared with the neck; a body image test (Daurat Hmelijak); a test of personal body parts estimations and finally a complete battery for the clinical evaluation of eating disorders. 5 patients also underwent MRI recording.
Results: Overall results showed that patients performed significantly more poorly in the distance tactile discrimination test; moreover, the ability on the tactile test significantly correlated with the level of body dissatisfaction. Further, anorexics performed worse in the body image test (Daurat Hmelijak) when compared to the control group.
Conclusions: Data suggest that in anorexics a body misperception can affect tactile perception; this issue could be used to elaborate new methods to assess body representation in eating disorders.
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G. CRUZ, J. EVANS & K. KILBORN. Effectiveness of Perceptual versus Conceptual Cues in Prompting Retrieval of Delayed Intentions.
Objective: Prospective memory (PM), the ability to execute an intended action after a delay, is central to our everyday activities (e.g. post a letter on the way home from work). Environmental cues often signal the appropriate moment to act. It has been hypothesised that focusing on the physical features of an external cue (e.g. post in a specific mailbox) is more effective than focusing on the conceptual relevance of a cue (e.g. post it where there is a facility for mailing letters). We examined whether conceptual or perceptual distinctiveness of cues linked to simple intentions, was more likely to promote the retrieval of delayed intentions.
Participants and Methods: Twenty-two students who were native speakers of English participated in the study. Participants undertook an ongoing task that, as in daily life, prevented the continuous rehearsal of the intended intention. The task was an n-back memory task involving making semantic judgements about words presented one at a time. In the PM conditions, participants had to indicate each time that they saw either (i) an animal word (conceptual cue) or (ii) a word presented with the first letter in upper case (perceptual cue). The intended action associated to the cue was to press a different key from the one used in the ongoing task.
Results: Participants were more accurate when they had to identify perceptual cues ($t(21)=-4.011$, $p=0.001$), supporting the hypothesis that perceptual distinctiveness favours the probability of cue recognition when it is encountered in the environment.
Conclusions: These results are consistent with other studies of PM, and contrast with studies in retrospective memory on which semantic distinctiveness leads to more enhanced recall and recognition than physical distinctiveness. This experimental paradigm is currently being used in a study using EEG to examine differences in neural processes supporting recognition of perceptual and conceptual cues related to intentions.
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M. GORECKA & C. RODRIGUEZ-ARANDA. Effects of Walking on Dichotic Listening Performance Among Young Healthy Adults.
Objective: In recent years, dual-tasks paradigms have been employed to study the involvement of attention in gait control across different populations (e.g. dementia types). Frequently, cognitive tasks are used in parallel during walking as secondary tasks either while walking over ground or on treadmills. Yet, most of these studies do not examine the effects of walking on the cognitive "dual-task" and selected tests often lack ecological validity. Thus, the experimental conditions do not reflect a real-world situation. To address this shortcome we suggest that dichotic listening (DL) is an ideal task to implement in this type of research since it demands different levels of attention and, performed during walking, it will mimic a natural situation. At present, the interplay between DL and walking has not yet been tested. Therefore, our study aims to evaluate whether DL performance is affected by walking and vice versa. As DL is not often studied as a dual-task, we examined the effects of another concurrent motor task that serves for comparative purposes to the effects of walking.
Participants and Methods: Four groups of young right-handed subjects participated in the study. Test for audiometry and screening for handedness were applied. The Bergen DL test was used. The control group (n= 22) performed DL in a sitting position. The experimental groups performed DL while walking on a treadmill (n= 15), walking over ground (n= 15) and concurrently to finger tapping (n= 15). Gait was assessed in the group walking over ground by the GaitRITE system.
Results: No significant group differences were found in the non-forced and forced-right conditions of DL. In contrast, walking on a treadmill and walking over ground significantly affected results in the left-forced part. Interestingly, finger tapping did not affect DL performance.
Conclusions: We conclude that evaluation of DL during walking is a useful model to better understand the association between attentional and gait changes in populations prone to cognitive-motor declines.
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K. KOLSKÅR, A. SOLBAKK, I. FUNDERUD & T. ENDESTAD. The Role Of The Middle Frontal Gyrus In Anticipatory Behavior.
Objective: Anticipatory behavior is behavior that is focused against a goal that is close in time. It contains a facilitation of perception, information processing and action. Investigation of its neural basis points towards an involvement of the prefrontal cortex, and specifically the middle frontal gyrus (MFG).
Models derived from functional neuroimaging studies have suggested that prefrontal cortex activations extert a modulatory influence over parietal cortex activations, and play a key role in the anticipation process. However, the specificity of this activation has not been determined.
The goal of the current study was to investigate if the activation of the MFG observed in cued delayed response tasks reflects a specific component in the anticipation of an upcoming imperative stimulus, or whether it reflects a more general attentional component.
Participants and Methods: A cued Go/NoGo delayed response functional magnetic resonance imaging (fMRI) experiment with 26 healthy young adults was used. A warning stimulus signalled whether the subjects should respond or refrain from responding to a time-locked (3.5 s

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delay) second stimulus. To capture the attentional component, a task manipulation involving a fraction (20%) of trials without a second stimulus was introduced. This manipulation enabled statistical analysis to capture the hemodynamic response associated with anticipation in a context with variation in attentional load.
Results: The results indicate that the MFG is involved in specific anticipation processes, but also in general attentional processes.
Conclusions: MFG plays a pivotal role in top-down control when anticipatory behavior occurs.
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Y. KOTANI, Y. OHGAMI, J. ARAI, S. KIRYU & Y. INOUE. Right Anterior Insular Cortex Modulates Anticipatory Attention Network via Anterior Cingulate Cortex.
Objective: Recent neuroimaging studies have hypothesized that the right anterior insular cortex modulates attention systems in the human brain. Intriguingly, a number of studies using event-related potentials (ERP) have also suggested the importance of the insular cortex for anticipatory attention process (Brunia et al, 2011). In the present study, we employed a time estimation task that has been conventionally employed in the ERP studies, and the brain activations were evaluated using event-related fMRI and psychophysiological interaction (PPI) method to examine the effective connectivity of the right anterior insular cortex in the anticipatory attention process.
Participants and Methods: Participants were twenty-eight healthy adults (16 females and 12 males). They performed a time estimation task with the following experimental conditions: Feedback, and Control conditions. In the Feedback condition, a feedback stimulus about task performance was presented three seconds after a button press while the feedback stimulus was omitted in the Control condition.
Results: The PPI analysis on brain activations during participants anticipated the occurrence of a feedback stimulus revealed that the right anterior insular cortex has greater effective connectivity with the anterior cingulate cortex (ACC) during the Feedback condition compared to the No feedback condition. In addition, the PPI analyses on the ACC and other regions revealed a network involving the ACC, the fusiform gyrus, the middle frontal gyrus, and the inferior parietal lobule.
Conclusions: The present results suggest that the ACC acts as a hub of anticipatory attention process connecting to the fusiform gyrus, the inferior parietal lobule, and the middle frontal gyrus. In addition, the PPI analyses revealed that the ACC was modulated by the right anterior insula. Taken these into account, the right anterior insula might control the anticipatory attention system by modulating the ACC activities.
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J.S. SKRANES, G.C. LOHAUGEN, L. EIKENES, A. HABERG & A. BRUBAKK. Cortical Surface Area and White Matter Microstructure Relate to IQ in Preterm Born Very-Low-Birth-Weight (VLBW) Young Adults.
Objective: Perinatal brain injury in VLBW children affecting grey and white matter is associated with neurocognitive deficits that persist into adulthood. The aim of the study was to investigate the relationship between cognitive deficits and cortical and white matter deviations in VLBW young adults.
Participants and Methods: 49 VLBW (birth weight ≤ 1500 grams) and 59 controls were examined at age 19 with Wechsler Adult Intelligence Scale-III and MRI. An automated MRI technique at 1.5 Tesla for morphometric analysis of cortical surface area and diffusion tensor imaging to investigate fractional anisotropy (FA) in white matter tracts was performed.
Results: Low IQ scores were correlated with reduced surface area in ventrolateral prefrontal, temporal and parietal regions. The FA-IQ correlation analysis demonstrated positive correlations in white matter including corpus callosum, long and short association tracts that ended in the affected cortical areas. No correlations between surface area or FA were seen in the control group.
Conclusions: Cognitive deficits in VLBW young adults are related with grey and white matter changes indicating perinatal brain injury with permanent influence on cortical development and tract connectivity.
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J. LÓPEZ-OLÓRIZ, E. LÓPEZ-CANCIO, J. ARENILLAS, M. BARRIOS, J. SORIANO-RAYA, J. MIRALBELL, R. DACOSTA-AGUAYO, N. BARGALLÓ, C. CÁCERES, P. TORAN, M. ALZAMORA, G. PERA, A. DÁVALOS & M. MATARÓ. Effects of Intracranial Pulsatility Index on Cognition and White Matter Integrity.
Objective: To assess the effects of increased intracranial pulsatility index (PI), an indicator of cerebral vascular resistance, on cognition and white matter (WM) integrity in a population-based sample.
Participants and Methods: A total of 95 men and women aged 50 to 65 and without history of cerebrovascular disease were included. PI was studied in the left middle cerebral artery by transcranial color-coded duplex examination. Neuropsychological tests were grouped into six cognitive domains: executive functioning, attention, verbal fluency, memory, visuospatial and visuocontructive abilities and speed and visuomotor coordination. Diffusion Tensor Imaging (DTI) images were acquired in a 3 Tesla Siemens Trio scanner and were analyzed using the Tract-Based Spatial Statistics (TBSS) tool of the FMRIB Software Library (FSL).
Results: Increased PI was related to lower executive functioning, attention, verbal fluency, memory, speed and visuomotor coordination, and with light WM disintegration. When cognitive analyses were adjusted for DTI-WM values associations were no longer significant for 4 of the 5 cognitive domains, just speed and visuomotor coordination relation remained significant.
Conclusions: Our study suggests that intracranial increases of PI may affect cognition via microstructural WM disintegration even in middle-aged asymptomatic adults.
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T. MOBERGET, E.G. HILLAND, S. ANDERSSON & T. ENDESTAD. Modulation of cerebellar BOLD-signals by the semantic context - evidence for cerebellar internal models in language processing?
Objective: The cerebellums striking anatomical homogeneity is strongly suggestive of a corresponding uniformity of function. Consequently, theoretical models accounting for the cerebellum's role in motor control should offer important cues to the understanding of "cerebellar cognition". The present study aimed to test whether the "internal model" hypothesis can also account for a cerebellar role in language processing. Specifically, we used fMRI to test two predictions derived from the model: 1) Increased cerebellar BOLD-signal should be observed when internal models are active making predictions (i.e. when the context makes stimuli predictable rather than unpredictable). 2) Increased BOLD-signal should also be observed when strong predictions are violated, reflecting processing of "error-signals" used to update the model.
Participants and Methods: 30 healthty participants were scanned at 3 Tesla while performing a reading task. Words were presented sequentially in series of 5. The predictability of the last word was manipulated by varying the preceding semantic context. This context could either consist of 1) a random sequence of words, making the 5th word unpredictable (scrambled); 2) words making up the beginning of a coherent sentence with the 5th word being the predictable last word (congruent), or; 3) words making up the beginning of a coherent sentence, but with a contextually inconguent 5th word (incongruent). fMRI-data was analyzed using SPM8.
Results: All reading conditions elicited primarily right lateralized cerebellar activation. Contrasting the congruent over the scrambled condition revealed increased activity in the right posterior cerebellum and tonsils. Contrasting the incongruent over the congruent condition revealed bilateral signal increases in the posterior cerebellum.
Conclusions: Consistent with the internal model hypothesis, cerebellar activation in a reading task was modulated by the preceding semantic context, with the most prominent effect being a BOLD-increase in the incongruous condition.
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K. MORADY & G. HUMPHREYS. The Role of Working Memory in Auditory Selective Attention.

Objective: Everyday complex environments contain more information than can be acted on at any one time. Attentional mechanisms are thus crucial to select relevant objects for further processing and, perhaps also, to inhibit those objects that are irrelevant to our current goal. Here we ask whether the maintenance of a sound in working memory also attracts our attention in auditory space? To do this, we tested performance in an auditory search task in which we asked participants to memorize a sound (prime) and then to detect a target sound in a search field of different sounds, to assess whether the stimulus in WM influenced selection in audition.

Participants and Methods: Twenty-five volunteers took part. Participants performed 25 practice trials. In the WM condition there followed 3 blocks of 40 trials, with 5 memory-probe trials appearing per block (when the stimulus display was followed by a memory probe stimulus, which participants had to match to the original cue). The task was to memorize a cued sound (e.g., the sound of a car) and then to detect a target sound (the sound of a dog) occurring in either the left or right ear. The different validity conditions were selected randomly on each trial.

Results: RTs for correct responses were analyzed followed by paired-sample t-tests to compare the mean RTs in the different conditions. There was a significant interaction between memorising the cue and validity ($F(2,48) = 4.573$, $p = 0.015$). Pairwise comparisons in the memorised cue condition showed faster performance on Valid than on Invalid trials ($t = 2.875$, $df = 24$, $p = .004$, one-tailed) and Neutral trials ($t = 2.590$, $df = 24$, $p = .008$, one-tailed

Conclusions: The data show for the first time that the selection of a target sound in a complex auditory environment can be affected by a sound held in WM. This means that WM exerts an involuntary influence over auditory attention that subjects cannot easily control.

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N. MOTA, M. CORRAL, M. PARADA, A. CREGO, S. RODRÍGUEZ-HOLGUÍN, F. CAAMAÑO & F. CADAVEIRA. Alcohol Binge Drinking Trajectory and Neuropsychological Dysfunction in University Students.

Objective: Neuropsychological studies have shown the effect of binge drinking on adolescent cognitive functioning but little is understood about its severity or clinical relevance. We investigated the prevalence of neuropsychological dysfunction in university students regarding their binge drinking trajectory in the University.

Participants and Methods: Ninety students between 19-22 years-old were administrated a neuropsychological battery assessing attention, memory and executive abilities during their third university grade. Alcohol consumption was evaluated during the first and the third university course.

Results: Significant differences in the prevalence of dysfunction in selective attention based on the trajectory of the pattern of consumption were observed. Those who maintained a binge drinking pattern from first to third grade showed more deficit scores (<-1.5 SD) than those who abandoned the pattern or were nonbinge drinkers (p=.027).

Conclusions: The results are consistent with the literature on the neurotoxic effects of intensive use of alcohol.

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C. NAVANEEDHAN. Relationship between brain activity and solving puzzles leads to positive or negative results.

Objective: Human brain is no longer considered as hard wired if it is stimulated. Just as physical activity keeps the body strong, mental activity keeps the mind sharp and agile. The present paper work explores the possibility of improved brain activity as the result of solving puzzles.

Research question: Is there a relation between mental activity and puzzle solving?

How mental exercise helps the brain to improve its ability? Is this possible through the ever changing capacity of the brain?

Participants and Methods: A group of 30 M.Ed students (male and female) in the age group 25 to 45 years were considered for the study. Before starting the experiment their general aptitude was tested to know their mental ability following this 15 M.Ed students were randomly selected from the group comprising (8 males and 7 females) and were asked to solve one puzzle a day for a period of six weeks .At the end of the experiment they were asked to solve the same general aptitude test which was originally given.

Results: Findings showed that there was significant improvement in mental ability, proving that when more mental exercise is given, the more is one's ability to solve problems.

Conclusions: Mental exercise initiates neural networks to reorganize and reinforce themselves in response to new stimuli and learning experiences. Therefore, solving puzzles stimulates brain cells to grow and connect with each other in complex ways. This is done by extending branches of intricate nerve fibers called dendrites, through which neurons receive communication from each other. A healthy, well-functioning neuron can be directly linked to tens of thousands of other neurons, creating a totality of more than a hundred trillion connections – each capable of performing 200 calculations per second. Thus by doing mental exercise it is possible to improve memory capacity as well as thinking ability of the brain. Hence, the human brain is ever changing.

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Y. OHGAMI, Y. KOTANI, J. ARAI, S. KIRYU & Y. INOUE. Anticipatory Attention for Facial, Verbal, and Symbolic Feedback Stimuli: An ERP Study.

Objective: The stimulus-preceding negativity (SPN), an event-related potential, reflects anticipatory attention processes. The right-lateralized distribution is a characteristic of the SPN. In the present study we investigated whether the right-lateralized SPN distribution was affected by the modality of a visual stimulus that was anticipated.

Participants and Methods: Electroencephalogram data was obtained from 30 healthy participants. They performed a time estimation task where a feedback stimulus about the performance of their timing was presented 2 s after a voluntary movement. The modality of visual feedback stimuli was manipulated by varying the following four experimental conditions: (a) facial (smiling, frowning), (b) verbal (correctness, incorrectness in Japanese), (c) symbolic (one, or two vertical bars), and (d) no feedback. Except in the no feedback condition, which was a control condition, participants received feedback information whether or not their time estimation performance was correct according to the content of the feedback stimulus.

Results: The statistical analysis demonstrated a significant interaction of condition by hemisphere. Follow-up tests revealed a significant right hemisphere preponderance only in the symbolic condition, whereas there was no right hemisphere dominance in the facial and the verbal conditions.

Conclusions: The right hemisphere dominance was shown only in the symbolic condition. The lack of significant hemispheric differences in the facial and verbal conditions may be because the facial and verbal feedback stimuli were translated into a reward. Some previous SPN studies, in which monetary reward was employed, showed increased activity in the left hemisphere. These results imply that language and facial processing might affect the emergence of the preponderance of the right hemisphere.

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H.F. ØSTGÅRD, G.C. LØHAUGEN, S. ANDREASSEN, G. JACOBSEN, T. VIK, A. BRUBAKK, J. SKRANES & M. MARTINUSSEN. IQ and Intrauterine Growth Restriction in Young Adults Born Small-for-Gestational-Age at Term.

Objective: To study the effect of being born small for gestational age (SGA) with intrauterine growth restriction (IUGR) on later cognitive functioning. We hypothesised that IQ scores would be lower among the SGA subjects, especially among those born after IUGR and those exposed to maternal smoking during pregnancy.

Participants and Methods: Population-based follow-up study at age 19 of 59 term-born SGA (birth-weight<10th centile, mean: 2920g) and

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81 controls (birth-weight>10th centile, mean: 3703g). IQ was assessed by the WAIS III. Fetal weight-deviation was calculated based on repeated ultrasound measurements of biparietal and mid-abdominal diameter at 25, 33 and 37 weeks of gestation for 29 SGA subjects and 75 controls. Weight-deviations were recorded as positive and negative percentages; zero denoted no deviation from individual expected growth based on weight at 25 weeks. Mean and standard deviation (sd) for estimated fetal growth in the control group was used to dichotomize the SGA group into normal growth and IUGR (growth deviation of more than -2sd from control mean). There was no difference in birthweight between SGA subjects with IUGR and those with normal growth. Maternal smoking in pregnancy was also recorded.
Results: The total SGA group had significantly lower IQ scores than the control group (p=0.001), including lower scores on six of the WAIS-III subtests. In the subgroup with repeated ultrasound measurements, six SGA subjects (21%) were defined as IUGR. In this subgroup, only these six had significantly lower IQ than controls (IQ 87 vs 101, p=0.003). SGA subjects with normal growth did not differ in IQ compared to controls. Maternal smoking in pregnancy was related to lower IQ in the comparison group, but not in the SGA or the IUGR groups.
Conclusions: Young adults born SGA had decreased cognitive outcome. Our results suggest that this decrease may be confined to SGA young adults with IUGR based on fetal growth pattern, whereas young adults born SGA with normal fetal growth have normal cognitive function.
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C. PARK, S. PARK, J. CHOI, H. LEE, J. LEE & H. JUNG. A study on neuropsychological performances and personality traits of internet addiction.
Objective: Internet addiction (IA) is defined as an individual's inability to control the use of the internet. Research on addictive behavior including substance abuse has suggested that addiction is related to impaired neuropsychological (NP) functioning and high impulsivity. However, studies on IA have been insufficient to describe psychological profile beyond impulsivity. This study aims to investigate psychological profile including NP performance and personality traits of individuals with IA.
Participants and Methods: Individuals who received a score of 50 or greater on the Internet Addiction Test (IAT) based on Young's (1998) criteria as well as spent over 4 hours per day and 30 hours per week on Internet use were classified as an IA group. The AI group (N=26, Male=15; mean age=23.08 y (SD=3.29); mean score on IAT=75.19 (SD=7.39); mean internet use time per day=6.08h (SD=2.45)) and age- and sex-matched control group (N=24, Male=13; mean score on IAT=17.08 (SD=8.57); mean internet use time per day = 1.32h (SD=0.62)) carried out a battery of NP tests, the Temperament and Character Inventory, and the Barratt Impulsiveness Scale 11. The battery of traditional NP tests consisted of the short version of Wechsler Adult Intelligence Scale (WAIS), WAIS digit span, the Stroop, and the Trail-Making Test. Cambridge Neuropsychological Test Automated Battery (CANTAB; Intra-Extra Dimensional Set Shift, Stocking of Cambridge, Spatial Span (SSP), and Stop Signal task (SST)) were also administered to assess NP functioning.
Results: The IA group showed higher levels of impulsivity, novelty seeking, harm avoidance, and lower levels of self-directedness compared to the control group. Among CANTAB variables, the IA group showed more errors on SST in the latter blocks and responded faster on SSP than the control group.
Conclusions: This study suggests that individuals with IA have notably high impulsivity both on personality traits and NP tasks.
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E. RACE, S. GALL, N. SEDANI, Y. XING, M.M. KEANE & M. VERFAELLIE. Reduced Coherence of Memory and Future Thought in Amnesia.
Objective: Amnesic patients are impaired at constructing narratives about autobiographical experiences as well as constructing narratives describing hypothetical or future scenarios (Klein et al., 2002; Hassabis et al., 2007; Andelman et al., 2010; Race et al., 2011). Quantitative assessments have primarily focused on narrative content, and have demonstrated that patients produce fewer event details compared to controls. However, in addition to the generation of narrative elements, the construction of narratives about lived or imagined experiences also requires the integration of elements into a coherent narrative. Given that amnesic patients demonstrate impairments in online relational processing (Hannula et al., 2006; Olson et al., 2006; Luck et al., 2010), an important question is whether patients demonstrate additional impairments in measures of narrative coherence that are sensitive to relational processing demands (Kurczek & Duff, 2011).
Participants and Methods: The current study investigated this hypothesis by testing the ability of nine amnesic patients with medial temporal lobe (MTL) damage to construct coherent narratives about future events, past events, and events based on visually-presented pictures. The inclusion of the picture narrative condition enabled evaluation of narrative coherence in a condition in which patients do not demonstrate reductions in narrative content (Race et al., 2011). Narrative coherence was scored using the Narrative Coherence Coding Scheme (Baker-Ward et al., 2007).
Results: Amnesic patients demonstrated impairments across all three conditions, suggesting that narrative coherence is impaired regardless of the integrity of narrative content.
Conclusions: These results highlight the fact that deficits in the integration of individual details into coherent units is an important aspect of the impairment in narrative-based memory and future thinking tasks in amnesia.
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L.M. RIMOL, M.K. OTNÆS, T. MOBERGET, T. SINNES, M. EIKEMO, M.H. SNEVE, B. SÆTREVIK, T. ENDESTAD & A. BJØRNERUD. Brain activation in the cerebellum to asynchronous and isochronous visual stimuli.
Objective: Over the last few decades it has become increasingly clear that cerebellar function extends beyond its traditional role in motor control. Although the precise nature of its role in cognition remains elusive, there is evidence for cerebellar involvement in temporal processing from studies showing that patients with cerebellar lesions have problems judging time intervals between pairs of stimuli. The objective of the present study was to determine whether non-motor related processing of complex ("asynchronous") temporal sequences of visual stimuli elicits stronger cerebellar BOLD activation than simple ("isochronous") sequences of stimuli, which would suggest a purely cognitive role for the cerebellum in temporal processing.
Participants and Methods: 16 subjects (19-44 yrs old) participated in the present fMRI study. A sequence of six visual stimuli (black circles) was presented to the subjects. After a variable interval the subjects were either presented with another sequence of six stimuli and asked whether it matched the first one (the "Match" condition), or they were instructed to try to reproduce the first sequence by pressing a button (the "Reproduce" condition). The stimulus sequences were either asynchronous (uneven interstimulus interval) or isochronous (even interval). After the experiment, two subjects reported "tapping" with a finger "to memorize the rhythm", and were excluded from the analyses in order to rule out motor processing. We compared brain activation to the encoding (first presentation) of asynchronous and isochronous stimulus sequences within the general linear model framework.
Results: In both the Match and Reproduce conditions, encoding of asynchronous stimulus sequences elicited significantly more activation in widespread cerebellar regions than encoding of isochronous stimuli.
Conclusions: The present results support a role for the cerebellum in motor-independent activation to complex temporal information, consistent with a recent fMRI study [Xu et al. (2006). J. Neurosci 26:5590-5595].
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K. ZAHEDI & M. SADEGHI. The use of different lexicon (pronouns and adjectives) in styles of attachment and its relationship with cerebral Event-Related-Potentials.
Objective: Objective: The aim of the present research is two-fold; (1) to examine the relationship between differences in the application of lexical items limited to emotive words with a focus on nominals, adjectivals and verbals and different attachment styles; (2) the ERP analysis of such differences.

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Participants and Methods: Participants and Method: 50 individual were selected through an accessible sampling. The method comprises 3 tools: a standard attachment style questionnaire; 4 tasks in the form of free writing by subjects on memorable events in their lives; and ERP
Results: Results: Findings indicate that attachment styles are represented proportionately by the language mechanisms of relevant lexical choices. Such representations have a neurological manifestation in ERP
Conclusions: Conclusion: There is a tripartitle convergent geometry of neuro-lingua-psycho angles to human structure.
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M. BARTÉS-SERRALLONGA, J. SERRA-GRABULOSA, J. SOLÉ-CASALS, A. ADAN, C. FALCÓN, X. CALDÚ & N. BARGALLÓ. Sustained attention and working memory networks revealed by a CPT task.
Objective: The Identical Pairs version of the CPT (CPT-IP) has been used to evaluate attention in normal subjects and in deficits in developmental, neurological and psychiatric disorders. The aim of our study was to design a task to evaluate sustained attention using functional magnetic resonance imaging (fMRI).
Participants and Methods: Forty right-handed, healthy subjects (20 women; age range 18–25) were recruited to participate in the study. A CPT-IP implemented as a block design was used to assess sustained attention in the fMRI session. fMRI data was analysed by using the General Linear Model (GLM) and Independent Component Analysis (ICA).
Results: Results showed that the CPT-IP task used activates a network of frontal, parietal and occipital areas. ICA was able to find more active networks than GLM. No gender differences were observed. These activations could be related to executive, attentional and numerical processing functions.
Conclusions: The CPT-IP task was associated with an attention network, where activation corresponds with the activations found in previous studies. Compared to GLM-based approaches ICA is able to separate statistical independent components and identify more networks than GLM.
This work has been partially supported by the Generalitat de Catalunya under the grant 2010BE1-00772 to Dr. Jordi Solé-Casals; by the University of Vic under de grant R0904; and by grants of the Ministerio de Educación y Ciencia of the Spanish Government (SEJ2005-08704) and the Departament d'Innovació, Universitats i Empresa of the Generalitat de Catalunya (2009BE-2 00239) to Dr. Josep M Serra-Grabulosa.
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E. SOLNTSEVA & N. KAPAI. Haloperidol Abolishes Donepezil-Induced Reversal of Long-Term Potentiation Impaired by Beta-Amyloid in Rat Hippocampus.
Objective: Donepezil is a potent acetylcholinesterase inhibitor used for the treatment of Alzheimer's disease (AD). Additional therapeutically relevant target for donepezil is sigma1 receptors (Kato et al., 1999). It is generally believed that beta-amyloid peptides (Abeta) contribute to the pathogenesis of AD. Low concentrations of Abeta were shown to impair long-term potentiation (LTP) in hippocampus (Chen et al., 2000), a cellular model for learning and memory. It was shown in our previous work that donepezil antagonizes the suppressive action of Abeta1-42 on LTP in rat hippocampal slices (Kapai et al., 2012). We suppose that sigma1 receptors might be involved into mechanism(s) of this effect of donepezil. The purpose of present study was to determine whether donepezil-induced reversal of LTP impaired by Abeta can be abolished by haloperidol, a potent antagonist of sigma1 receptors (Hayashi and Su, 2008).
Participants and Methods: Population spikes (PS) were recorded from the pyramidal layer of the CA1 region of rat hippocampal slices. Drugs were applied by addition to the perfusate from 15 min before to 5 min after the tetanus.
Results: In the control group, the amplitude of PS 30 min post-tetanus reached 146±11% (n=10). Neither 1 microM donepezil (n=6), nor 0,5 microM haloperidol (n=5) changed LTP significantly. Abeta1-42 (200 nM) markedly suppressed the LTP induction or even caused the depression of PS: the amplitude of PS 30 min post-tetanus was 82±15% ($P<0.005$, n=7). This suppression of LTP could be markedly prevented when donepezil was co-administered with Abeta: the amplitude of PS 30 min post-tetanus was 136±11% ($P<0.05$, n=5). Further, we co-administered three substances: Abeta, donepezil and haloperidol, and have found that haloperidol antagonizes the stimulating effect of donepezil on LTP: the amplitude of PS 30 min post-tetanus was 92±6% ($P<0.05$, n=5).
Conclusions: Results suggest the involvement of sigma1 receptors into mechanisms of the rescue of hippocampal LTP impaired by Abeta by donepezil.
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O. TRAUPE, C.D. WIESNER & C. KAERNBACH. The Amygdala Shows Early and Late Responses to Facial Threat Signals.
Objective: The perception of facial emotion and gaze direction appears to be interdependent to a certain degree. In the supra-threshold domain direct-gaze expressions of anger and averted expressions of fear are of particular significance. This can be seen from detection measures as well as self-reported and neurophysiologically determined affective responses. As the amygdala is known to be involved in the underlying processing, it can be debated on whether this interaction effect is mediated by early affective responses or by gaze-orienting potentially based on more deliberate allocation of attention.
Participants and Methods: We presented backwardly masked gaze-varied facial displays of anger and fear to 17 healthy participants in an attempt to separate such early responses from processing relying more strongly on visual awareness. This method meant to elaborate on the opposed effects of affective habituation and perceptual learning.
Results: Results from behavioral detection of affective (vs. neutral) facial displays show a significant interaction effect in the first part of the experiment, likely emanating from early responses to facial threat. Neuroimaging (fMRI) results are twofold: angry faces activated the amygdala in the first part, while fearful faces yielded activation in the second part of the experiment. In particular, early responses to fearful faces, evident from behavioral analyses, seem not to be mediated by the amygdala.
Conclusions: In contrast to behavioral results, neuroimaging confirms separate processes activating the amygdala due to direct (direct anger) and indirect threat (averted fear), respectively. Later activation of the superior temporal sulcus (STS) by direct anger and the fusiform face area (FFA) by direct fear confirms nonaffective processing to increase over time. In addition to presenting behavioral and neuroimaging results separately, detection performance can be shown to correlate strongly with caudate activation yielding a possible basis for an attention-based decision process.
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S.K. VANDBORG, T.B. HARTMANN, B.E. BENNEDSEN, A.D. PEDERSEN & P.H. THOMSEN. Memory and Executive Functions in Patients with Obsessive Compulsive Disorder and Outcome of Cognitive Behavioral Therapy.
Objective: It is undetermined why up to 50% of patients with Obsessive Compulsive Disorder (OCD) do not have a clinically significant outcome of Cognitive Behavioural Therapy (CBT). The aim of this study was to investigate whether memory and executive functions in OCD-patients were associated with outcome of CBT.
Participants and Methods: 39 OCD-patients were assessed with the Yale-Brown Obsessive Compulsive Scale (Y-BOCS) to assess OCD symptom severity before and after CBT, and with neuropsychological tests of memory and executive functions before CBT. Responders were defined as having ≥ 30% reduction in Y-BOCS scores after CBT.
Results: There was a greater risk of non-response to CBT for OCD-patients with poorer performance on Rey Complex Figure Test (RCFT), a neuropsychological test of visuo-spatial memory and organizational strategies (p=.043). There were no statistically significant differences between responders (56%) and non-responders (44%) on any demographic or baseline psychopathological variables, nor on any other neuropsychological tests of memory and executive functions.

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Conclusions: Poor performance on the RCFT usually reflects difficulties in organizing the complex and ambiguous information during encoding of the figure, and these difficulties subsequently result in memory impairments. Difficulties organizing complex information may make it more difficult for OCD-patients to encode and subsequently remember relevant messages from CBT, thereby decreasing their response rate. Integrating cognitive remediation strategies and CBT might improve the number of OCD-patients with a good treatment outcome.
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A.N. WADHAWAN & S. BAJPAI. Neuropsychological Disability Evaluation Trends in India: Past, Present & Future.
Objective: 1. Compare past & present neurological / neuropsychological disability (NPD) evaluation in India, its limitations & bridging gap between the 2.
2. Obtain comprehensive & objective method of neurological & NPD evaluation procedure.
Participants and Methods: Total 43 patients (pts) in age 5-60 yr, both males (M) & females (F) were referred to dept. of clinical neuropsychology for assessment of NPD by their treating doctor, pts undergoing treatment at the center (> 2 years), maintaining regular follow ups, & had irreversible neurological problems were assessed on the existing disability evaluation guidelines (Gazette' 2001). Pts. under 2 - 5 yrs of treatment, at NS Center, AIIMS were eligible for assessment to obtain temporary certification, while pts under treatment > 5 yrs, were eligible for assessment to obtain permanent neurological disability certificate (provided they fit into disability criteria). No outside/direct disability referrals were entertained. Fitness assessed by the concerned consultant
Results: In total 28 M & 15 F. 22 pts were referred for temporary, 21 for permanent NPD evaluation. Considering pts existing problems, 41pts= IQ assessment, 2pts=IQ+SQ, 6pts=physical disability+IQ+SQ. 8 disability assessment procedures exist in India. Gazette' 2001, is most recommended procedure, which mentions IQ /SQ/ VSMS & physical disability but not premorbid functioning. Since, prior mental, social, emotional & physical status is important for success of prognosis. Hence, mere innate/acquired IQ due to trauma may not suffice the criteria of NPD evaluation.
Conclusions: Gazette' 2001 guidelines are used for NPD, despite the fact that it only includes MR and physical disability criteria. No uniform procedure for NPD certification (head trauma) exists, showing immense discrepancy, a major lacunae of many procedures used in India. Thus, immediate need for developing uniform guidelines to make disability evaluation an eclectic mix of psychosocial approach in comparison to premorbid functioning in India.
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L. ZHAVORONKOVA, A. ZHARIKOVA, E. KUSHNIR, S. KUPTSOVA & A. MIKHALKOVA. Psychological, stabilographic and EEG markers of successful dual task performance in healthy persons.
Objective: Healthy young adults are able to perform successfully dual tasks. A little is known about brain mechanisms of multiple information streams processing in these conditions. The present study was aimed to reveal specificity of brain regions interaction during two concurent stimulus processing – motor and cognitive tasks.
Participants and Methods: 40 healthy subjects (aged 29,8 ± 2,47 years) participated in a multidisciplinary neuropsychologic and stabilographic study, in 20 of them we additionally recorded EEG during tasks performance. The subjects performed different cognitive tasks (counting) while standing on force platform during special balance tasks. We analyzed EEG coherence during dual and single tasks.
Results: The results showed that 30% of subjects better performed in dual task comparing to isolated tasks. Better results have been observed in people with larger cognitive resources, especially in those with higher speed of attention switch. Stabilography data showed decrease of the amplitude of center of pressure (CoP) sway along the frontal axis and decrease of CoP velocity fluctuations. EEG analysis revealed specific markers for performance in isolated motor and cognitive component: motor component was accompanied by maximal increase of EEG coherence in the right hemisphere for long pairs of leads, predominantly for alpha1-and alpha2-bands, as well as by increase of inter-hemispheric pairs in the parietal and occipital regions. The cognitive component was accompanied by functional coupling in the left hemisphere, especially for slow delta- and theta-bands. EEG markers of "conflict of the interest" during dual-task performance were observed in the frontal regions for alpha-1 band.
Conclusions: Our results suggest the successful performance in the dual tasks is determined by large cognitive resources and is provided by frequency-spatial diversity of activation of different brain regions which are involved in performance of each dual task's component. Supported by RFH 10-06-00114a
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Electrophysiology/EEG/ERP

J.F. BRUNNER, T.I. HANSEN, J. KROPOTOV, T. SKANDSEN, A. OLSEN & A. HÅBERG. Longterm test-retest reliability of visual event related potentials in a two stimulius Go/NoGo task.
Objective: The Go/NoGo task is commonly used in research to study control functions in the brain. Two well known cognitive ERP waves, P3b and P3 NOGo, can be extracted from the electroencephalogram (EEG) recorded during this paradigm. The P3 NoGo wave can, by using Independent component analysis (ICA) on group data be decomposed into two independent components (Kropotov 2009, 2011). The first component is localized by sLORETA in the supplementary motor area (BA 6) area and the second in gyrus cingulate area (BA 24). The first component (mean latency 332 ms) is assumed to be related to response conflict processing (suppression of ongoing neural activity and action selection). The other (mean latency 395 ms) can be associated with monitoring – and reflect the match/mismatch between an action model (intention) and action outcome (close relation to error related negativity, but activates to successful inhibitions and not errors). The objective of the current study was to determine the long-term reliability of the P3 waves and the two independent components.
Participants and Methods: 19-channel EEG has been recorded during the Go-NoGo task in normal healthy subjects (N=20) on two occasions separated by 6-12 months. The age of the subjects had a mean of 35 years (range 16 to 68 years). Different methods of estimating latency and amplitude were used; peak, peak to peak and fractional area.
Results: Statistical analysis (intra-class correlation) revealed excellent test-retest reliability for latency (>.90) for both waves and components if measured by fractional area, and strong reliability for amplitude (<80) if mean area was used. Using other scoring variables, for instance peak latency, gave lower, but still moderate to strong reliability.
Conclusions: These results demonstrate that latency and amplitude of P3's in this Go/NoGo task have superior long-term reliability and can be applied in research. If used for individual clinical assessment, replication in appropriate clinical populations is necessary.
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S.L. HAUGER, C. SCHNAKERS, F. BECKER, A.K. SCHANKE & M. LØVSTAD. Electrophysiological Indications of Working Memory Processes in High- but not Low-Level Minimally Conscious Patients – A Pilot Study.
Objective: The minimally conscious state (MCS) is a clinically heterogeneous category, recently subdivided in two groups; MCS- showing only basic signs of consciousness such as visual pursuit, and MCS+ who display more complex behaviors, such as inconsistent command following. This pilot study applied Event Related Potentials (ERP) in a working memory task comparing MCS- and MCS+ patients with healthy controls and patients in a vegetative state (VS; showing no behavioral signs of consciousness).
Participants and Methods: Level of consciousness was established behaviorally with the Coma Recovery Scale-Revised (CRS-R). Four

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MCS patients (age range: 19-49, 3 traumatic brain injury (TBI), 1 stroke) were compared to 3 VS patients (age range: 18-38, CRS-R score ≤ 6; all TBI), and 9 healthy controls (age range: 28-48). Injury onset range for included patients: 3,5-120 months. Two MCS– patients showed visual pursuit, but no command following (CRS-R score 7 & 9), while 2 MCS+ patients showed inconsistent command following or reaching for objects (CRS-R score 14 & 11). The ERP task included (1) passive listening to the subject`s own first name (SON) repeated 100 times (SOA: 2 sec) and (2) active counting of SON (SON: 50 times), randomly interspersed between an unfamiliar name (UN: 50 times).
Results: The healthy control group displayed a P300 component over midline electrodes (Fz, Cz and Pz) in the active counting condition, that was markedly larger compared to the passive listening condition. The 2 MCS+ patients also displayed a delayed, but distinct P300 in the active counting condition. The 2 MCS– and the VS group, did not show a P300 in either task.
Conclusions: These preliminary ERP data suggest that working memory processing may be impaired in MCS–, but at least partially present in MCS+. The results tentatively confirm the distinction between MCS- and MCS+, and that cognitive functioning of non-communicative MCS+ patients is potentially underestimated by behavioral assessment.
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V. PEREZ-BOCOURT. Effects of Erythropoietin in the Executive Control in Parkinson Disease.
Objective: Evaluate the protective effects of the human recombinant erythropoietin (EPOrh) in the executive control in Parkinson disease (PD) recording the Event Ralated Potentials (ERPs).
Participants and Methods: ERPs where recorded while the subjects respond to the Eriksen flanker task. Sample: 18 PD patients (I-III Hoehn and Yahr stage, medicated, 41-65 years) and 9 healthy controls, matched in age, sex and education level.
Results: Patients were slower and committed more mistakes than controls, creating a response selection that requires extra time and greater effort, due to the dysfunction in the dopaminergic system produced by PD. Behavioral results shows no effect of the EPOrh medication in patients in the executive control, according to the worse performance of the EPOrh group in precision and reaction time. However, non medicated patients show a possible dissociation in the neural answer mechanism in the incongruent condition. The ERPs show maximum amplitude of the N2 component at Cz with a significant difference between patients and controls. Patients with EPOrh medication have the minor N2 amplitude, being absent a component modulation by the effect of the new medication. N2 latency does not show significant difference by groups or by conditions.
Conclusions: The EPOrh medication could have an effect in the early visual processing or the perceptual integration of task, given that the amplitude of the complex N1-P1 was greater in patients with EPOrh than in not medicated patients.
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Visuopatial Functions/Neglect/Agnosia

G.A. DE HAAN, J. HEUTINK, B. MELIS-DANKERS, O. TUCHA & W. BROUWER. Subjective Complaints in Patients Suffering from Hemianopia.
Objective: Homonymous hemianopia, the most common form of Homonymous Visual Field Defects (HVFD), refers to a loss of perception for half the visual field, affecting both eyes, due to acquired postchiasmatic brain injury. Impaired reading and mobility problems have been frequently reported in patients with hemianopia. Other vision-related complaints are less well-known. This study aimed to survey the prevalence of these other visual complaints in a group of patients with HVFDs.
Participants and Methods: Several questionnaires were used to examine the subjective complaints of 45 hemianopia patients. The spontaneously reported difficulties in daily life caused by the hemianopia were assessed, followed by three standardized questionnaires: The Visual Functioning Questionnaire (NEI-VFQ-25), the Cerebral Visual Disorders questionnaire (CVD) and the Impaired Mobility Questionnaire (IMQ).
Results: Most of the reported difficulties were related to reading and mobility, as expected. However, the hemianopia patients shared several other complaints, such as blurred vision, impaired light adaptation, visual hallucinations and pain or discomfort around the eyes, which are usually not mentioned in the existing literature on hemianopia. Examples of problems experienced in everyday life were difficulties with watching television, selecting clothes and perceiving facial expressions.
Conclusions: Apart from the well-known complaints with regard to reading and mobility, hemianopia patients frequently report other vision-related problems. This is important information for practitioners and researchers in the field of vision rehabilitation.
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B. GUTIÉRREZ, F. PUJADAS, A. PALASÍ, D. LIÉBANA, M. OLABARRIETA & M. BOADA.. Visuospatial Deficits in Depressive Disordes: Common or Athypical Neuropsychological Impairment?
Objective: Depressive disorders are well reported associated with cognitive deficits, including problems with attention, learning and memory, processing speed and executive functions. Some authors considered that visuospatial ability is frequently compromised in elderly depressed patients. On the other hand some studies have found dysfunction in the right-hemispheric attention network in depression, affecting visuospatial performance. However, published studies don't support this relationship.
The aim of this study is to determine how common visuospatial deficits are in a very well characterized sample of depressive patients without other neurological or psychiatric illness.
Participants and Methods: 39 adults between 60-84 years old (30 females, 9 males) with depression, diagnosed by standard assessment, were referred to us to evaluate cognitive complaints last year. All of them were assessed with a comprehensive neuropsychological battery, including several cognitive domains: alertness and attention, executive functions, learning and memory and visuospatial performance.
Results: Alteration in visuospatial abilities was presented in 22 of the 39 patients (56,4%). Verbal memory problems (56,4%), whose results improved with recognition (100%), deficits in information processing speed (43,6%) and executive functions problems (74,6%) being planning, cognitive flexibility and verbal fluency the most frequent frontal dysfunctions, were observed.
Conclusions: A neuropsychological pattern with deficits in verbal memory, information processing speed, executive functions and visuospatial abilities we observed in our sample.
Visuospatial difficulties may be found without other cognitive posterior impairment, however more studies are needed to determinate whether the impairment is a consequence of a visuospatial deficit or of an executive dysfunction that impacts visuospatial ability.
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M. HARCIAREK, J.B. WILLIAMSON, B. BURTIS, S. HAQUE & K.M. HEILMAN. Putaminal Ipsilesional Neglect.
Objective: Although lesions to subcortical regions may result in hemispatial neglect, ipsilateral neglect from putaminal damage has not been previously reported. It has been posited, however, that ipsilateral neglect from unilateral frontal lesion may be induced by an attentional grasp type reflex. Thus, since putaminal injury may induce frontal dysfunction, subjects with putaminal stroke may develop an attentional grasp, causing ipsilateral neglect.
Participants and Methods: We describe a patient with a right putaminal-white matter injury who, when compared to 9 neurologically healthy age and education matched controls, presented with ipsilateral neglect. We also tested how the ipsilateral neglect might be altered with repeated trials, distractors (left, right and bilateral), and spatial position (close vs. far space).

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Results: Overall, the patient had a leftward bias. This leftward bias increased with repeated trials, particularly in the close condition and with left-sided distractors. By comparison, a reduction in this left-sided bias was observed in the far condition with either left or right-sided distractors.
Conclusions: Ipsilateral neglect is often caused by frontal injury and has been attributed to a release-increase in parietal lobe mediated attentional approach-grasp. This patient's putaminal-white matter injury may have induced dysfunction in frontal mediated networks. With repeated trials this patient's right frontal basal ganglia network may have fatigued and this fatigue together with left-sided distractors in the close condition enhanced this contralesional attentional grasp.
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K. HIROMITSU, S. SAITO, Y. TABEI, R. YAMADA, N. SHINOURA & A. MIDORIKAWA. Error patterns of the picture naming predict the brain lesion and unilateral neglect.
Objective: There are several methods which may detect the existence of unilateral neglect (UN) in brain damaged patients. However most of the methods were dependent on motor domain such as paper and pencil tests. In this study we examined the availability of simple recognition task in order to identify the existence of UN.
Participants and Methods: The subjects were 42 patients with brain injury. The patients were asked to name the pictures of the Randt memory test (Randt and Brown, 1986) and to perform traditional paper and pencil test such as the line bisection test. The naming test was composed of fifteen pictures including everyday objects, animals and body parts.
Results: The results showed that eight patients had failure in the picture of "human ear" and could name other pictures perfectly. In addition, six patients of them (four were the frontal lobe lesion and two were temporal lobe lesion) had lesion in the right hemispheres and tended to have UN. And the pattern of the failure was categorical errors. On the other hand, patients with the left hemisphere lesions had not naming errors but naming deficits. And they had no symptoms of UN.
Conclusions: This data suggested that the naming paradigm might predict not only the existence of the right hemisphere lesion but also the existence of UN.
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K. HIROMITSU, S. SAITO, Y. TABEI, R. YAMADA, N. SHINOURA & A. MIDORIKAWA. Error patterns of the picture naming predict the brain lesion and unilateral neglect.
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M. LESNIAK, U. STEPIEN & P. SOLUCH. Pure Alexia After Right Fusiform Gyrus Hemorrhagic Stroke.
Objective: Pure alexia is an acquired disorder of reading commonly associated with damage to the posterior part of the left medial occipito-temporal (fusiform) gyrus which is a neural basis for visual processing of letters and words. This region is referred to as the visual word-form area (VWFA). Right-sided lesions very rarely lead to pure alexia. We report a case of a young man presenting with isolated pure alexia after a damage to the right fusiform gyrus.
Participants and Methods: AB, a 33-years-old right-handed male was admitted to the stroke unit with severe headache. CT revealed a hemorrhage in the right occipito-temporal area that encompassed the fusiform gyrus. Neurological examination revealed only meningeal signs. Visual acuity and visual field proved normal. However, AB complained on persistent inability to read, including difficulties in identification of letters. The patient's visual and cognitive functioning was assessed using a battery of neuropsychological tests. An fMRI examination was performed to investigate BOLD signal response to language and reading tasks.
Results: Neuropsychological assessment revealed no language impairment, neglect syndrome or other visual and cognitive disturbances that could affect reading. AB was able to write correctly but his reading was very slow (14 words/min) and laborious with frequent visual errors. A pronounced word length effect (200ms per letter) indicated that AB developed a strategy of letter-by-letter reading. AB's reading speed significantly improved but two months post onset it was still below normal range (50 words/min). fMRI revealed language areas in the right hemisphere. Reading single words was correlated with bilateral activation within posterior parts of fusiform gyri.
Conclusions: This case provides an evidence that in individuals with right hemisphere dominance for language, VWFA may be situated in the right fusiform gyrus. Damage to this area may cause pure alexia as severe as that observed in patients with left hemisphere language specialization.
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T.C. NIJBOER, B.J. KOLLEN & G. KWAKKEL. Recovery of hemispatial neglect after stroke: a longitudinal cohort study.
Objective: The aim of the current study was to investigate the longitudinal relationship between (severity of) hemispatial neglect and change in time-dependent covariates.
Participants and Methods: 101 Acute stroke patients with first-ever ischemic middle cerebral artery strokes were included. This prospective cohort study based on 18 repeated measures over time during the first post-stroke year. Baseline characteristics as well as longitudinal information from the letter cancelation (LC), line bisection (LB), and Barthel Index (BI) were used. From these repeated measures, time-dependent measures weekly, starting from within 14 days post-stroke, and bi-weekly from week 10-20 were analyzed, using random coefficient analysis.
Results: Of the cohort, 51 patients showed signs of neglect. Result indicate that at least 16% of significant change in performance on the LC was explained by the regression coefficients for time, whereas time explained 42% of change scores for the BI. Time was significantly negatively correlated with improvement.
Conclusions: Most pronounced improvements occur earlier after stroke, but recovery profiles clearly extend beyond the first 3 months post-stroke.
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L. PALERMO, F. BIANCHINI, V. GIORGIO, C. INCOCCIA, L. PICCARDI & C. GUARIGLIA. Is the Developmental Topographical Disorientation Just a Navigational Disorder? Mr L.A. (Lost Again!) Says Yes.
Objective: Developmental topographical disorientation (DTD) is the presence of navigational deficits in the context of normal intellectual ability and in absence of any known neurological or psychiatric disorder. Until now only three cases of DTD have been fully described, thus we can not drawing definitive conclusions about this disorder. What we are missing is (a) establishing whether different kinds of DTD can ex-

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ist; (b) understanding if DTD is a specific deficit involving only navigational processes or if the navigational problems typical of DTD are just the more invalidating consequence of a more general deficit in a visuo-spatial and visuo-constructive process affecting also other skills such as mental rotation.
Participants and Methods: Mr L.A., a 38-year-old man with no history of neurological or psychiatric disorders, can shed more light on DTD characteristics. The absence of alterations of his brain was confirmed by a neuroradiological exam. Mr L.A was submitted to a neuropsychological assessment including IQ, memory, visuo-spatial and visuo-constructive tests. Different navigational skills were investigated by means of specific tasks. Mr L.A.' performance on tests lacking of standardized data was compared with that of healthy individuals by means of the Crawford and Howell's methodology.
Results: Mr. L.A. showed a severe impairment in the route knowledge and in the formation of mental representations of environments, while his landmark knowledge was preserved. This deficit was selective, since, at variance with previous cases of DTD, he was not affected by other visuo-spatial deficits (for example on mental rotation or block design).
Conclusions: Following the Siegel & White (1975) model of the human navigation, we can hypothesize that Mr. L.A. had only landmark-based strategy, but not route or survey ones. A comparison with previous different DTD cases will be presented.
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S. PÉREZ MARTÍNEZ & M. ANDEYRO GARCÍA. Cognitive profile involved in architectural drawing in Down syndrome.
Objective: We show the methodology belonging to an intervention program in architectural drawing through the work on neuropsychological processes involved in Down syndrome as part of the development of the research plan "Pedagogical Graphic Strategies for the development of the capacity of understanding space through the architectural drawing".
Participants and Methods: 30 subjects affected by DS participate in the project. A neuropsychological evaluation is performed individually, later and into three groups (2 experimental and 1 control) develop 2D and 3D graphics work.
The proposed methodology is experimental and analytical. The subjects make drawings that maintain certain parallelism with the current practices of Architectural Drawing in first and second university levels, and make the analysis of the graphical results.
Results: Neuropsychological profile of subjects were evaluated through tests such as CPT-II, EMAV and RIAS among others, highlighting the decisive aspects in visual attention and visuospatial skills developing competent 2D and 3D graphic activities as well as the structure of the program of intervention from the displayed profile.
We show in a poster examples of the evolution of the drawings made. They incorporate reinforcements to the traditional techniques of teaching methods in architectural drawing, new graphic strategies in order to the subjects can gradually become familiar with spatial aspects.
Conclusions: Preliminary data, the structure of the program of intervention shown in relation to the neuropsychological profile and performance of subjects show our program as a model feasible for application in subjects with Down syndrome in order to improve the concept of physical space (2D and 3D) and their involvement in everyday life, and therefore, in the improvement of the quality of life for them.
We demonstrate the progress of their ability to relate with the space of their immediate environment, object location, size and orientation of their home and knowledge of their city.
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J.E. ROSENQVIST, P. LAHTI-NUUTTILA, M. LAASONEN, S.L. KEMP, J. HOLDNACK & M. KORKMAN. Influence of TV, Computers, and Books on Visuospatial Processing and Visual Memory.
Objective: The time children spend watching TV, using computers, and reading books has previously been shown to influence language development. The present study explored the influence of habits of watching TV, using the computer, and reading books on neurocognitive development of another area, key to children's learning, namely visuospatial processing as well as visual memory.
Participants and Methods: The participants were 5-12-year-old typically developing North American children (N = 398). Visuospatial processing and visual memory were assessed with the NEPSY-II subtests Block Construction, Design Copying, Memory for Designs (Immediate and Delayed recall), and Memory for Faces (Immediate and Delayed recall). Information on TV, computer, and reading habits was provided on a questionnaire filled out by the parents.
Results: Increasing number of hours per week spent on the computer had a significant positive relationship with Memory for Designs (Immediate and Delayed), Memory for Faces (Delayed), and Block Construction. An increasing amount of hours per week spent reading had a significant positive relationship with Block Construction. An increasing number of hours of daily TV watching had a significant negative relationship with Design Copying.
Conclusions: Increasing amounts of time spent on the computer positively influence children's development of both visuospatial processing and visual memory. Visuospatial processing is also positively influenced by increasing amount of time spent reading, whereas the amount of time that a child spends watching TV has the opposite effect. These results are similar to previous results found on language development. They might suggest that the activities of using the computer and reading books, in contrast to the more passive activity of TV watching, require visual and visuospatial abilities, and therefore contribute to enhancing the development of these neurocognitive abilities.
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L. SCHMIDT, I. KELLER, K. UTZ, F. ARTINGER, O. STUMPF & G. KERKHOFF. Galvanic Vestibular Stimulation Modulates Impaired Arm Position Sense In Spatial Neglect.
Objective: Disturbed arm position sense is a frequent and debilitating consequence in patients with hemiparesis after stroke. Neglect patients, in particular, are significantly impaired in contralesional arm position sense. Currently, there are few effective therapies available for this disorder. Galvanic vestibular stimulation (GVS) activates the thalamocortical network which is typically partly damaged in the majority of neglect patients.
The present study aimed to investigate the immediate and after-effects (20 min) of subsensory, bipolar GVS (M = 0.6mA current intensity) on arm position sense in post-stroke patients with vs. without spatial neglect, and matched healthy individuals.
Participants and Methods: A novel, opto-electronic device was developed (Arm Position Device, APD), enabling precise measurement of horizontal arm position of both arms. Ten healthy control subjects, seven patients with left-sided hemiparesis with left spatial neglect, and fifteen patients with left hemiparesis but without left spatial neglect were tested. Horizontal arm position was measured separately for both arms under four experimental conditions (left-cathodal/right-anodal GVS, right-cathodal/left-anodal GVS, sham GVS, baseline without GVS). Immediate effects during GVS and after-effects (20 min) after termination of GVS were examined.
Results: Neglect patients showed an impaired contralateral arm position sense in contrast to patients without neglect. Left-cathodal GVS significantly increased the accuracy of arm position in the left arm, and led to a further improvement at 20 minutes post-stimulation. GVS had no effect in the patients without neglect. In addition, right-cathodal GVS worsened arm position sense in healthy subjects significantly.
Conclusions: Left-cathodal/right anodal GVS significantly modulates deficits of arm position sense in neglect. Multi-session GVS may induce long-lasting therapeutic effects on arm position in neglect.
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K. SUZUKI & Y. UNO. Neuronal Bases of Texture Discrimination and Identification.
Objective: Previous functional neuroimaging studies suggest that surface properties of objects, such as texture and color, are dealt with in

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the medial occipital areas near the collateral sulcus (CoS). Little clinical evidence supported this finding as only one patient was reported who showed impairment selective for texture discrimination but preserved shape discrimination. We examined patients with lesions in the occipital, temporal, and parietal lobes using newly devised texture and shape discrimination tasks to clarify the critical area for processing texture.
Participants and Methods: Five patients with the occipital lesion and three patients with the parieto-temporal lesion participated in the study. We conducted the texture discrimination task and texture naming task using images of materials from 9 basic real-world categories (metal, ceramic, glass, stone, bark, wood, leather, fabric, and fur). Each material category was represented by eight different realistic, synthesized exemplar images with controlled 3D shapes. The shape discrimination task using meaningless fractal figures was also provided.
Results: We found that a patient with bilateral lesion around CoS demonstrated marked impairment of texture naming and discrimination, with shape discrimination preserved. In addition, patients with the occipital lesion including the unilateral CoS showed mild difficulty in texture naming. By contrast, texture naming and discrimination was well preserved in patients without lesions around CoS.
Conclusions: These data indicate that bilateral occipital lesions around CoS may cause dysfunction of texture discrimination and identification, while the unilateral lesion in that area is related to the partial impairment of texture identification. Our findings confirm the important role of the medial occipital areas close to CoS for texture processing and suggest that this function is bilaterally represented.
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M.N. TOBA, M. CHUPIN, F. PONCET, F. CIARAFFA, P. PRADAT-DIEHL & P. BARTOLOMEO. Fronto-parietal white matter disconnection in right spatial neglect.
Objective: Spatial neglect is a neurological condition usually affecting left-sided objects after right hemisphere damage. Both grey (GM) and white (WM) matter lesions have been described in neglect patients, with recent evidence suggesting a critical role for fronto-parietal WM pathways disconnections in the right hemisphere (1). Right spatial neglect has been explored less often in left hemisphere stroke patients, because of frequent language impairments.
Participants and Methods: Here we investigated three subacute (range: 3 - 6 months) right-handed patients (age: 65-80 years) after left hemisphere strokes. Patients were assessed with a standardised paper-and-pencil battery of tests (2). Brain structural and Diffusion Tensor (DT) MRI were also obtained. Lesions were manually reconstructed for each patient and DT MRI-based tractography was used to assess the integrity of the major WM cerebral tracts and to analyze the WM metrics. Hippocampal volumes were also obtained by using a fully automatic segmentation (3).
Results: Right-sided neglect signs were observed in bells cancellation (two of the three patients), the Ogden figure (one patient), and line bisection (a pathological leftward deviation for one patient), as well as in the Catherine Bergego Scale, which tests real-life situations. Structural MRI showed in one patient a focal stroke in the frontal lobe of the left hemisphere, whereas the two other patients presented focal strokes at the level of the parietal lobe. DT MRI tractography showed disconnections in the fronto-parietal and temporo-parietal regions, concerning principally the ventral branch of the superior longitudinal fasciculus (SLF). The corpus callosum was disconnected at the level of each lesion. Hippocampal volume was similar in the left and right hemispheres.
Conclusions: These data suggest a role for left SLF disconnection in right-sided neglect. This result complements analogous evidence for right SLF disconnection in left-sided neglect.
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A. DUMBRAVA, M. TATU, M.N. TOBA & C. BALUT. Line bisection performances in apathy versus depression.
Objective: Given the well-documented left cortical hypoactivity in depression, several of its associated symptomatology could prove to result in corresponding bias in estimations of centers of lines.
Participants and Methods: The performance using each hand on line bisection task have been compared in equivalent (in respect to usual psycho-demographic parameters) groups of right-handed, middle-aged persons, corresponding to each combination of depression (according to DSM-IV criteria and clinical cut-off scores of common severity measures) and apathy (estimated with "The Apathy Evaluation Scale" of Marin, Biedrzycki and Firinciogullari, 1991): with depression but no apathy (n= 31), with apathy but no depression (n= 29), with depression and apathy (n= 30), without any of the two (n= 35).
Results: A systematic bias in estimating the center of the lines was similar in depressives and non-depressives but was significantly larger in the presence as compared with the absence of apathy (either alone or associated with depression).
Conclusions: It seems that apathy but not depression is related with relevant errors on line bisecting.
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A. DUMBRAVA, M. TATU, M.N. TOBA & C. BALUT. Line bisection performances in depressives.
Objective: The recent Theory of Group Cortical Organization and Activation (Carlstedt, 2004) suggests that depressive subjects, with their well-known left cerebral hypoactivity, will err more leftward on line bisection. In the present paper we try to test this prediction.
Participants and Methods: The performances using each hand in line bisection task have been compared in three equivalent (in respect of relevant psycho-demographic variables) groups of right-handed, middle aged persons: non-depressive (euthymic) controls (n=19 female + 19 male), dysphoric subjects (n=17f + 15m), and depressive patients before the initiation of any treatment (n=16f + 16m). [All the diagnosis were based on DSM-IV criteria and clinical cut-off scores of common severity measures of depression.]
Results: Despite a relatively constant more leftward deviation of the estimations from objective midpoint in depressive and dysphoric as compared with euthymic subjects, the data analyses revealed no statistically significant difference in performances with each hand in neither pairs of groups.
Conclusions: Given the large heterogeneity of the depressive syndrome, such result pleads just for the need to develop a more sophisticated evaluation of the visuo-spatial correlates of the influence of depression on hemispheric asymmetry.
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N. VAN DER STOEP, S. VAN DER STIGCHEL, K. HUISMAN, J. KAPPELLE, A. VISSER-MEILY, A. EIJSACKERS, M. KOUWENHOVEN & T. NIJBOER. Exploring Space: Dissociations and Interactions Between Neglect in Near and Far Regions of Space.
Objective: There is some evidence that severity of neglect can differ between different regions in space. This study systematically investigated the relation between regions in space (near vs far) and performance on star cancelation (SC), line bisection (LB) and cross-modal (visual, auditory, tactile) extinction tests (ET).
Participants and Methods: So far, 54 stroke patients were included. Patients performed the LB and SC in near (30 cm) and far (120 cm) space. They were divided into four groups based on their performance on the SC. The criterion for neglect was an asymmetry in the number of misses between the left and right part of the SC (N≥2). This resulted in a group with no neglect (N-), with more severe neglect in near space (NN), with more severe neglect in far space (NF), and with comparable severity in both near and far space (NNF). We compared performance on the tests between groups and tests using multivariate, regression and correlational analyses.
Results: Based on the performance of SC, our preliminary data shows that 30.4% showed signs of neglect (33.3% NN, 40% NF, 26.7% NNF). The NN group performed similar to the N- group on the SC in far space, while the NF group performed similar to the N- group in near space. The NNF group performed significantly worse than the N- group on the SC in both regions. The performance on the visual ET significantly predicted performance on SC in far space (Beta=-.593, p<.001), but

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not in near space. We found a significant correlation between number of misses on the SC and deviation in degrees from the center in the LB in near (r=.498, p<.01) and far space (r=.662, p<.01). We also found a relation between visual ET and number of misses on the star cancellation in far space (r=.366, p<.25), but not in near space.
Conclusions: These preliminary data already indicate evidence for dissociations between near and far space neglect. We only found a relation between visual ET and far space performance on the SC. This suggests that ET tap into different processes than the SC.
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K. VANCLEEF, J. WAGEMANS & G.W. HUMPHREYS. Recovery from Extinction in Texture Segregation and Contour Integration.
Objective: When presenting extinction patients with two competing stimuli, both can be integrated by perceptual grouping, resulting in attention to the whole configuration and not only to the ipsilesional stimulus. The effect of grouping on extinction is observed for a wide range of isolated grouping cues. The study's objective was to investigate if grouping in the context of texture segregation and contour integration can also reduce extinction while controlling for eye movements. Texture segregation refers to the separation of texture regions based on orientation differences. Contour integration is the grouping of collinear elements embedded in random oriented elements.
Participants and Methods: 4 left and 5 right parietal patients, as well as 12 healthy controls, were presented with texture and contour stimuli consisting of oriented elements. We induced regularity in the stimuli by manipulating the orientations of the elements resulting in an implicit texture border or an explicit contour. The shape of the border/contour could be (1) straight, have (2) an ipsilesional curve or (3) a contralesional curve. Subjects had to discriminate curved from straight shapes without making eye movements. Stimulus presentation time was varied according to an adaptive procedure to estimate the required presentation time to achieve 75% correct responses.
Results: Results show that for both textures and contours only the right parietal patients need a longer presentation time to determine the shape of the border/contour for the contralesional curve than for the ipsilesional curve when compared to controls and left parietal patients. These results indicate that perceptual grouping in texture segregation and contour integration is not strong enough to reduce extinction for right parietal patients.
Conclusions: We conclude that perceptual grouping in textures segregation and contour integration not always induces recovery from extinction if eye movements are restricted and that in these processes the right parietal cortex plays a crucial role.
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THURSDAY AFTERNOON, JUNE 28, 2012

Invited Address: Biological Mechanisms Underlying Late Recovery from the Minimally Conscious State: The Re-awakening of Terry Wallis After 19 Years.

Speaker: Joseph Giacino

12:00–1:00 p.m.

J.T. GIACINO. Biological Mechanisms Underlying Late Recovery from the Minimally Conscious State: The Re-awakening of Terry Wallis After 19 Years.
In 1984, 39-year-old Terry Wallis plummeted off a mountainside road and fell 25 feet into a ravine. He was found the next day by police and admitted to an acute care hospital in coma. Historical information suggests that he emerged from coma within a few weeks, evolved to a vegetative state (VS), and then transitioned to a minimally conscious state (MCS). For the next 19 years, he remained in MCS with no discernible mode of communication. He was cared for in a nursing home and received no formal rehabilitation. In 2003, over a 3-day period, Mr. Wallis unexpectedly regained conversational-level speech. This unusual event provided a unique opportunity to investigate the potential contribution of neuroplasticity to Mr. Wallis' late recovery of language. Two evaluations were subsequently performed over an 18-month period, permitting assessment of cognitive, behavioral, physical and neurophysiologic changes. Neuropsychological findings indicated that language abilities were surprisingly well-preserved. Executive functions, initially severely impaired, showed some qualitative improvement while memory remained densely amnestic. Both lower extremities were paretic on initial evaluation but improved dramatically on follow-up with active resistance noted against gravity. Neuroimaging studies, including FDG-PET, functional MRI and diffusion tensor imaging, revealed evidence of ongoing neuroplasticity. On initial assessment, large, bilateral areas of significantly increased anisotropy were noted in the mesio-occipital region, however, these regions diminished significantly on follow-up. In contrast, marked increases in anisotropy and resting metabolism were demonstrated within the midline cerebellar white matter at follow-up, correlating with the recovery of active lower extremity movement. These findings suggest axonal regrowth as a putative biological mechanism to account for the late recovery of language, motor and cognitive functions.
Learning Objectives:
1. Understand the limits of outcome prediction following severe TBI through the case of Terry Wallis - one of the most well-documented cases of late recovery of consciousness on record.
2. Learn how an integrated multimodal assessment battery can be used to investigate neuroplasticity following severe traumatic brain injury.
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Invited Symposium: Methods of Assessing Cognitive Drug Effects in Epilepsy

Chair: Arne Gramstad

12:00–1:30 p.m.

A. GRAMSTAD, E. HESSEN & C. HELMSTAEDTER. Methods of Assessing Cognitive Drug Effects in Epilepsy.
Symposium Description: Chronic antiepileptic drug (AED) treatment is often the treatment of choice for patients with epilepsy. Many patients experience cognitive side effects from the drugs, which may come in addition to pre-existing cognitive dysfunction. For both patients and clinicians it is important to have evidence-based knowledge about such side effects, so that this can be taken into consideration when choosing a proper AED. If cognitive side effects are experienced, it is important to have reliable methods that can aid in monitoring cognition and in separating drug effects from other factors that may affect cognition. In this symposium, the state of neuropsychological science in this field is evaluated, with a particular emphasis on methodology.
Presenters:
Erik Hessen, Dept. of Psychology, University of Oslo, Oslo, Norway
Christoph Helmstaedter, University Clinic of Epileptology, Bonn, Germany
Moderator:
Arne Gramstad, Dept. of Neurology, Haukeland University Hospital, Bergen, Norway
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E. HESSEN. Neuropsychological assessment of antiepileptic drug effects in patients with epilepsy.
Objective: All major antiepileptic drugs (AEDs) have been reported to be associated with cognitive side effects. More than 100 studies have been published on this issue in the last 30 years. Still much uncertainty remains regarding the degree of cognitive effects of AEDs and whether

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significant differences in adverse cognitive effects exist between the major AEDs. The reason for this uncertainty is that many studies do not adhere to basic standards of methodology, design, and neuropsychological evaluation. Four major problems have been encountered: (1) The selection criteria of subjects in many of the studies have differed, so that results from one group cannot necessarily be compared with other groups. (2) The neuropsychological testing has not been consistent with regard to test selection, administration of tests, and reporting of test results. (3) The existing studies often lack control groups and randomization of the treatment. In many studies, results regarding the target drug are distorted by the effect of polytherapy. (4) A statistical problem in many of the studies relates to sample size. Many studies involve only a few subjects and therefore lack statistical power. Based on our own research this presentation will argue that the best research design to address the question of absolute neuropsychological drug effects is to employ a randomized, double-blind, placebo-controlled withdrawal study of seizure-free epilepsy patients receiving monotherapy, tested after several months of steady state treatment. Furthermore, the presentation will discuss what kind of neuropsychological outcome measures that are most appropriate both with regard to sensitivity but also with regard to clinical relevance, which may be the most important question.

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C. HELMSTAEDTER. Monitoring neurocognitive side effects of antiepileptic drugs: Approaching the individual patient.

Objective: Cognitive impairment in epilepsy results from the complex interaction of more static and sometimes progressive morphological lesions with the more dynamic effects of seizures and antiepileptic drug (AED) treatment. Cognitive treatment related side effects determine the long term retention of AED and in chronic epilepsy side effects of AED may impair the patients Quality of Life more than seizure frequency. A great variety of paper pencil tests, computerized tests, questionnaires, or rating scales is available for assessing cognitive side effects of AED. However, subjective complaints, ratings or Quality of Life measues often lack validity and appear to reflect the patients mood more than his factual impairments. Routine monitoring of individual patients with objective tests would be appreciated but requires valid, easy applied, brief, and repeatable measures to become accepted. In this regard it will be discussed, whether a short screening tool of executive functions, which was explicitly designed to assess AED effects in epilepsy patients and which has successfully applied in recent drug trials, is suited to model the known cognitive effects of common old and new AED when used in mono- or polytherapy. In addition the question of the usefulness of memory testing or application of computerized tests including simple and choice reaction times for the assessment of cognitive AED effects will be addressed. In summary, the clinical relevance of cognitive AED effects and the necessity of approaching the individual patient when treating epilepsy is emphasized.

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A.P. ALDENKAMP. Neuropsychological assessment of drug effects in epilepsy.

Objective: Cognitive impairments have been observed as a secondary effect even for single seizures (Aldenkamp et al., 2001). In individuals with high seizure frequency such impairments may accumulate and have a much greater impact on daily life that hitherto suspected (Aldenkamp et al., 1999). In addition, the risk of cognitive impairment is increased for some seizure types, such as for secondary generalised seizures, and if seizures persist of longer periods. This is irrespective of aetiology.

Clinical studies show that seizure-induced cognitive impairments are reversible for most seizure types when seizures are controlled. Additionally, for some seizure types there may be a kind of time-window that allows for correction of the cognitive impairments. Exceeding the time-window may result in irreversible impairment.

These studies suggest that antiepileptic drug (AED) treatment can thus protect against such secondary cognitive impairments or at least correct these when seizures are controlled. This emphasises the need to achieve complete and early seizure control.

On the other hand, all AEDs have a detrimental effect on the central nervous system and may affect cognitive function to some extent (Aldenkamp & Vermeulen, 2001). Some treatments may undo the beneficial effects of antiepileptic drug treatment by inducing new or other cognitive impairments.

This once more illustrates that in clinical practice the emphasis should evolve from mere seizure control to a more comprehensive approach in which the prevention of central (cognitive) effects of both the seizures and the drugs is given due attention. Treatment requires careful balancing in an attempt to reach early and maximal seizure control and at the same time to avoid tolerability problems.

This balance is reviewed for the older and newer AEDs with an emphasis on lamotrigine (Aldenkamp & Baker, 2001), topiramate (Aldenkamp et al., 2000; aldenkamp, 2000) and levetiracetam (Bootsma et al., 2006).

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Poster Session 2: Aging, Dementia, Medical/Neurological Disorders

12:45–2:15 p.m.

Aging

D. ANTONENKO, M. MEINZER, R. LINDENBERG, A. WITTE & A. FLÖEL. Grammar Learning In Older Adults Is Linked To White Matter Microstructure And Functional Connectivity.

Objective: Age-related decline in cognitive function has been linked to alterations of white matter and functional brain connectivity. With regard to language, aging has been shown to be associated with impaired syntax processing, but the underlying structural and functional correlates are poorly understood.

Participants and Methods: In the present study, we used an artificial grammar learning (AGL) task to determine the ability to extract grammatical rules from new material in healthy older adults. White matter microstructure and resting-state functional connectivity of task-relevant brain regions were assessed using multimodal magnetic resonance imaging.

Results: AGL performance correlated positively with fractional anisotropy underlying left and right Brodmann areas (BA) 44/45 and in tracts originating from left BA 44/45. An inverse relationship was found between task performance and functional connectivity of left and right BA 44/45, linking stronger inter-hemispheric functional coupling to lower performance.

Conclusions: Our results suggest that white matter microstructure in specific prefrontal regions and their functional coupling affect acquisition of syntactic knowledge in the aging brain, offering further insight into mechanisms of age-related functional decline.

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L. HAASE, C. SUMIDA, D. DOWNER, K. CROSS, S.M. NADALIN, E. GREEN, A. JACOBSON & C. MURPHY. Cognitive and emotional functioning in young, middle-aged, and older adults with metabolic syndrome.

Objective: Metabolic syndrome (MetS) is a constellation of vascular and metabolic risk factors that frequently occur in combination and increase the risk of developing cardiovascular disease and type 2 diabetes mellitus. MetS is associated with changes in brain structure (i.e., cerebral atrophy and white matter abnormalities) and cognitive functioning. To date, research has focused primarily on older cohorts. However, prevalence rates in young and middle-aged adults are increasing. As such, cognitive changes associated with MetS in early and mid-life and predictors of cognitive decline are unclear. The purpose of the current study was to investigate potential differences in emotional and cognitive functioning in young middle-aged, and older adults with and without MetS.

Participants and Methods: Two x three (metabolic status X age group) analyses of variance tests were conducted to examine differences in emotional and cognitive performance.

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Results: There were no significant differences among the groups for years of education, height, depression (Beck Depression Inventory), state anxiety (State-Trait Anxiety Inventory; STAI), and perceived hunger (Three Factor Eating Questionnaire; TFEQ). Significant differences between MetS and controls were found for memory performance (composite score for the long-delay free recall condition for the California Verbal Learning Test-II and Brief Visual Memory Test) and body mass index. Additionally, there were significant interactions between age and MetS for motor abilities, body weight, waist circumference, disinhibition (TFEQ), and trait anxiety (STAI).
Conclusions: The present findings suggest that MetS is associated with changes in cognitive functioning, and that aspects of emotional and cognitive functioning in this cohort are also moderated by age. Greater understanding and more precise characterization of the cognitive sequelae associated with MetS may provide evidence for targeted interventions earlier in the lifespan. Supported by NIH grant number R01AG04085-24 to CM.
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T. HATTA, T. HATTA, A. IWAHARA, E. ITO, N. NAGAHARA, J. HATTA, K. YOSHIZAKI & N. HAMAJIMA. Relation between daily living activity and cognitive function in late-adulthood: a report from Yakumo Study.
Objective: Cognitive function of aged people is associated with social activity. However, the characteristic of precise relations still remains unclear. Our objective was to examine the relations between cognitive function and social activity among rural community-dwellers in Japan.
Participants and Methods: Data are from 162 men and 245 women, mean age of 66.1 years old (SD = 10.1) from 2011 Yakumo study. Participants were given IADL (Instrumental Activity of Daily Living Scale) and were underwent cognitive test battery consisted of Logical Memory Test, D-CAT (digit-cancellation test), LFT and SFT, Money road test, Stroop test and MMSE.
Results: The relation between IADL score and cognitive test scores was examined by Persons' co-efficient correlation. Correlation co-efficient was significant for all test items except Stroop color naming error and D-CAT 1 digit condition cancellation error score. The absolute co-efficient scores were higher for information speed related item scores (e,g,, D-CAT 1 digit and Stroop dot color naming) than for memory related item scores (e.g., Logical Memory Test and SFT).
Conclusions: The findings suggest that social activity relates cognitive function reflected prefrontal cortex more strongly than that reflected temporal and parietal cortex related cognitive function.
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A. IWAHARA, E. ITO, N. NAGAHARA, C. HOTTA & T. HATTA. Not an Intellectual Activity but the Adoption of New Technology Acts as a Buffer of Cognitive Decline.
Objective: Epidemiological evidences have suggested that a lifestyle characterized by engagement in leisure activities of intellectual and social nature relate to a slower cognitive decline in elderly. One informal hypothesis is that a more engaged lifestyle leads to greater use of cognitive resources and practice of cognitive skills, both of which associate to a relative sparing of cognitive decline. However, little is known about the benefits of the use of information technology. In the present study, we investigate the relationship between cognitive functions and lifestyles including IT use.
Participants and Methods: Participants were 1082 community-dwelling middle aged and older persons without dementia. They were assessed for cognitive functions and frequency condition of lifestyle activities. The cognitive functions were measured by means of logical memory test, Money road test, Stroop test, D-CAT and verbal fluency test.
Results: A principal components analysis for 12 lifestyle activities identified three factors that accounted for 62.0 % of the variance: IT use, intellectual activities, and interpersonal exchange. We constructed a series of linear regression models to examine the association of lifestyle activities with cognitive functions. A more frequent intellectual activity related to a better performance in D-CAT, Stroop test, and Money road test. However, when we further conducted multiple linear regression analysis using three composite measures as explanatory variables, only Money road test related to intellectual activities. A higher frequency of IT use led to a better performance in D-CAT, Stroop test, and letter fluency test.
Conclusions: The results suggest that the adoption of new technology contributes to slower decline of cognitive functions. These may implicate that an onward intention or determination to acquire new skill of participants might have a substantial effect on the maintenance of cognitive function than the facts of engaging some intellectual activities.
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L. LANDRÉ, A. SAVA, A. KRAINIK, G.A. MICHAEL, R. VERSACE, P. KROLAK-SALMON & H. CHAINAY. Emotional Enhancement of Memory in Aging : A fMRI Study of Visual Recognition.
Objective: Emotional (both positive and negative) items are generally better retrieved in memory than neutral ones. In aging, this effect is maintained mainly for positive information. This emotional effect in memory has been related to functional variations in frontal and amygdalar regions during encoding (FADE pattern, see St Jacques et al., 2009). Our study focuses on the functional aging brain correlates of the interaction between emotion and memory at retrieval.
Participants and Methods: 21 aging participants (14 females, 7 males : 77.7 ±7.4 year old) performed encoding and recognition of 60 pictures (20 negative, 20 neutral and 20 positive, as opposed to the same number of foils in recognition) during MRI acquisition. EPI images were acquired using a 3T Brucker MRI, and were analyzed using SPM8 (time and motion-correction, 128s high-pass filter, 10mm FWHM). Old / New (hits vs correct rejections) contrasts were both generated across all conditions and separately depending on emotional valence of material. Interactions were modeled using full factorial design, with emotion (negative / neutral / positive) and memory (Old / New) as within subject factors. Voxel-wise significance threshold was set at $p = 0.005$, uncorrected.
Results: Negative and positive pictures were better recognized than neutral ($p < 0.05$ and $p < 0.001$, respectively).
Neutral Old/New contrast corresponds to the pattern classically described in the literature. Conversely, different frontal regions were found to be related to the Old/New effect when restricting analyses to negative material, with a significant emotion × memory interaction in the right insula. No significant increase was found between Old and New items for positive material.
Conclusions: Our results indicate different patterns for the Old/New contrasts at retrieval in aging participants, depending on the emotional valence of material, with a particular implication of the insula in emotional memory enhancement for negative material.
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C. MOHN & B. RUND. The MATRICS Consensus Cognitive Battery in older Norwegians.
Objective: As the Norwegian population is rapidly ageing, the mental health care system expects an increased need for standardized tests suitable for assessment of comprehensive neurocognitive function in the elderly. The MATRICS Consensus Cognitive Battery (MCCB) consists of 10 neuropsychological tests assessing the seven neurocognitive domains Speed of Processing, Attention/Vigilance, Working Memory, Verbal Learning, Visual Learning, Reasoning/Problem Solving, and Social Cognition (Green & Nuechterlein, 2006). Standardized versions are emerging in several non-Enlish speaking countries.
Previously, we have presented Norwegian MCCB reference scores for 250 healthy individuals between 12 and 59 years of age (Mohn, Sundet & Rund, submitted). The present study will generate Norwegian neurocognitive reference scores for healthy men and women between 60 and 69 years of age.
Participants and Methods: The participants are 50 healthy men and women between the ages of 60 and 69 who are fluent in Norwegian and not suffering from chronic psychological or neurological disorders. Neurocognitive function will be assessed by the Norwegian version of the MCCB (Nuechterlein & Green, 2009).

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Results: Data collection will be finished by March 2012 and the results will be ready for presentation at the Mid-Year Meeting of the International Neuropsychological Society in Oslo in June 2012.
Conclusions: References
Mohn C, Sundet K, Rund BR (2012). The Norwegian standardization of the MATRICS Consensus Cognitive Battery. Submitted.
Nuechterlein KH, Green MF (2009). MATRICS Consensus Cognitive Battery, Norwegian Version. (BR Rund, KS Sundet, trans.) Los Angeles: MATRICS Assessment, Inc.
Nuechterlein, K. H. & Green, M. F. (2006). MCCB. MATRICS Consensus Cognitive Battery. Manual. Los Angeles, CA: MATRICS Assessment Inc.
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A.L. RUIZ-RIZZO & G.E. MAESTRE. Qualitative Measures Including Grammar In The Controlled Oral Word Association Test For Healthy Older Adults.
Objective: The objective is twofold: to report normative data for the Controlled Oral Word Association Test (COWAT) in a healthy population above 55, and to analyze usefulness of other measures than traditional ones.
Participants and Methods: A sample of 239 healthy older adults (82,8% females) examined in the context of the Maracaibo Aging Study, was selected on the basis of being physically and mentally healthy, according to medical/neurological and neuropsychological data. Sample's ages ranged between 54 and 90, and education between 0-21 years. Therefore, the sample was split in four age groups (i.e. 54-60, 61-70, 71-80, and 81-90) and 3 educational levels (i.e. low, middle, and high). The neuropsychological battery included the COWAT, on which this analysis was focused.
Results: Means for each letter (i.e. P, A, F) and correct total were obtained as to the traditional scoring way. Moreover, means for types of errors (i.e. violation of instruction, perseverations, and set loss) and for grammatical types (i.e. substantives, verbs, etc.) were also obtained. All results were obtained for each age x educational level group. Furthermore, simple regression analyses were also conducted using either years of education or age as a predictor of total correct words. These analyses yielded e.g. that education predicted 14,8% of correct words variance (p=,000), whereas age predicted 4,8% (p=,001). In other correlation analyses where quantitative and qualitative measures were matched, it was found e.g. that correlation index between total substantives and correct words was r=.864.
Conclusions: Normative data for the COWAT in Venezuelan population older than 55, were obtained. The most common type of error was violation of instruction, followed by perseveration, and set loss. Substantives were the most frequent grammatical types of words, followed by adjectives, verbs, adverbs and conjunctions. Total of substantives highly correlated with total of correct words. Education explained variance in correct words much better than what age did.
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Multiple Sclerosis/ALS/Demyelinating Disorders

O. BOSNES, O. DAHL & O. ALMKVIST. The Paced Auditory Serial Addition Test (PASAT) effectively detects cognitive dysfunction in Multiple Sclerosis: Data from the MS population-study in Nord-Trøndelag, Norway.
Objective: To investigate the possible impact on PASAT performance of inter-stimulus interval (ISI) and resonse format (singles, dyads and triads of correct responses), simultaneously taking demographic and clinical characteristics, as well as cognitive functions and affective status, into account.
Participants and Methods: Participants were a population-based sample (n=34; Age mean=47.2, SD=8.6) from Nord-Trøndelag in Norway. Participants underwent a thourogh neuropsychological assessment (WAIS/WMS/CVLT/PASAT/SDMT/HADS/EDSS/FSS & HRB).
Results: Decreasing ISI, increasing demands on response format, IQ, working memory and processing speed were all significantly associated with PASAT performance level. Subtype of MS, severity of disease, age, gender, education, finger-motor function, affective status and fatigue were, however, not related to PASAT performance.
Conclusions: PASAT is sensitive to core cognitive dysfunction in MS and relatively uninfluenced by demographic, affective, and clinical features of the disease. PASAT performance may therefore safely be used as a valid indicator of cognitive function in MS-patients.
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Dementia (Alzheimers)

O. ALMKVIST & M. SWENSSON. Alzheimer's Disease: the Contribution of Information on Strategies as Indicated by BQSS.
Objective: Strategies of test performance may provide powerful diagnostic information. Several methods have been suggested in which points of observation have been identified and scales of executive function have been designed. There are several examples of this approach regarding the Rey-Osterrieth Complex Figure (ROCF) test. One example is the Boston Qualitative Scoring System (BQSS).
The objective was to examine whether BQSS executive function provide information that is unique in Alzheimer's disease compared to standard neuropsychological tests.
Participants and Methods: Assessment of executive function in ROCF following BQSS was utilized to compare demographically matched patients diagnosed with Alzheimer's Disease (AD, n=20) and Mild Cognitive Impairment (MCI, n=17) and healthy controls (HC, n=20). All individuals had a comprehensive neuropsychological assessment in addition to a comprehensive clinical examination including medical history, somatic and psychiatric status, MR imaging, analyses of blood, urine and CSF.
Results: Results showed that the five BQSS executive function variables separated the three diagnostic groups significantly, although less strongly than the majority of neuropsychological test. Furthermore, it was possible to summarize the BQSS executive variables into one single PCA component and his component was related to several cognitive domains and test, not exclusively to attention/executive tests. Finally, a discriminant analysis demonstrated that BQSS executive variables did not add any further information compared the information provided by standard neuropsychological tests.
Conclusions: In conclusion, the present study did not support the hypothesis that BQSS executive function provides unique information in dementia evaluation that cannot be acquired by standard neuropsychological tests.
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A. AL SALMAN, S. WAHASS, A. ALTAHAN, H. BALUBAID, F. ALGERESHAH & J. EVANS. Reliability of an Arabic Version of the Addenbrookes Cognitive Examination- Revised.
Objective: Arabic is the native language of more than 250 million people worldwide. However, there has been very little in the way of development and validation of Arabic neuropsychological instruments. The Addenbrookes Cognitive Examination- Revised (ACE-R) is a brief cognitive screening tool that has been well validated for the assessment of cognitive impairments associated with dementia. The present study investigated the reliability of an Arabic ACE-R, and involved data collection from both literate and non-literate participants.
Participants and Methods: The ACE-R was translated into Arabic. Some items were adapted for use in an Arabic cultural context. Three parallel versions were developed. Data was collected from four participant samples: (1) Healthy literate (N= 147); (2) Healthy illiterate (N= 283); (3) Literate with a diagnosis of Alzheimer's disease (AD) or Mild Cognitive Impairment (MCI) (N= 54); (4) Illiterate with a diagnosis of AD or MCI (N= 169). Parallel forms of the Arabic ACE-R were administered on two occasions separated by approximately one week. Test-retest and internal reliability (Cronbach's alpha) were examined.
Results: For literate participants, internal reliability was high (Cronbach's alpha, 0.932) as was total score test-retest reliability (rho=0.944).

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Individual subscale reliability ranged from rho=0.685 (Fluency) to rho=0.865 (Memory). For illiterate participants, internal reliability was also high (Cronbach's alpha, 0.987) as was total score test-retest reliability (rho=0.916), with individual sub-scale scores ranging from rho=0.647 (Language) to 0.861 (visuo-spatial).
Conclusions: The Arabic ACE-R appears to be a reliable instrument for the assessment of cognitive impairment that may be arising from a degenerative neurological condition for both literate and illiterate participants.
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R. GRAMBAITE. The Relationship between Memory and Depression Severity in Patients with Mild Cognitive Impairment.
Objective: Mild cognitive impairment (MCI) is a concept used to describe a high-risk pre-dementia state (including the prodromal stage of Alzheimer's disease). Measures of subjective memory complaints, in addition to objective memory test scores, provide important clinical information. Depression symptoms are also common in MCI patients. Here, we analyze how depression severity is associated with subjective memory complaints and objective memory test scores.
Participants and Methods: We included 71 patients with MCI (MMSE 28.1: 25-30, age 60.4: 45-76, education 12.6: 7-18, sex: 37 women), who underwent neuropsychological examination, including tests of verbal (The Rey Auditory and Verbal Learning Test) and visual (The Rey Complex Figure Test) memory and the Symptom Checklist-90-R. Depression scale score from the Symptom Checklist-90-R was correlated with visual/verbal memory test scores and subjective memory complaints score from the Symptom Checklist-90-R.
Results: Depression severity was significantly associated with subjective memory complaints ($p<0.01$). In contrast, neither visual, nor verbal memory scores were significantly associated with subjective memory complaints or depression severity ($p>0.05$).
Conclusions: There is a relationship between depression severity and subjective memory complaints in MCI.
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A. HAYASHI, H. NOMURA, R. MOCHIZUKI, A. OHNUMA, K. SUZUKI & E. MORI. Writing Impairments in Japanese Patients with Mild Cognitive Impairments and with Mild Alzheimer's Disease.
Objective: We investigated writing abilities in amnestic types of mild cognitive impairments (MCI) and mild Alzheimer's disease (AD). To examine the earliest changes of writing function, we used writing tests for both words and sentences with different types of Japanese characters (Hiragana, Katakana, and Kanji).
Participants and Methods: Twenty-five MCI, 38 AD patients and 22 healthy controls performed four writing tasks: 1) writing to dictation 10 hiragana words and 10 katakana words(the maximum score was 20), 2)copying 10 Kanji words(the maximum score was 10), 3) writing to dictation 50 Kanji two-character words(the maximum score was 50), and 4)writing picture-story (Standard Language Test of Aphasia: SLTA), in which we rated from 1(representing severe deficiency) to 6(representing normal performance) based on scales of SLTA. Analysis of valiance (ANOVA) was used to test the subject group effects on the scores of above four writing tasks.
Results: The effects of the subject groups in Kana writing to dictation and copying task were not significant, while those in the Kanji writing to dictation task and the writing SLTA picture-story task were significant. Post-hoc analysis (Tukey's test) showed that the performances in the mild AD group were lower than in the MCI group and in the controls in Kanji dictation task ($p<0.01$ for each comparison), but there was no significance between the MCI and the control subjects. The performances in the writing picture-story task were lower in the mild AD group and the MCI group than in the controls [$p<0.01$, $p<0.05$] but the difference between the AD and the MCI groups was not significant.
Conclusions: We found writing difficulties in Kanji characters with preserved Kana writing in the mild AD group and impairments in the writing picture-story task with preserved writing word tasks in the MCI group. Although the picture-story writing would demand complex integration of multiple cognitive functions, our study has suggested that sentence writing might detect the writing deficits in MCI.
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K. IRVINE, K.R. LAWS & T.M. GALE. Facial Emotion Recognition Deficits in Alzheimer's Patients.
Objective: People with Alzheimer's disease have difficulties with social relationships which may arise from difficulties in facial emotion recognition (FER): AD patients are worse than both the elderly and young adults at FER. Research has shown that the elderly are impaired compared to young adults on FER but they have been shown to be better at recognising disgust. AD patients, however do not appear to display this age advantage for disgust, although the literature is sparse. This research was carried out to determine whether there were any differences between these three groups (AD patients, the elderly and young adults) in FER, particularly in recognizing disgust.
Participants and Methods: We tested 51 AD patients (24 males, 27 females) (mean age 80.66 years), 51 elderly controls (28 males, 27 females) (mean age 76.60 years) and 70 young adults (13 males, 57 females) (mean age 21.80 years) using the facial expressions of emotion: stimulus and test (FEEST – Young et al, 2002). The data was analysed using a 3 (group) x 6 (emotions) MANOVA.
Results: There was a significant group difference in recognising FER across all emotions with the young performing best and the AD group having the lowest accuracy. Pairwise comparisons for the disgust emotion revealed that the elderly were more accurate than young adults (effect size, Cohen's $d = 0.37$) but that AD patients failed to show this age advantage as they performed worse than both the young adults (Cohen's $d = 1.00$) and the elderly (Cohen's $d = 1.00$).
Conclusions: FER deteriorates with age and AD patients demonstrate deficits in addition to those that would be accounted for by the aging process. The elderly have a better recognition of disgust than the young, but AD patients do not benefit from this advantage. Results may be due to distinct neural localisation for recognition of disgust emotion, or the direction of eye gaze differing between groups.
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K. IRVINE, K.R. LAWS, T.M. GALE & T.K. KONDEL. Sex Differences in the Cognitive Abilities of People with Alzheimer's Disease: a Meta Analysis.
Objective: Studies examining sex differences in cognition in people with Alzheimer's disease (AD) have been surprisingly few. Those papers that have been published present variable findings, with some reporting a male advantage, for both visuospatial and verbal abilities, whilst others report no sex differences; however no reports of a female advantage appear to exist. This Meta-analysis sought to quantitatively review the literature to determine whether sex differences in cognition exist in people with AD.
Participants and Methods: A systematic search of the literature was done, using combinations of the following terms: Alzheimer*, sex differences, cognition and cognitive deficits. The inclusion criteria were that research papers needed to include demographic data and results that allowed for calculation of Cohen's d (e.g. mean and standard deviations) of both male and female AD patients on at least one cognitive test. We analysed the data from 15 studies, comprising a total sample size of 789 men and 1189 women. The meta-analysis was carried out using Metawin 2.1 (Rosenberg et al, 2000). The tests were divided into different domains, semantic, non-semantic verbal and visuospatial and a mean effect size was calculated according to these domains for each paper, and then across all papers for each domain.
Results: The analysis revealed a significant male advantage for both verbal and visuospatial tasks, even though in the general population, women are reportedly better at verbal tasks than men. Moderator regression analyses showed that neither age nor level of dementia (as measured by MMSE scores) were significant predictors of the male advantage. A brief examination of the data for elderly controls in the examined papers reveal no sex differences in either domain.
Conclusions: Reasons posited for a male advantage in AD include the reduction of estrogen in women following the menopause, that AD pathology might affect men and women differently and the possibility that men have greater cognitive reserve than women.

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E. KIM & B. YE. Neuropsychological performance and prediction of conversion to Alzheimer's disease in patients with early- versus late-onset amnestic cognitive impairment: CREDOS study.

Objective: Our study involving a large sample of patients with aMCI who were followed for about 1.5 years investigated 1) differences in baseline neuropsychological characteristics and rates of conversion to AD between early onset amnestic mild cognitive impairment (EOMCI) and late onset aMCI (LOMCI) 2) differences of baseline neuropsychological performances between converters and non-converters in each aMCI group 3) differences of baseline neuropsychological performances between converters of EOMCI and LOMCI and finally 4) differences of neuropsychological measures predicting AD conversion between EOMCI and LOMCI.

Participants and Methods: We enrolled 425 patients with aMCI (124 EOMCI, 301 LOMCI) to be followed for about 1.5years, and 958 normal control subjects (NC) from the CREDOS data set. The aMCI patients were followed for variable duration. Consensus diagnosis and neuropsychological evaluations were performed at each follow-up.

Results: In the baseline neuropsychological tests, the LOMCI group had significantly lower scores in the visuospatial recognition and frontal tests than those of the EOMCI group. The proportion of subjects with conversion was significantly different between EOMCI (18.5%) and LOMCI (33.6%). Annual conversion rates were 11.5%/year in EOMCI and 23.3%/year in LOMCI, respectively. While converters in EOMCI group showed significant deficits in visuospatial memory, converters in LOMCI group showed significant deficits in verbal memory and semantic word generation, when compared to non-converters of each group. The visuospatial memory for EOMCI and clinical dementia rating sum of boxes score for LOMCI were highly significant predictors of AD conversion.

Conclusions: Our study indicates that EOMCI with severe visuospatial memory impairment which imply underlying parietal and right predominant pathology and LOMCI with poor verbal memory and semantic word fluency which suggest underlying temporal and left predominant pathology are individuals at increased risk of conversion to AD.

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L. LANDRÉ, A. SAVA, A. KRAINIK, G.A. MICHAEL, R. VERSACE, P. KROLAK-SALMON & H. CHAINAY. Effect of Emotion on Memory in Alzheimer's Disease and its Relationship to Mediotemporal Atrophy.

Objective: In both young and aging participants, emotional material tends to be better retrieved in memory than neutral one. This emotional enhancement of memory may be related to the attentional effects of amygdala response to emotional stimuli. Because early neuropathological changes in Alzheimer's disease involve the amygdala it has been suggested that this effect is impaired in patients, however inconsistent results have been reported. The goal of our study was to evaluate emotional effects on memory for pictures in Alzheimer's disease, and to explore the link between this effect and the degree of amygdalar atrophy.

Participants and Methods: 28 patients (mean MMS=23.7, SD=2.2; mean age=81.4, SD=4.9) and 28 control participants (mean MMS=29.1, SD=0.8; mean age=75.4, SD=8.1) performed a categorization task (natural vs manmade) on a set of pictures of various emotional valence (20 negative, 20 neutral, 20 positive), prior to a Old / New recognition task. A subset of 15 patients and 20 control participants underwent high-resolution T1 MRI acquisitions, which were analysed using Freesurfer in order to obtain amygdalar and hippocampal volumes. Correlation analyses were then performed between volumetric data, memory and the emotional effect on memory.

Results: An effect of emotion was found on memory for control participants (with positive items better recalled than neutral and negative ones), with no correlation between this effect and amygdalar volumes, and a significant correlation between overall recognition scores and hippocampal volumes ($r = 0.43$, $p < 0.05$). Conversely, no emotional effect on memory was found for the whole group of patients, however, significant correlations were found between this effect and amygdalar ($r = 0.47$, $p< 0.05$) and hippocampal volumes ($r=0.69$, $p< 0.01$).

Conclusions: These results tend to confirm a link between the loss of emotional effect on memory and neuropathological change in mediotemporal structures including the amygdala during the course of Alzheimer's disease.

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T. NIKOLAI, O. BEZDICEK, L. MOTAK, M. VYHNALEK, H. STEPANKOVA & M. PREISS. Phonemic verbal fluency differentiates between normal aging, amnestic and non-amnestic mild cognitive impairment and Alzheimer's dementia.

Objective: Verbal fluency tests, in particular phonemic fluency, are commonly used to assess executive dysfunction. The purpose of the study was to evaluate the discriminative validity of phonemic fluency as a test that measures executive functions in normal aging, amnestic and non-amnestic presentation of mild cognitive impairment (MCI) and Alzheimer's dementia (AD).

Participants and Methods: The Czech version of The Controlled Oral Word Association (COWA) Test (3 letters N, K, P) was administered as a part of neuropsychological battery to 501 healthy controls, 105 subjects with amnestic MCI (aMCI), 35 subjects with non-amnestic MCI (naMCI) and 47 patients with mild to moderate AD. These four groups differed in age, education and also Rey Auditory Verbal Learning Test (RAVLT) performance, these latter being thus included as covariates in further analyses.

Results: A two (gender) x four (clinical group) ANCOVA with age, education and RAVLT performance as covariates yielded no effect of gender but revealed an effect of group, $F(3, 676) = 7.72$, $p < .001$, $\eta 2 = .03$. The control group performed better than the naMCI group (estim. Ms = 43.89 vs. 34.79, $p < .001$) and also marginally better than AD and aMCI groups, estim. Ms = 37.42 and 39.58, ps = .06 and .07, respectively (Sidak's multiple means adjustment). Neither any other group comparison nor the interaction term were significant.

Conclusions: Phonemic verbal fluency did not differentiate between different types of MCI (aMCI vs. naMCI) even after minimizing the contribution of memory (RAVLT performance was taken as covariate). However, it differentiated between normal aging and pathological aging (aMCI, naMCI and mild to moderate AD). In conclusion, phonemic verbal fluency is a useful tool for early diagnosis of cognitive impairment in eldery.

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F. STRIJKERT, G.J. IZAKS & J.M. SPIKMAN. Is There a Relationship Between Recognizing Emotions and Behavioral Changes in Patients Suspect for Dementia?

Objective: Behavioral changes in dementia may occur at an early stage, sometimes even before other cognitive impairments become apparent (e.g. Rubin & Kinscherf, 1989). Patients with dementia also show impairments in emotion recognition abilities (Phillips et al., 2010). Therefore, the aim of the present study was to investigate whether behavioral changes were related to the ability to recognize emotions in patients with mild dementia.

Participants and Methods: Persons suspect for dementia were included if the Mini Mental Status Examination (MMSE) score was ≥ 20 points and the Clinical Dementia Rating scale (CDR) was 0.5 or 1 (very mild - mild dementia). Emotion recognition was assessed with the Facial Expression of Emotions-Stimuli and Tests (FEEST; Young et al, 2002) and behavioral changes were assessed with the Neuropsychiatric Inventory (NPI; Cummings, 1994), a structured interview with a caregiver.

Results: A total of 35 persons were included: 16 women and 19 men (median age = 70 years, median MMSE = 27). 30 persons had CDR 0.5, 5 persons had CDR 1. Mean total NPI score was 9 (SD 11). Behavior changes that were reported most often were: depression (34% of patients), agitation (32%), apathy (29%), irritability (17%) and disinhibition (14%). The mean FEEST total score was 45.97 points (SD = 7). FEEST total score was not significantly correlated to NPI total score. However, a significant negative correlation was found between FEEST

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total and NPI Fear/Anxiety (r= -.352, P=.04) and between FEEST total and NPI Hallucinations (r= -.416, p=.01). Furthermore, significant correlations were found between FEEST Disgust and NPI Hallucinations (r= -.575, P=.00), NPI Fear/Anxiety (r= -.455, P=.01), NPI Delusions (r= -.420, P=.01) and NPI Disinhibition (r= .335, P=.05).
Conclusions: In patients suspect for dementia, significant correlations are found between emotion perception deficits and behavior changes. This means that behavior changes that are observed by significant others can be objectified with neuropsychological test measures.
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B. VAN GELDORP, N. GORGORAPTIS, O. MEULENBROEK, M. HUSAIN & R. KESSELS. Precision of Working Memory Binding in Alzheimer's Disease.
Objective: Damage to the medial temporal lobe (MTL) has been related to working memory (WM) deficits both when binding is involved and when WM capacity is exceeded. The present study examines WM binding in Alzheimer patients while varying WM load. If the MTL is involved in WM binding, patients will perform worse than controls on a WM binding task. If the MTL is involved in WM when the load increases, we expect patients to perform disproportionately worse with increasing set size.
Participants and Methods: Twenty patients fulfilling the criteria for early Alzheimer's disease (AD; i.e. mild cognitive impairment or early Alzheimer's dementia) and 21 controls performed a computerized WM task with 9 blocks of 10 trials each. In each trial, set size varied between one and three stimuli. The stimuli were colored lines, of which both its color and orientation had to be maintained. Color was used as a cue and the precision with which participants could reproduce the line's orientation was measured. All patients had an MRI scan and the hippocampus was automatically segmented using FSL FIRST.
Results: The first results show a near significant group effect: patients performed worse than controls ($F(1,39)=3.78$, $p=.06$). WM precision decreased as the set size increased ($F(2,38)=15.25$, $p<.01$), but no group by set size interaction effect was found ($F<1$). Volumetric analysis of the hippocampus (volume corrected for total brain volume) showed a trend towards a significant correlation of both left (r=.33, p=.09) and right hippocampal volume (r=.31, p=.10) with performance.
Conclusions: AD patients show a clear impairment in WM function when color and orientation have to be associated. This may be the result of a deficit in the precision of WM. The hippocampus seems to be involved in this binding process as hippocampal atrophy correlates with performance. The findings of this ongoing study are discussed in relation to current insights into the role of the MTL in WM binding as well as capacity models.
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Dementia (Subcortical, Specific Disorders, MCI, etc.)

E. BOLCEKOVA & R. RUSINA. Hashimoto's Encephalopathy: A Case Study.
Objective: Hashimoto's encaphalopathy (HE) is a rare neurological condition with heterogenous symptoms. It is responsive to steroid treatment and very often misdiagnosed.
Participants and Methods: We present a case of 65-year-old left-handed female with a history of schizophrenia and epilepsy who was admitted after a seizure. After regaining consciousness, there was prolonged disorientation and psychological alteration.
She underwent an extensive examination which included neurological, psychiatric and neropsychological evaluation, toxicology screen, MRI, SPECT, CSF analysis, EEG, EMG, or genetic testing for CADASIL.
Results: MRI revealed white matter edema, high antithyroid titers were found, and neuropsychology showed congitive and executive dysfunction. The results finally lead to the diagnosis of HE. The patient was treated with Solumedrol and afterwards with Prednisone, and her condition improved rapidly. Control examination after 6 months revealed improved MRI and CSF results, as well as higher neuropsychological functioning (namely in flexibility, shifting, control, psychomotor speed and attention). Patient's mood had also improved and she was able to resume her activities.
Conclusions: Prevalence of HE is probably higher than what we would expect according to the few reported cases. We should be aware of HE in the diagnostic process, as it it a very well treatable condition.
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C. CHI, C. CHEN, G. PENG, H. MA & S. CHIANG. Cognitive Recovery in Idiopathic Normal Pressure Hydrocephalus after Shunt Surgery: follow-up of a Case in Taiwan.
Objective: It has been much debated that the ventriculoperitoneal (VP) shunting could improve cognitive functions of patients with Idiopathic Normal Pressure Hydrocephalus (INPH). Thus the long-term changes on the neuropsychological performance after VP shunt insertion of a patient with INPH was followed and examined..
Participants and Methods: The patient, who is a 70-years-old female meeting the criteria for INPH, presented with gait disturbance, urinary incontinence, and cognitive impairment. This patient was admitted to the Department of Neurological Surgery at Tri-Service General Hospital in Taiwan. She underwent neurological, radiological, and neuropsychological examinations before lumbar drainage. Neurological and neuropsychological examinations were re-administered after lumbar drainage. She showed improvement in at least 1 clinical symptom with lumbar drainage. The follow-up included the administration of neuropsychological tests in 6 and 18 months after insertion of a VP shunt. The same neuropsychological tests were used each time to measure general intelligence, visual construction, memory and learning, and verbal fluency. These tests were the Wechsler Adult Intelligence Scale—Third Edition (WAIS–III), the word list subtest of the Wechsler Memory Scale—Third Edition (WMS–III), Rey Complex Figure Test (RCFT), and Semantic Association of Verbal Fluency.
Results: On all the neuropsychological tests, the patient showed no difference between before and after lumbar drainage. This level of performance remained the same in 6 months after VP shunt. However, the patient showed significant improvement by more than 1 standard deviation on all neuropsychological tests at the follow-up in 18 months after VP shunt.
Conclusions: Wide ranges of cognitive functions are affected by INPH, but cognitive improvement after VP shunt of INPH has still been controversial. In this case study, the patient with INPH treated by VP shunt showed significant improvement in cognitive functions in the long run.
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C.B. GÓMEZ, R. SANCHEZ-VALLE, G. RIBERA & M. JÓDAR. Frontotemporal Dementia: 2 Atypical Familiar Cases Associated with Mutations of the Gene Prp.
Objective: Frontotemporal Dementias (FTDs) is a group of neurodegeneratives diseases with very heterogeneous clinic, genetic and histopathological characteristics.The most common clinical features include behavioural and personality changes, social behaviour and emotionality disorders, as well as alteration executive functions and attention. FTDs have been associated to MAPT gene (chr 17) which codifies the protein Tau, and the PGRN gene (chr 17) which codifies the progranulina. Nevertheless, these genes do not explain all the cases of familiar FTD. We report 2 cases with clinical characteristics of FTD and confirmed genetic study of mutation of the prion protein gene (PrP) (PRNP)
Participants and Methods: 2 family cases of siblings (41year male and 47 year woman) were fully assessed, including neurological evaluation and neuroimaging study (SPECT and MRI). A comprehensive neuropsychological exploration was carried out, assessing orientation, memory, attention, language, gnosis, visuospatial/visuoconstructive skills and executive functions. A genetic study was performed to both subjects.
Results: The neuropsychological evaluation of both patients showed a cognitive frontal deterioration with attention, working memory, executive functions and premotor skills alterations. Recent memory as well

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as perceptual and language skills were preserved. Family reported changes in behaviour and personality in both patients, emphasizing a progressive change of character with irritability, severe apathy, infantilism, reasoning difficulties, desinhibition and lost of the personal hygiene. MRI showed signs of global cerebral atrophy. The SPECT did not show valuable alterations of cerebral perfusion.
Conclusions: A typical neuropsychological FTD pattern was associated to mutation of the prion protein gene. In addition to the 2 described genes (MAPT and PGRN), mutation of PrP could be considered as a new genetic variant of FTD. Further studies are necessary in order to define this new FTD genetic variant.
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A. LADAS, A.B. VIVAS, C. FRANTZIDIS, A. SEMERTZIDOU & P.D. BAMIDIS. The Relationship Between Dopamine Activity and Cognitive Function in Mild Cognitive Impairment: Eye Blink Rate as a Reliable Measure of Brain Dopamine Activity.
Objective: We investigated the relationship between dopamine (DA) activity, as measured by Eye Blink Rate (EBR), and cognitive function in old adults with Mild Cognitive Impairment (MCI). Research is not conclusive about the factors responsible for the transition from MCI to dementia. However, studies suggest that cortical hyperexcitability in very early stages of pathological aging, may progressively lead to cell death, and thus to Alzheimer's disease. Consequently, we speculated that abnormally increased dopamine activity may characterize people with MCI, and account for their poor cognitive function.
Participants and Methods: Thirty three healthy old adults, and 36 old adults with MCI (Mean age= 67.3 y.o, ± 7.13) participated in the study. The EBR, a reliable measure of brain DA function, was recorded for 6 minutes under resting conditions, using two gold skin electrodes placed above and below the left eye. Cognitive function was assessed with a battery of neuropsychological tests.
Results: Participants with MCI showed significantly higher EBR than the healthy controls, and the "standard" rate based on previous studies, which suggest that they have abnormally high levels of DA. Also, EBR was positively correlated to scores on the Digit Span Backwards test and negatively related to scores on the Montreal Cognitive Assessment test (MoCA).
Conclusions: As the Digit Backwards test assesses functions specifically modulated by dopamine, its positive relation to the EBR suggests EBR's validity as an index of central DA. Moreover, as MCI participants showed abnormally high EBR and EBR was negatively related to scores on the MoCA, a global measure of cognitive functions sensitive to dementia, this implies a hyperexcitability of dopaminergic neurons, contributing to a general neurotransmitter imbalance which in turn is reflected in worse general cognitive performance. These findings suggest that excessive DA activity (abnormally high EBR) may be a potential biomarker of the transition from healthy aging to dementia.
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A. MIDORIKAWA, C. ITOI & M. KAWAMURA. Getting a residual functions through eye-movement in a patient with severe frontotemporal lobar degeneration (FTLD).
Objective: When the patients' disease progressed and their cognitive functions declined during the course of the disease, the caregivers and other support staff gradually could not find a window of communication with them. However, some caregivers were quite sure that their patient recognized their surroundings even when the patient was akinetic with mutism. In this study, we observed a patient's eye-movement (preferential looking paradigm) in order to obtain residual cognitive functions of a severe FTLD patient.
Participants and Methods: The subject was a 76-year-old female. Her symptoms began in 2000, and her condition gradually deteriorated. Recently, she was completely loss of any spontaneous activities. MR imaging showed dense atrophy in the frontotemporal lobe, but the parieto-occipital lobe was preserved. In the experiment, two different faces (one was a target face and the other was a distracter face) were presented to the patient simultaneously using a TV monitor. The target was learned face and the distractor was novel face. During the experiment, we observed her eye-movement using a video camera recorder.
Results: We obtained eight trials composed of sixteen faces (eight target faces and eight distractor faces). When the patient looked the presented faces, she showed strong right side bias. However, when the time of saccade to the presented faces were examined, she showed much longer latency for target faces ($t(6)= 4.42$, $p<0.01$).
Conclusions: Even when the patient was completely loss of spontaneous activities, we could find their residual cognitive abilities using the eye-movement paradigm.
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J. MIRALBELL, J. SORIANO, E. LÓPEZ-CANCIO, J. ARENILLAS, J. LÓPEZ-OLORIZ, M. BARRIOS, A. GALÁN, C. CÁCERES, M. ALZAMORA, P. TORÁN, A. DÁVALOS & M. MATARÓ. Association between Markers of Inflammation, Endothelial Dysfunction and Thrombosis with Cognitive Impairment.
Objective: Biomarkers could be useful in selecting those patients with higher risk of cognitive impairment. Our aim was to examine the associations between biomarkers of inflammation, endothelial dysfunction and vascular thrombosis with neuropsychological indicators of vascular cognitive impairment and Alzheimer's disease.
Participants and Methods: 702 participants from the population-based Barcelona-ASIA Neuropsychology study who had completed neuropsychological and laboratory assessments were included in the study. Subjects were aged ≥ 50 years old, free from dementia and without history of cardio and cerebrovascular disease. Multiple linear and logistic regression analyses were used to assess the relationship between blood markers of inflammation (C-reactive protein (CRP) and resistin), thrombosis ((Plasminogen Activator Inhibitor –1 (PAI-1)) and endothelial dysfunction (Asymmetric Dimethylarginine (ADMA)) with performance in visuospatial, verbal memory and fluency factorial-derived domains.
Results: Mean age was 66.10 (range: 50-91) and 35% were women. After adjustment for several confounders and mediators, CRP was negatively related to performance in fluency. Increasing levels of ADMA were associated with lower performance in memory and a higher risk of impairment in this domain. Resistin and PAI-1 were not associated with cognitive function.
Conclusions: CRP is related to a cognitive pattern consistent with vascular cognitive impairment whereas cognitive deficits related to ADMA are more similar to that observed in pre-clinical stages of Alzheimer's disease. Our findings suggest that both molecules might play a role in cognitive impairment.
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M. NESSET & I. ULSTEIN. Conversion from Mild Cognitive Impairment to Dementia in a Clinical Population: Predictability from simple Cognitive Testing?
Objective: Assessment methods and the conversion from MCI to dementia were targeted in a study as part of quality enhancement at an outpatient clinic at a Department of Psychogeriatry.
One aim was to explore if conversion from MCI to dementia can be predicted from simple cognitive tests.
Participants and Methods: In a retrospective study we used data from medical records of 93 patients who were diagnosed with MCI, and had attended one or more follow–up assessments after at least five months. We recorded social demographic data (gender, age, marital status), life situation (housing, cohabitants, home-services) and clinical data (activities of daily life (ADL) function, brain imaging (MRI, CT, single-photon emission computer tomography (SPECT)), cognitive test results (Mini Mental State Examination (MMSE), Clock-drawing test (CDT) and Neurobehavioral Cognitive Status Examination (Cognistat), ICD10-diagnosis).
Results: Of 93 patients with MCI, 3 were diagnosed with mood disorder, having no MCI at first follow-up (5, 6 and 9 months). Of the remaining patients, 60 were women (mean age 75.5), 30 were men (mean age 69.4). Sixty-four converted from MCI to dementia, 33 of them within12 months (early converters (EC)) and 31 after more than 12 months (late converters (LC)), while 26 patients retained their MCI diagnosis (MCI).

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There was significant association between low CDT-scores and conversion to dementia (chi-square= 10.98, df=2, p<0.01), but not significant association for MMSE and Cognistat.
An ordinal logistic regression was conducted to predict classification on the dependent variable Conversion (EC, LC, MCI). CDT as a single predictor had a pseudo r-square of 0.16 using the Cox and Snell statistics.
Discussion:
MMSE and Cognistat might lack sensitivity for early differentiation between MCI and mild dementia, while CDT have some sensitivity.
Conclusions: Low CDT scores was associated with conversion from MCI to dementia in a clinical population.
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E.J. SITEK, M. HARCIAREK, E. NAROZANSKA, A. BARCZAK, P. ROBOWSKI, M. CHODAKOWSKA-ZEBROWSKA, S. KONIECZNA, M. BARCIKOWSKA, Z.K. WSZOLEK & J. SLAWEK. Is Phonemic Fluency Deficit A Good Marker Of FTDP-17 Onset And Progression? - Evidence From Patients With MAPT P301L Mutation.
Objective: Frontotemporal dementia and parkinsonism linked to chromosome 17 (FTDP-17) is a rare neurodegenerative condition with autosomal dominant inheritance, affecting behavior, cognition and motor function. Former case series have suggested that the verbal fluency trials, the analysis of the motor aspects of speech, as well as the olfactory testing could be useful in the detection of the clinical onset. In FTDP-17 phonemic fluency can be compromised because of executive dysfunction and/or aphasia. The study aimed at verifying the utility of phonemic fluency trials to capture the early symptoms of FTDP-17 and to measure the progression of deficits.
Participants and Methods: Nine individuals (3 affected with 2 to 6 follow-up examinations performed, 2 possibly affected, and 4 asymptomatic individuals), all carriers of MAPT P301 mutation were administered phonemic and semantic fluency trials. The phonemic fluency results are presented in the context of general cognitive status, language, visuospatial, memory, and executive function.
Results: Phonemic fluency was deficient in all symptomatic and possibly affected patients, and in 3/4 asymptomatic gene carriers. Phonemic fluency was very low in symptomatic patients at the first assessment and showed rapid decline. The discrepancy between semantic and phonemic fluency was the most striking feature in the possibly affected patients. However, phonemic fluency did not capture the progression of deficits at the advanced stages due to floor effect.
Conclusions: Deficient phonemic fluency is frequently present in asyptomatic MAPT P301L individuals. It is a useful marker of progression early in the disease course.
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Medical/Neurological Disorders/Other (Adult)

M. HARCIAREK, J.B. WILLIAMSON, B. BIEDUNKIEWICZ, M. LICHODZIEJEWSKA-NIEMIERKO, A. DEBSKA-SLIZIEN & B. RUTKOWSKI. Reno-Cerebrovascular Disease: A Model For Cognitive Decline In Patients Treated With Dialysis.
Objective: End-stage renal disease (ESRD) is a multi symptom illness complex resulting from chronic kidney failure that often co-occurs with cognitive deficits. Although dialysis may reduce some neuropsychological deficits resulting from ESRD, cognitive problems are still frequently observed in dialyzed patients. It remains unknown, however, if the cognitive status of dialyzed subjects is stable or declines over time. Thus, this study was aimed at determining the trajectory of cognition in dialyzed patients with ESRD.
Participants and Methods: A comprehensive set of neuropsychological tests was prospectively administered to 46 dialyzed patients and to 30 matched control subjects without nephrological problems. All participants were assessed on the following longitudinal schedule: baseline, 8 and 20 months.
Results: The analysis revealed that, at baseline, patients receiving dialysis performed significantly worse on measures of both verbal and visual memory, abstract reasoning, executive function and psychomotor speed. Further, the profile of their test performance was consistent with that of patients with subcortical cognitive impairment. Also, the analysis of change in cognitive performance of dialyzed subjects revealed that, over approximately 2 years, regardless of dialysis modality (hemodialysis vs. peritoneal dialysis), there was a significant decline (up to 12%) on measures of verbal memory, executive functions and psychomotor speed. Moreover, the extent of this decline was related to renal-dialysis and vascular factors.
Conclusions: Cognitive function is significantly, although selectively, compromised in dialyzed patients, with the profile of their cognitive performance mirroring that of subjects with mild subcortical impairment. What is more, the performance of subjects receiving dialysis on measures of memory, executive function, and psychomotor speed substantially declines over a time period of approximately 2 years. The results are discussed in light of the concept of reno-cerebrovascular disease.
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M. HARCIAREK, J.B. WILLIAMSON, B. BIEDUNKIEWICZ, M. LICHODZIEJEWSKA-NIEMIERKO, A. DEBSKA-SLIZIEN & B. RUTKOWSKI. Hypertension And Blood Urea Nitrogen Independently Predict Progression Of Executive Problems In Dialized Patients With End-Stage Renal Disease.
Objective: Dialyzed patients with end-stage renal disease often have cognitive problems, executive deficits in particular. Nonetheless, little is known about the nature of this dysexecutive impairment seen in the dialysis population. Thus, this study was aimed at determining possible factors that may contribute to the decline of executive function in patients receiving dialysis.
Participants and Methods: To assess executive function in dialyzed patients, we longitudinally compared verbal fluency performance between 49 dialyzed patients and 30 controls. We hypothesized that since decreased phonemic fluency in light of relatively normal semantic fluency has been typically considered a sign of dysexecutive impairment, patients receiving dialysis would present with a selective and possibly progressive impairment in the performance of the phonemic fluency task. Next, we wanted to learn if the degree of this potential decline of phonemic fluency in this population is associated with demographic and clinical factors.
Results: Overall, the statistical analysis confirmed our predictions and revealed that patients performed below controls only on the phonemic fluency task and not the semantic fluency task. Further, their performance on this task declined over time, whereas there was no change in semantic fluency. Moreover, the results of the regresion model indicated that this decline was independently related to the presence of hypertension and higher blood urea nitrogen.
Conclusions: This study confirms previous reports suggesting that dysexecutive problems are present in patients with end-stage renal disease receiving dialysis. Further, these problems in this population seem to be progressive, likely due to increasing vascular-toxic effects on fronto-subcortical networks.
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S. AFSHAR & M.A. PORTER. Facial Emotion Expressions in People with William's Syndrome and Down Syndrome.
Objective: The aim of the current study was to indirectly assess the ability of individuals with William's syndrome (WS) and Down syndrome (DS) to express a wide range of basic emotions (anger, disgust, fear, happiness, sadness and surprise) on their face. This was achieved by investigating how accurately and quickly untrained undergraduate students could label photographed facial expressions of emotion produced by individuals with WS and DS, compared to expressions produced by typically developing mental age matched controls.
Participants and Methods: Sixteen participants with WS (aged 5.33 to 32.33 years) were individually matched to 16 participants with DS on chronological age, mental age (as assessed by the Woodcock-Johnson Test of Cognitive Ability-Revised; Woodcock & Johnson, 1990) and sex. Participants with WS and DS were also individually matched to a third group of typically developing controls on mental age and sex.

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Results: Untrained viewers were found to display a similar level of accuracy in recognising expressions of happiness across the three populations, but were significantly poorer at recognising all other emotion expressions for participants with WS and DS compared to controls. Viewers were also less accurate at recognising expressions of disgust produced by participants with DS compared to those displayed by participants with WS. Speed of judgement was assessed using reaction time. Viewer reaction time was found to be influenced by level of exposure of viewers to clinical populations, questioning the validity of reaction time measure employed in the current study.
Conclusions: Overall, findings suggest that individuals with WS and DS are as accurate as typically developing mental age peers at expressing happiness, but are below mental age level for all other basic emotional expressions. The spared ability to express happiness is consistent with previous research and the reported sociable personalities of individuals with WS and DS.
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A. CAMPABADAL, A. SOLER, C. GALISTEO, M. LARROSA, M. MASDEU, L. VIGIL & M. JÓDAR. Verbal Memory in Fibromyalgia and Chronic Pain.
Objective: Neuropsychological deficits, such as attention and memory, have been described in patients with fibromyalgia (FM). Some authors have proposed that cognitive deficits in FM could be a specific symptom of the illness, although others have considered that these neuropsychological alterations are due to comorbid psychiatric disorders (anxiety) or pain itself. In fact, there is some evidence that chronic pain could consume the limited attention resources, affecting performance in other cognitive functions. The aim of this study is to explore the verbal memory performance in FM patients controlling these variables
Participants and Methods: 81 postmenopausal women were included in the study: 31 FM patients who meet criteria ACR/90, 24 subjects with musculoskeletal chronic pain (CP) and 26 healthy controls (CG). Subjects with neurological diseases that could cause cognitive deficits, with diagnosis of moderate-severe depression (Beck > 20) and/or patients treated with psychotropic drugs were excluded. Verbal memory was assessed using the Rey Auditory-Verbal Learning Test (RAVLT). Hamilton anxiety scale was used to detect anxiety symptoms.
Results: Statistical analysis using an ANOVA with a Bonferroni post-test showed significant differences in RAVLT long-term memory task between FM and CP ($p=0.04$) and FM and CG ($P=0.05$). No significant differences were found in the first and fifth trials, short-term recall, neither on recognition task. FM patients scored more than CG ($x=11.68$, $x=1$; $p<0.001$) and CP ($x=3.42$; $p<0.001$) in Hamilton scale. A lineal regression model revealed no impact of anxiety in the long-term verbal memory ($p= 0.06$).
Conclusions: FM patients showed more difficulty in long-term verbal memory comparing with CG and CP groups, although all scores were found into normal range. Anxiety levels did not explain the long-term verbal memory performance in FM patients. Difficulties in verbal memory in FM could be considered a specific symptom of the illness. Funded by the Fundació La Marató de TV3.
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A. NIETO, R. CORREIA, ÉRIKA. DE NÓBREGA, F. MONTÓN, S. HESS, D. FERREIRA & J. BARROSO. Relationship between processing speed and clinical parameters in Friedreich ataxia.
Objective: Few studies have examined the cognitive status of patients with genetically defined Friedreich ataxia (FRDA), the most frequent of the inherited ataxias. Movement disturbances present in this clinical population cause slowed motor response, but cognitive speed may be also affected. Our aim was to study motor and cognitive processing speed in FRDA and their relationship with disease duration, ataxia severity and disability on daily living.
Participants and Methods: 36 FRDA patients and 31 matched controls were administered a Reaction Time task. We used a computerized system to differentiate cognitive response time (Decision time, DT) from movement time (Motor time, MT). A Clinical Rating Scale modified from Appollonio et al. (1993) was used to assess ataxia severity (cerebellar signs). The modified Rankin Scale (Van Swieten et al., 1988) was used to assess disability.Duration was computed as years since the symptoms onset.
Results: We found significant between-groups differences in both motor and decision times (MT: $p<0.0001$; DT: $p<0.0001$). Significant correlations were found between motor time and the clinical parameters (MT- duration: $r=0.459$ $p=0.012$; MT- severity: $r=0.520$, $p=0.039$; MT-disability: $r=0.545$, $p=0.002$). More substantial relations were found between these parameters and cognitive reaction time (DT- duration: $r=0.641$ $p= 0.000$; DT- severity: $r=0.648$ $p= 0.007$; DT-disability: $r=0.690$ $p= 0.000$).
Conclusions: FRDA patients not only showed a motor slowing but also diminished mental processing speed. Cognitive slowing is related to disease duration, severity and impact on independent functioning. This impairment may have a noticeable effect on multiple cognitive domains. Thus, our results suggest as the disease progress, FRDA patients may experience difficulties in their social and professional life not only due to ataxia severity but also because their diminished processing speed.
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I. HUMAIDA. Relationship Between Stress And Psychosomatic Complaints Among Nurses In Tabarjal Hospital).
Objective: Establishing the existence and extent of work stress in nurses in a hospital setting, identifying the major sources of stress, and finding the incidence of psychosomatic illness related to stress
Participants and Methods: This study used a questionnaire relating to stressors and a list of psychosomatic ailments. One hundred and six nurses responded and they were all included in the study. Stressors were based on four main factors: work related, work interactions, job satisfaction, and home stress. The factors relating to stress were given weights according to the severity. The total score of 50 was divided into mild, moderate, severe, and burnout
Results: Most important causes of stress were jobs not finishing in time because of shortage of staff, conflict with patient relatives, overtime, and insufficient pay. Psychosomatic disorders like acidity, back pain, stiffness in neck and shoulders, forgetfulness, anger, and worry significantly increased in nurses having higher stress scores. Increase in age or seniority did not significantly decrease stress
Conclusions: Moderate levels of stress are seen in a majority of the nurses. Incidence of psychosomatic illness increases with the level of stress. Healthcare organizations need to urgently take preemptive steps to counter this problem
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Z. MELIKYAN, Y. MIKADZE & A. POTAPOV. Speed of Information Processing and Working Memory in Patients with Mild and Moderate TBI 1, 3 and 6 Months Post-injury.
Objective: Young adults often suffer from TBI, with mild and moderate TBI being most common. TBI often leads to long-lasting cognitive deficits. Speed of information processing and working memory – crucial for daily functioning - are frequently disturbed in TBI. Determining mechanisms of cognitive disturbance and recovery after trauma can help cognitive remediation planning.
Participants and Methods: 43 adults (27 male, 16 female), 16-62 years old with mild (23 patients) and moderate (20 patients) TBI were tested within 1, 3 and 6 months after trauma. Digit Symbol Coding, Digit Span, Spatial Span, and Letter-Number Sequencing from WAIS-III were administered to TBI patients. Standard scores were analyzed 1-3 and 3-6 months post-injury. ANOVA was performed. Only statistically significant results ($p<=0.05$) are reported.
Results: Overall at first month post-injury Digit-Symbol Coding performance was more impaired as compared to other tests. 1-3 months post-injury: performance in Digit Symbol Coding, Digit Span, and Letter-Number Sequencing improves significantly. 3-6 months post-injury: only performance in Spatial Span improves significantly. Overall Digit Span performance is poorer as compared to Spatial Span performance.

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Conclusions: According to our results, speed of information processing is somewhat impaired at first month post-injury. Within the first three months after the injury significant improvement is seen in speed of information processing and verbal working memory. Within the next three months significant improvement in spatial working memory is seen.
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E.A. PECK & M.N. MICKENS. Base Rate Data of Epworth Sleepiness Scale Scores in a Sample of US Adults Referred for Neuropsychological Assessment.

Objective: Excessive Daytime Sleepiness (EDS) is sleepiness that occurs when a person is expected to be awake. EDS is a symptom of a sleep disorder which may influence neuropsychological function. The prevalence of EDS in Ss seen for neuropsychological evaluation (NE) assessment is poorly documented. The purpose of this study was to use the Epworth Sleepiness Scale (ESS), a measure of EDS, to establish base rates of EDS in Ss seen for NE.

Participants and Methods: 300 Ss were seen for NE due to cognitive difficulties. 183 were female, 117 were male. The M age = 49 years (SD=18) and M education = 14 (SD=3). Ss were randomly selected. Each completed the ESS. The ESS is an internationally used self-report questionnaire which assesses the risk for dozing during listed daytime activities. Scores on the ESS range from 0-24, with scores >10 indicating an increased risk of EDS.

Results: Men reported ESS scores (M=9 SD=5) v women (M=8, SD=5). t (300)=1.26, p=.21, ns. Ss aged 18-40 reported higher scores (M= 9, SD=5) than those aged 65-90 (M=6, SD=5), F (2,294)=9., p<.001. The interaction effect of age & sex was ns, p=.10. Ss reporting a relevant medical problem (e.g. CVA) endorsed higher rates of EDS (M=10) when compared to other presenting problems (e.g. ADHD), F(4,294)=4.84, p<.001.

Using a cut-off of >10, 38% of Ss reported elevated ESS scores, which suggests that they may experience an increased risk of EDS. Ss with elevated ESS scores also reported higher percentages of the following disorders when compared with those with non-clinical scores: Apnea (21% v 7%), Hypertension (27% v 17%), Diabetes (10% v 5%), CVA (6% v 4%).

Conclusions: Using a sample of 300 Ss referred for NE, this study examined the prevalence of EDS using the ESS. Findings suggest that neuropsychologists need to consider the impact of sleep on the results of test data. Findings suggest that younger individuals and those with a medical diagnosis that may impact their neuropsychological functioning could be at a risk for co-morbid health consequences.
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Medical/Neurological Disorders/Other (Child)

A.M. HAAVISTO, E. QVIST, C. HOLMBERG, H. JALANKO & M. KORKMAN. Visuomotor and Visuoconstructive Difficulties After Pediatric Solid Organ Transplantation.

Objective: End-stage organ failure and consequent transplantation (Tx) is a risk factor for impaired neurodevelopmental outcome. A comparison of results on a standardized neuropsychological assessment (NEPSY-II) between different Tx groups has been presented earlier. This study compared neurocognitive profiles and parental evaluation of development in Tx patients with those of healthy children. Risk factors for poorer development were analyzed.

Participants and Methods: 76 Tx patients aged 6-16 years (17 heart, 45 kidney, 14 liver) and a matched control group of 60 healthy children underwent assessment with NEPSY-II and a parental developmental questionnaire (Five to Fifteen). Mean age at assessment was 11.5 (SD 3.2) for Tx patients and 11.0 (SD 3.0) for the control group. Time since Tx was, on average, 7.1 (SD 3.7, range 1.0-15.0) years.

Results: There was a significant between-subjects effect of group on the NEPSY-II, $F(1, 129.3) = 34.44$, $p < .001$. The control group performed significantly better on all subtests (all $p < .001$). The Tx group achieved significantly poorer scores on subtests assessing visuomotor and visuoconstructive functions compared to subtests of attention and memory. Neurological comorbidity and lower intelligence quotient predicted poorer outcome in Tx children (adjusted $R^2 = 0.13$ to 0.47, $p < .001$ to .002). Disease duration, age at Tx, type of Tx, or follow-up time since Tx did not predict outcome. Tx children had more problems on Five to Fifteen compared to age-specific norms.

Conclusions: Thus, school-aged children who have undergone a solid organ Tx exhibited significant neurocognitive impairment on both neuropsychological assessments and parental reports. These findings indicate that neurological sequelae, rather than type of Tx or other Tx related variables, are associated with poorer outcome, and that visuomotor and visuoconstructive domains are particularly sensitive to diffuse and non-acute, acquired insult.
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M. NOTOYA, K. HASHIMOTO, H. HARADA, N. SUNAHARA, M. ITO & T. YOSHIZAKI. Neuropsychological analysis by WISC-III/WAIS/III of congenitally hearing-impaired subjets with normal range verbal IQ.

Objective: Generally, many authors have reported a delay of language acquisition in hearing-impaired subjects. However, we have trained many congenitally hearing-impaired subjects by multi-modal training program (Kanazawa method) in our clinic, and almost of them have acquired a level of language equal to their hearing peers. In another report, we administered the Wechsler intelligence scales (WISC-III/WAIS-III) to 18 hearing-impaired children/adults aged more than 9 years, with normal range performance intelligence (PIQ) levels, Almost all subjects could respond orally. As a result, for hearing-impaired children to acquire normal oral language, it is not necessary to have high PIQ.
In this study, we administered the WISC-III/WAIS-III) to congnital hearing-impaired subjects and evaluated performance IQ sub-items that may affect verbal intelligence.

Participants and Methods: Participants: 21 congenital hearing-impaired children/adults aged > 9 years, with normal-range verbal intelligence (VIQ) levels were selected. They were trainded at our Kanazawa University Hospital.
Methods: Subjects were measured their mental functions by WISC-III/WAIS-III .
Statistic analysis: Simple correlation among sub-items of performance IQ. After that, to identify factors affecting the VIQ socre, multiple regression analysis was preformed.

Results: As a result, the median VIQ score in all 21 subjects was 102, the mean VIQ score was 102.4(SD11.4). The score ranged from 86-124. There was no associated between the VIQ and PIQ socres. Significant positve correlations were not observed among sub-items.

Conclusions: We analyzed sub-items of WISC-III/WAIS-III, neuropsychological assessment of cogenitall hearing-impaired children to having acquired normal oral language, it is not necessary to have high PIQ sub-items.
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P. MUNCK, A. NYMAN, H. KIISKI-MÄKI, H. LAPINLEIMU, L. LEHTONEN & L. HAATAJA. Cognitive and Neuropsychological Development of Children Born <32 Gestational Weeks at 2 and 5 Years of Age.

Objective: Preterm born children are at risk for a spectrum of cognitive and neuropsychological deficits. Despite of the advances in neonatal care, cognitive and neuropsychological deficits are common morbidities in preterm population. The aim of the present study was to describe the longitudinal developmental outcome of a cohort of VLBW children.

Participants and Methods: A regional cohort of 71 children born under 32 gestational weeks in 2004-2006 was followed up using Mental Development Index (MDI) of Bayley Scales of Infant Development, II at two years of corrected age, and full-scale IQ of Wechsler Scale of Intelligence (WPPSI-R) at the age of five years. The neuropsychological profile was assessed with NEPSY-II at the age of five years. A total of 192 randomly selected healthy full-term (FT) born children born in the same hospital were assessed with similar methods for comparison.

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Results: In the preterm group, mean MDI and IQ were at the average level compared to the test norms. However, preterm children performed significantly poorer compared to FT controls. At the age of five years, the performance IQ of preterm born population was more significantly impaired than verbal IQ. Preterm children showed significantly lower scores in all sub-domains of NEPSY-II (language, memory, attention and executive functioning, and visuomotor skills) compared to FT group. Many of these differences were strongly mediated by IQ. However, preterm children were at risk for poorer phonological processing, attention problems, and visual memory deficits compared with FT peers, even after controlling for the IQ.
Conclusions: Preterm born children's cognitive development was at the average level at the ages of two and five years. However, when development was compared to FT controls, preterm born children were at risk for poorer cognitive development, as well as for neuropsychological deficits. Therefore, we stress the clinical significance of long-term follow-up of these at-risk children.
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V. SIFFREDI, V. ANDERSON, R.J. LEVENTER & M.M. SPENCER-SMITH. Neuropsychological profile of agenesis of the corpus callosum – A systematic review.
Objective: To conduct a systematic review of the literature to characterize the neuropsychological profile of individuals with agenesis of the corpus callosum (ACC).
Participants and Methods: The literature was searched systematically using electronic databases and broad keyword searches restricted to English-language publications in peer-reviewed journals from January 1980 to January 2011. We included only studies that focused on individuals diagnosed with ACC via magnetic resonance imaging and reported standardized performance scores on neuropsychological tests and/or compared performance with a healthy control group.
Results: A total of 47 articles describing individuals aged 3 months to 73 years met inclusion criteria. Results showed an overall mean IQ of 82.2 (SD=24.05, n=110). Pragmatic language and mathematical skills were at high risk of impairment. Individuals with ACC may present with difficulties in visual and spatial skills, expressive and receptive language skills, information processing speed, attention, executive functions, and memory. Performances within the 'Average' range have been found in vocabulary, visual-spatial long-term memory, reading, and spelling skills.
Conclusions: It is unclear from the identified literature whether the lack of a characteristic profile of individuals with ACC is purely related to methodological limitations in the research or reflects the inherent heterogeneity of the causes and comorbidities of ACC.
Correspondence: *Vanessa Siffredi, Master of science in Psychology, The Murdoch Childrens Research Institute, 369 Royal Parade, Parkville, VIC 3052, Australia. E-mail: vanessa.siffredi@gmail.com*

Invited Address: Frontal-Cerebellar Systems: How Closely do the Functions Map Together?

Speaker: Donald Stuss

1:30–2:30 p.m.

D.T. STUSS. Frontal-Cerebellar Systems: How Closely do the Functions Map Together?
Until and through the 1980s, there was little if any mention of a potential non-motor "cognitive" involvement of the cerebellum. The influential Schmahmann and Sherman (1998) description of the "cerebellar cognitive-affective syndrome" Frsummarizing their own and other literature shone a new light on the role of the cerebellum. Cerebellar damage was reported as causing impairment in several functions, many if not most associated with dysfunction after frontal lobe pathology. The hypothesis was that the cognitive effects were related to cerebellar-cerebral connections, in particular cerebellar-frontal connections.
Several principles guided our research in studying frontal-cerebellar functional connectivity. First, studies may have been confounded by being completed in acute or sub-acute stages. Second, lesions may have extended beyond focal cerebellar regions. And third, it would be important to ground the study in knowledge of focal frontal patients. Our approach then in studying this hypothesis was to start from the foundation of our knowledge of attentional and "executive" processes from work with patients with prefrontal lesions. This work demonstrated dissociable brain-behaviour relations: superior medial lesions affect response activation (Energization); left ventrolateral lesions impact initial category set and switching to new categories; right lateral frontal lesions often affecting monitoring. In these carefully selected cerebellar patients, there were no significant differences from matched neurologically normal individuals on many tasks that had been demonstrated sensitive to prefrontal lesions. Cerebellar deficits were found in a few tasks, those seen after left lateral frontal lesions - and these deficits were almost limited to right cerebellar lesions. There may be a "cerebellar cognitive affective syndrome" but the cognitive component is less dramatic and persistent at least in adults with circumscribed focal cerebellar lesions.
Learning objectives:
1. Apply knowledge of neuro-anatomical connectivity to generate hypotheses about brain-behaviour functional relationships and brain networks.
2. Recognize the similarities and differences between functions of the frontal lobes and the cerebellum.
Correspondence: *Donald T. Stuss, Ontario Brain Institute, MaRS Centre, 101 College St. Box 21, Toronto, ON M5C 1L7, Canada. E-mail: dstuss@braininstitute.ca*

Paper Session: ADHD/Attentional Functions

1:45–3:15 p.m.

A. HOLTH SKOGAN, J. EGELAND, N. ROHRER-BAUMGARTNER, A. URNES, H. AASE & P. ZEINER. Working Memory and Inhibitory Control in Young Preschool Children at Risk for Attention Deficit Hyperactivity Disorder.
Objective: Working memory and inhibition are two core executive functions (EFs) found to be compromised in ADHD. These EFs are rapidly developing in early childhood, and findings regarding EF impairment in young children with ADHD symptoms have been inconsistent. The present study examined whether impairments in working memory or inhibitory control are present in preschool children with significant ADHD and/or other clinical problems, and how possible neurocognitive deficits are related to behavioural symptoms of ADHD.
Participants and Methods: Participants were 811 children aged 37-45 months, recruited from the population based Norwegian Mother and child cohort study (MoBa). Measures of verbal an nonverbal working memory, and inhibition from the Stanford-Binet 5 and NEPSY were subjected to categorical analyses according to behavioral symptoms. A one-way between-groups multiple analysis of variance (MANOVA) were conducted, exploring the relationship between clinical symptoms and measures of inhibition and working memory. Comparison groups did not differ in age or intellectual ability.
Results: Significant group differences were evident in some, but not all tests measuring working memory and inhibition ($p<.05$-$p<.001$). ADHD symptoms alone or in combination with other symptoms were associated with poor test performance when compared to other symptoms and controls. Nonverbal working memory were more strongly related to ADHD symptoms than were verbal working memory. The ADHD-related reduction in test performance were partly independent of variations in parents' educational level.
Conclusions: Our findings indicate that neurocognitive impairment found in older children with ADHD symptoms are identifiable also at an early age, and that working memory and inhibitory functions may be related to ADHD symptomatology from early childhood on. The ADHD related reduction in working memory performance appear to be modality specific, indicating that verbal and nonverbal working memory should be studied separately in this age group.

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J. EGELAND, A. AARLIEN & B. SAUNES. Both sides now: Transfer effect of Working Memory Training.

Objective: Studies have shown that children with ADHD profit from Working Memory training, although few studies have investigated transfer effects comprehensively. The present study analyzes transfer both to other neuropsychological domains, academic performance and daily life functioning at home and school.

Participants and Methods: Seventy-two children with ADHD were randomized into a control group or a training group completing Cogmed's RoboMemo program. They were assessed pre-training, immediately after and eight months later with a battery of neuropsychological tests, rating scales filled out by parents and teachers as well as measures of mathematical and reading skills.

Results: There were small but significant training effects related to some, but not all, measures of psychomotor speed and controlled attention but no effect on memory. Reading and mathematics were improved. Inattention-ratings at home were differentially reduced in the training group, but more detailed mapping of executive function by BRIEF, did not show improvement. There was no improvement in teacher ratings. Generally, improvements attained immediately post training remained eight months later.

Conclusions: The study is the most comprehensive study of transfer effects to date, and with mixed results compared to previous research. More research is needed as to how improve the training program and regarding conditions and thresholds for successful training.

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Y. BAO, L. FU & E. POEPPEL. Inhibitory Processing across Life Span: Evidence from Inhibition of Return.

Objective: When a target appears at the same location of a peripheral cue, responding is typically delayed if the cue-target interval reaches ca. 200ms. This phenomenon is termed inhibition of return (IOR) and has been generally assumed to reflect an inhibitory mechanism of spatial processing. By examining the time course of IOR in children, adolescents, adults and elderly people, the present study aims to examine how inhibitory processing changes over human life span.

Participants and Methods: Thirty participants in each age group (children, adolescents, adults and elderly) participated in the present study. IOR effects were measured in a simple detection task with a typical double-cue IOR procedure. The cue-target interval was systematically manipulated at some critical cue-target intervals (namely, SOAs), i.e., the shorter and longer interval ranges in order to capture the onsets and offsets of IOR for different age groups.

Results: As expected, young adults showed a typical time course of IOR, i.e., IOR started at a SOA of 150ms and disappeared after 3200ms. Both children and adolescents exhibited same later onset of IOR (100ms later), while elderly people showed an onset of IOR in between, i.e., at 200ms. With respect to the offset of IOR, adolescents and elderly people exhibited the same offset as young adults, but children demonstrated an earlier offset of IOR (ca. 500ms earlier).

Conclusions: The present study indicated different time course of IOR in different age groups. While the onset of IOR developed earliest in young adults, later in elderly people, and latest in children and adolescents, the offset of IOR were the same except for children who showed an earlier offset. The smaller temporal window in children indicated a weaker inhibitory processing in life span. However, counter-intuitively, the inhibitory function in elderly people was, although not as good as adults, but still better than both children and adolescents (This study was supported by NSFC from China, No.30670703).

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G. SÖDERLUND. Improving Cognitive Functions with Noise in Inattentive Children.

Objective: Noise of all kinds is typically regarded as detrimental for memory and cognitive performance. Earlier theorizing suggests that this is more pronounced among inattentive people than attentive people. However, recent research has found that background auditory noise surprisingly improves the cognitive performance in inattentive persons. This finding has been attributed to the phenomena of stochastic resonance where a moderate amount of white noise improves the signal-to-noise ratio, and thus perception, by making it easier for the neural system to differentiate between the information-carrying target and the surrounding noise. The theoretical underpinning is described in the framework of the Moderate Brain Arousal (MBA) model. This talk will review current findings in the field of noise research linked to attention and memory performance in groups that differs in attention ability.

Participants and Methods: Participants were children with attention difficulties, as judged by their teachers, or children with an ADHD diagnosis. Age-matched children with normal cognitive development were used as comparison. Various cognitive and memory tasks were carried out in different background noise conditions.

Results: Exposure to background noise improved performance for inattentive children and attenuated performance for attentive children; to the degree and that group differences were eliminated. A comparison between stimulant medication and noise exposure showed that the effect of noise on performance was in parity with, or even larger as the effect of medication.

Conclusions: Consistent with the MBA model, our data show that cognitive performance can be moderated by external background white noise stimulation in both non-clinical and clinical ADHD groups of inattentive participants. Required noise levels vary with attention ability. We now have evidence showing that noise could possibly be a non-pharmacological alternative to stimulant medication in ADHD with respect to school performance.

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M.A. GARCIA-BARRERA, E. DIRENFELD, J. HATTER, G. TUTT & E. PEREZ-HERNANDEZ. Neural Markers of ADHD: Is Larger Worst? Examining the Relationships between Subregional Brain Sizes, Behavior and Attentional Systems in a Pediatric ADHD Sample from Spain.

Objective: Despite the large variability observed in the ADHD behavioral and cognitive presentation, brain volumetric studies concurred in identifying smaller neural regions associated with the presence of ADHD symptoms and executive attention networks (i.e., Prefrontal Cortex - PFC and Anterior Cingulate Cortex-ACC). Contrary to most evidence, our laboratory has consistently and reliably identified larger volumes of these areas in a sample of children from Spain diagnosed with ADHD (Direnfeld et al., 2011, Direnfeld et al, 2012). To further examine this sample, the current study aimed to measure the integrity of the interhemispheric connections of the PFC and ACC via the Corpus Callosum (CC). It was hypothesized that larger volumes will be associated with larger CC areas.

Participants and Methods: Ten children with ADHD (aged 7-10) and matched controls underwent structural MRI and neuropsychological assessment (N=20). ANALYZE 9.0 was used to manually trace PFC, ACC and CC subregions, followed by between-group statistical comparisons. Correlation analyses were used to examine whether these subregions were related to diagnosis, behavior ratings and performance on neuropsychological tasks of attention.

Results: Overall, a tendency towards larger subregional CC compartments was observed for the ADHD group versus the controls. In particular, the rostrum/genu compartment ($p = .031$) and the anterior portion of the trunk ($p = .021$) were significantly larger. The total area for the ACC was also significantly larger ($p = .033$). Larger volumes of the rostrum/genu correlated with worse levels of hyperactivity ($r = .655$).

Conclusions: Our findings support the hypothesis of a maturation delay possibly reflected in a slower prunning of gray matter. The question that remains imperative is: How can larger volume/size be associated with worst behavioral outcomes and task performance in this sample? An analysis of IQ differences and other behavioral patterns shed light over these findings and will be further discussed.

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Invited Address: Electrophysiology of Human Prefrontal Cortex

Speaker: Robert Knight

2:30–3:30 p.m.

R.T. KNIGHT. Electrophysiology of Human Prefrontal Cortex.
EEG data from prefrontal stroke patients and electrocorticographic (ECoG) evidence from subdural intracranial recording in neurosurgical patients supports a central role of PFC in goal directed behavior. For instance, voluntary attention is dependent on PFC control of sensory flow in posterior cortical regions in the first 200 msec of stimulus processing and automatic attention to novel events depends on a prefrontal-hippocampal network engaged within 300-500 msec. Recovery after frontal damage is indexed by sub-second patterns of re-organization in the non-lesioned hemisphere supporting a flexible model of neuroplasticity. Since the 1920's neurophysiological dogma has claimed that the human cortex does not generate activity above 50-60 Hz. However, we have observed neural activity up to 250 Hz in ECoG recordings from the human cortex. Indeed, every process we have examined with ECoG including attention, language, memory and motor control generates high gamma activity (70-250 Hz; HG). For instance, during linguistic processing the HG response has provided novel insights into the role of Wernicke's and Broca's area in language perception and production. HG has also provided new insights on the role of PFC in working memory and response selection. HG is phase locked to the trough of theta rhythms in the neocortex and this cross frequency coupling manifests in a task specific manner with different cognitive tasks eliciting unique spatial patterns of HG-theta coupling. These findings support the notion that cross frequency coupling between low- and high-frequency brain rhythms provides a mechanism for effective communication in distributed neural networks during cognitive processing. Taken together the results obtained from PFC lesioned patients and ECoG recording support the notion that the human prefrontal syndrome can be viewed as a failure of PFC control of distributed neural networks subserving human behavior.
Learning Objectives:
1. Define the role of human prefrontal cortex subregions in goal directed behavior
2. Describe the role of neural oscillations in cognition
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Symposium: Investigation of Emotional and Social Cognitive Dimensions in Epilepsy and Mon-Pharmacological Approaches to Cognitive-Behavioral Problems

Chair: Anna Rita Giovagnoli

Discussant: Arne Gramstad

3:30–5:00 p.m.

A. GIOVAGNOLI, A. GRAMSTAD, S. MELETTI, E. HESSEN, A. GRAMSTAD, A. GIOVAGNOLI, P. MARUSIC, A. RAGLIO & F. ELISABETTA. Investigation of Emotional and Social Cognitive Dimensions in Epilepsy and Non-Pharmacological Approaches to Cognitive-Behavioral Problems.
Symposium Description: Social cognition, including theory of mind, empathy, and the understanding of conventional and moral rules, and the recognition of emotion, are prerequisites to successful behaviour. An increasing number of studies has shown social cognitive impairments in neurologic and psychiatric conditions. In epilepsy, a variety of aspects were explored using different behavioural and neuropsychological methods, highlighting the interactions of affective and cognitive components and their influence on behaviour, mood, and quality of life.
This symposium addresses some emerging aspects of this topic: the recognition of emotions from faces and voices in temporal lobe epilepsy, behavioural adjustment in seizure-free epilepsy, self-efficacy and quality of life, emotional-behavioural implications of theory of mind impairment, postoperative changes in emotional recognition and social cognition in temporal lobe epilepsy, music therapy effectiveness and neuropsychological research perspectives, and evidence-based cognitive rehabilitation in epilepsy.
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S. MELETTI & A. BONORA. Recognition of Emotions from Faces and Voices in Medial Temporal Lobe Epilepsy.
Objective: Defective social abilities have been observed in patients with Mesial Temporal Lobe Epilepsy (MTLE). Especially MTLE impairs facial expressions recognition of negative emotions. To test the existence of a supramodal system for recognizing signals of fundamental emotions, we evaluated in a group of MTLE patients, the ability to recognize basic emotions from visual and prosodic cues. Moreover we tested: (a) if patients impaired in one modality presents deficits in the other one; and (b) the correlation of emotion recognition with cognitive intelligence.
Participants and Methods: Forty-one patients were enrolled in the study and performed two different tasks of basic emotions recognition as part of a comprehensive neuropsychological assessment. The identification of happiness, fear, disgust, anger and sadness were assessed in the two tasks: for the visual domain, we test the emotion recognition from facial expressions, while to investigate emotional prosody we used sentences with neutral semantic, but expressed with different prosodic intonation.
Results: Results showed deficits both in the recognition of facial and vocal expression for all basic emotions (fear, sadness, disgust, anger), but happiness: the accuracy of recognition in the patients' group was significantly lower respect to healthy subjects both in the visual and auditory domain. Furthermore, we observed a strong correlation of performances across the two tasks. On the contrary, no correlation was evident between emotions recognition and intelligence measures.
Conclusions: These data suggest that emotion recognition impairment in MTLE is not dependent from the sensory modality through which the emotional stimulus is conveyed, and support the notion that emotional processing is at least partly independent from measures of cognitive intelligence.
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E. HESSEN. Behavioural Adjustment in Well Controlled Epilepsy Patients.
Objective: Risk of reduced quality of life, anxiety and depression is elevated in people with epilepsy. This may be due to a range of factors including brain lesions, worry about seizures, hereditary factors, psychosocial factors, and possible adverse effects of antiepileptic drugs (AEDs). Studies on the relation between epilepsy related variables and behavioural adjustment have mainly been conducted on patients with persisting seizures.
Participants and Methods: In the present study we investigated behavioural function in epilepsy patients (n=126) seizure-free for more than 2 years on AED monotherapy, with the Minnesota Multiphasic Personality Inventory-2 (MMPI-2), in addition to MRI and EEG.
Results: Group analysis found mean MMPI-2 scores on all the clinical and content scales to be within the normal range. Abnormally elevated scores on scales measuring aspects of depression, health-related concerns, low self-esteem, negative treatment indicators, and physical complaints were recorded in a higher proportion of patients than would normally be expected. Multiple regression analysis showed that MRI pathology significantly predicted abnormally poor score on the low self-esteem scale, and that epilepsy onset before 18 years was a significant predictor of abnormally poor score on the work interference scale.
Conclusions: Most seizure-free epilepsy patients showed normal behavioural adjustment. However, a higher proportion than expected obtained scores suggesting depression, low self-esteem, and health-related concerns. Both neurobiological and psychosocial factors may explain different aspects of problems with behavioural adjustment.
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A. GRAMSTAD. Self-Efficacy and Quality of Life in Epilepsy.
Objective: The concept of self-efficacy have gained a central position in psychology. It refers to expectations of successful performance, and represent an important factor in the way we perceive ourselves in society. Self-efficacy may be regarded as a cognitive moderator between inner emotional state and behavior, and could be a possible target for cognitive behavioral modificaton. Therefore, assessment of self-efficacy could have implications for treatment planning, also in medical patients. It could help clinicians in determinating whether there is reasonable correspondence between expectations and performance.
Participants and Methods: Self-efficacy can be assessed both in general and specifically towards particular diseases or problem behaviors. A short screening-scale of self-efficacy in epilepsy, and data concerning impact of self-efficacy on quality of life in patients with epilepsy, will be presented.
Results: The self-efficacy in epilepsy scale correlates about .40 - .45 with measures of psychosocial functioning and quality of life. In an expanded model, incorporating also measures of positive and negative affectivity, self-efficacy in epilepsy independently explains between 10 and15 % of the variance in the Overall Psychosocial Functioning scale of the Washington Psychosocial Seizure Inventory.
Conclusions: Self-efficacy represent a significant explanatory factor of psychosocial functioning and quality of life in patients with epilepsy. Because it may have direct implications for treatment planning, the self-efficacy scale may be an effective aid in screening of behavioral problems in patients with epilepsy.
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A. RAGLIO. Music Therapy Effectiveness and Neuropsychological Research Perspectives.
Objective: Music therapy is a non-pharmacological therapeutic intervention based on the sonorous-music relationship between music therapist and patient. The music therapy approaches use active or receptive techniques supported by theoretical assumptions. Generic use of music (listening to music, playing instruments, etc.) is a different condition. Aims of the study were to analyze the literature to show the efficacy of music and music therapy in different neurological or psychiatric diseases.
Participants and Methods: Music and music therapy papers from the scientific literature (CCT and RCT) were critically revised.
Results: Music and music therapy produce very important effects on mood (Kim et al., 2011; Bradt et al., 2011; Guetin et al., 2009; Sarkamo et al., 2008), behavior (Svansdottir et al., 2006; Raglio et al., 2008; 2010; Purdie et al., 1997), quality of life (Hilliard, 2003; Walworth et al., 2008; Grocke et al., 2009; Zanini et al., 2009; Cooke et al., 2010; Lee et al., 2010; Solé et al., 2010), psychiatric symptoms (Maratos et al., 2008; Erkkila et al., 2008; 2011; Harv Ment Health Lett, 2008; Peng et al., 2010; Mossler, 2011) and relationships (Gold et al., 2006; 2009; Kim et al., 2009; Raglio et al. 2008). Literature also shows effects on cognition (Brotons & Koger, 2000; Sarkamo et al., 2008; Samson et al., 2009), although some aspects such as executive functions and theory of mind are less investigated.
Conclusions: The neural bases (Sloboda, 2001; Zatorre & Krumhansl, 2002; Peretz & Zatorre, 2003; 2005; Zatorre, 2003; Zatorre & McGill, 2005; Hillecke et al., 2005; Peretz, 2006; Sacks, 2006; Trainor, 2008; Levitin & Tirovolas, 2009; Koelsch, 2009; 2010) and relational component of music therapy suggest potential effects on cognitive, psychological and behavioral aspects, in particular emotion processing and social cognitive abilities. Controlled randomized studies are needed to clarify the impact of music therapy on cognition and behavior.
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E. FARINA. An Evidence-Based Review of Cognitive Rehabilitation in Epilepsy.
Objective: Cognitive rehabilitation deals with remediation of cognitive and behavioral deficits due to static or progressive diseases. Most of the experience in this field stems from rehabilitation of stroke and traumatic brain injury patients. However, in the last years, cognitive rehabilitation has been applied in a large variety of diseases, such as multiple sclerosis, epilepsy, and dementia. The aim of this study is to present general concepts about cognitive rehabilitation and to summarize the data about its efficacy in epilepsy.
Participants and Methods: First based on an empirical approach, cognitive rehabilitation has taken advantage from different domains (neurobiology, cognitive psychology, neuropsychology, assistive technology). The most popular approach is holistic in nature, taking into account not only the neuropsychological deficit but also the behavioral and psychological aspects, establishing a therapeutic alliance with the patient and his/her family. Cognitive rehabilitation is a multiprofessional domain, where medical doctors, psychologists, therapists and social assistants all play a significant role. A PubMed and PsychInfo search was performed in order to review the evidence about cognitive rehabilitation efficacy in epilepsy.
Results: Gains obtained by cognitive rehabilitation depends on many factors, such as the disease nature, the severity of deficits, the collaboration of the affected subject and his/her family. Anosognosia can be a major limitating factor. Patients with epilepsy frequently show memory problems, above all patients with refractory temporal lobe epilepsy. Existing data suggest that outcomes depend on several clinical and pathological factors but there is still scarce evidence of rehabilitation-related effects.
Conclusions: A holistic approach including tailored cognitive training and compensation strategies might be useful in patients with epilepsy. Controlled studies are needed to document the efficacy of well-defined rehabilitation therapies.
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P. MARUSIC, J. AMLEROVA & A. JAVURKOVA. Postoperative Changes in Emotional Recognition and Social Cognition in Temporal Lobe Epilepsy Patients.
Objective: The abilities to identify facial expression and to infer emotional experiences may be impaired in patients with temporal lobe epilepsy (TLE). The aim of our study was to compare the ability to detect facial emotion and social faux-pas in TLE patients considering the cross-sectional and longitudinal data.
Participants and Methods: We included 61 refractory TLE patients with left speech dominance indicated for epilepsy surgery; 28 left-sided (mean age 33 years, FSIQ 96, VIQ 95, PIQ 98) and 33 right-sided (mean age 40 years, FSIQ 96, VIQ 98, PIQ 92). Besides routine neuropsychological testing, an experimental protocol focused on social cognition and emotion recognition was performed before and after surgery in all patients. Faux-pas test based on identification of a clear social faux-pas in three short stories was used to test social cognition. To assess for emotion recognition an adapted version of Ekman and Friesen emotion recognition test containing 25 facial expressions was used. The cut off scores for both tests were set in the group of healthy controls. Longitudinal data (preoperative and one year after surgery) were available for 21 patients; 13 left-sided, nine right-sided.
Results: Overall, 35 % of patients scored abnormal in faux-pas test, and 45 % scored abnormal in emotional recognition test in cross-sectional data analysis. There was no significant difference between pre- and postoperative groups in longitudinal evaluation in general. However, in individual cases an improvement to normal (faux-pas n = 0; emotion recognition n = 2) or deterioration (faux-pas n = 2; emotion recognition n = 2) after surgery was observed without any dependence on clinical characteristics or seizure outcome.
Conclusions: Epilepsy surgery does not seem to cause significant deterioration in emotion recognition or faux-pas detection in general. However, improvement or worsening can be observed in individual TLE patients. No specific group in risk can be identified based on our data.
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A. GIOVAGNOLI, A. PARENTE, S. OLIVERI, A. TARALLO, F. VILLANI, S. FRANCESCHETTI, R. SPREAFICO & G. AVANZINI. Emotional-Behavioral Implications of Theory of Mind Impairment.
Objective: Theory of mind (ToM), an ability to recognize and understand others' and ones' own affective and epistemic mental states, is relevant to successful social behavior. It may be significantly impaired in patients with focal epilepsy, but there is scarce evidence of its emotional-behavioral implications. This study explored the relationships between ToM, cognitive self-efficacy, coping, and quality of life (QOL) in patients with focal epilepsy of temporal or frontal lobe origin.

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Participants and Methods: Data were collected from 64 patients (ILAE, 1989). The Faux Pas test (FPT), Multiple Ability Self-report Questionnaire (MASQ), Coping Responses Inventory (CRI), and WHO QOL100 and Spiritual, Religiousness, and Personal Beliefs (WHO SRPB) scales were used to assess the recognition and comprehension of mental states, cognitive self-appraisal, coping, and QOL.
Results: According to partial correlation and regression analyses (with age of seizure onset and education as covariates), the FPT scores were significantly associated with different inventory scores. In particular, the comprehension of affective mental states predicted some WHO SRPB facets, the ability to recognize mental states predicted cognitive self-appraisal, and the comprehension of intentions predicted coping capacities.
Conclusions: These findings provide evidence of the emotional-behavioral implications of ToM in patients with focal epilepsy. ToM appears important to subjective well-being, self-awareness, and interpersonal adaptation. Careful assessment of ToM impairment may contribute to explain some behavioral or psychosocial aspects associated with epilepsy.
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Poster Session 3: ADHD, Autism, Learning Disabilities, Language and Speech Functions, Hemispheric Asymmetry, HIV

2:30–4:00 p.m.

ADHD/Attentional Functions

P. ARNESEN. Retrospective cognitive perspective – an additional element in cognitive therapy.
Objective: A theory and case presentation.
Participants and Methods: not applicable
Results: not applicable
Conclusions: Cognitive therapy is useful for improving executive functions but not always helpful for people with AD/HD. Planning is one of the core elements of prospective cognitive therapy but on the same time the core deficit in AD/HD. In 1995 Russell Barkley made it clear that planning stems from the ability of memorizing behavior sequences, backward thinking, but so far this idea has not influenced models of modern cognitive therapy.
However, J. Wolpe developed a precursor of this idea in his "assertive training" theory (1963), and elements of the same can be found in the works of D. Olweus (1993) – in his antibullying programs.
For more than 25 years I have found it useful to combining the perspectives of Wolpe, Olweus and Barkley in clinical work. Especially while working with children and adolescents with serious behavior problems. Their trouble is not only the actual behavior, but often as well the lack of good, prososial behavior. To increase the number of effective prososial strategies for some people a retrospective perspective need to be added to cognitive therapy.
Interestingly there seem to be a growing body of theoretical interest and research done on this topic. The human brain seems to increase its capacity for organizing behavior by what science call behavior chunking and what Barkley has called "backward thinking" fits well into the concept of understanding behavior sequences (behavior chunking).
For some people lack of retrospective thinking seem to be an obstacle for their capacity of taking charge of their own behavior, becoming better planners, observing their interaction with others and improving their capacity for learning by the outcome of their own actions. Theoretically a full concept of planning should include a retrospective perspective as well, and good executive function should include the capacity for buzzing back and forth within the retrospective and prospective perspective of planning.
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J. BORRANI, M. FRÍAS, X. ORTIZ, N. ALEJOS, M. CERVANTES & P. VALDEZ. Analysis of the Components of Attention in Juvenile Delinquents.
Objective: Juvenile delinquents have a greater incidence of attention deficit hyperactivity disorder than adolescents in general, suggesting difficulties in attention. This cognitive process has four components: tonic alertness, phasic alertness, selective attention and sustained attention. The aim of this study was to analyze the components of attention in juvenile delinquents.
Participants and Methods: Participants were 39 males, 13 juvenile delinquents (JDG), 13 adolescents with no criminal records paired by age and years of education (PCG), and 13 normal adolescents paired by age but with a normal education level for their age (NCG). The components of attention were analyzed using a Continuous Performance Task with indices for each component of attention.
Results: Juvenile delinquents had no differences with the paired control group on any of the components of attention. Nevertheless, both groups performed at a lower level compared to the normal control group on all components of attention. Differences observed were: tonic alertness (JDG 80.47±18.95 % of correct responses, PCG 88.26±12.62 %, NCG 99.06±0.89, $H=23.67$, $p<0.001$); phasic alertness (JDG 63.13±26.96 %, PCG 66.95±31.05 %, NCG 88.32±8.26%, $H=9.89$, $p<0.01$); selective attention (JDG 57.66±17.12 %, PCG 65.24±21.90 %, NCG 84.62±7.27 %, $H=17.71$, $p<0.001$); and the general stability index of sustained attention (JDG 2.51±0.73 standard deviation, PCG 2.18±0.69, NCG 0.93±0.24, $H=24.76$, $p<0.001$).
Conclusions: The low levels of attention observed in juvenile delinquents and in the low education group, may be due to a developmental delay in these adolescents. Attention difficulties can reduce school achievement, while also increasing the risk of school drop-out and delinquency.
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I. SUAREZ DEL CHIARO & L. CASINI. Time stretches for adults with Attention Deficit Hyperactivity Disorder : can this explain their symptoms ?
Objective: Several studies indicate deficits in timing tasks in ADHD patients but the origin of this deficit seems still unanswered. According to the pacemaker-counter model, the most prominent model of temporal processing, at least two hypotheses are possible : either the symptom of inattention in ADHD or a purely temporal deficit, corresponding to an impairment of the clock stage and, more precisely, of the pacemaker device, coud be the cause of their difficulties with time estimation.
Participants and Methods: To investigate this question, we compared 1/ performance of 15 ADHD adults and 16 controls on a temporal bisection task, and 2/ temporal performance of 3 adults regularly treated with atomoxetine (ATX), under medication (ON) and without medication (OFF). Two psychometric index, the PSE (point of subjective equality) and the SD (standard deviation) were computed and used to analyze performances.
Results: The results of Experiment 1 showed that ADHD patients overestimated durations, suggesting an acceleration of the internal clock in these patients which could be the result of an enhanced level of DA in the brain. If the internal clock of individuals with ADHD runs faster, time always will seem long and could lead them to have the illusion of time stretching.
In Experiment 2, results showed that ATX, which is known to modify several aspects of behavioral performance in patients with ADHD, could also affect pacemaker rate and more precisely slow it down.
Conclusions: In summary, two main conclusions can be retained from these studies : first, temporal difficulties encountered by ADHD patients would come from a pure timing deficit probably linked to an acceleration of pacemaker rate, and second, this acceleration of the pacemaker would be one possible cause of several symptoms expressed in ADHD. This could provide a new way of envisaging ADHD, which is consistent both with the neurobiological hypothesis of a dopaminergic deficit in ADHD and with our knowledge about the neural substrates of timing.
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V.A. GRANE, T. ENDESTAD, A.F. PINTO & A.K. SOLBAKK. Attention and Inhibitory Control in Adult Attention Deficit Hyperactivity Disorder.

Objective: Attention Deficit Hyperactivity Disorder (ADHD) is a developmental disorder that often persists into adulthood. In childhood, behavioral disinhibition is thought to constitute the core problem. The manifest symptoms may change over time, however, in that problems of attentional control rather than behavioral impulsivity may become more pronounced in adulthood. The aim of this study was to examine attentional and motor response control in adult ADHD.

Participants and Methods: We examined 36 treatment-naïve adults with newly diagnosed ADHD and 34 age-, sex- and education matched healthy controls. Participants performed a visual Continuous Performance Test (Test of Variables of Attention; TOVA) which is a behavioral paradigm that measures inhibitory control (inattention and impulsiveness). TOVA is a Go-NoGo task which requires the occasional suppression of a prepotent response.

Results: The ADHD group differed significantly from controls in the number of target omission errors in the 1st half of the test, and at trend level in the 2nd half. Patients also made a greater amount of commission errors in the 3rd quarter of the test, which contains an increased number of Go stimuli, and at trend level for the entire test. The ADHD group also had slower reaction times to Go stimuli in the 1st half of the test. Moreover, there was a strongly significant group difference in reaction time variability over the entire task.

Conclusions: The results suggest that ADHD adults have inattention problems as reflected in both target omission errors and delayed responses to detected targets. Morover, the increased reaction time variability indicates fluctuating levels of attention. Difficulty with response inhibition was a less pronounced feature of the ADHD patients. They did, however, have more commission errors than controls when the number of targets increased. Altogether, the results suggest multifaceted alterations of attentional control in adult ADHD.

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M. LIPOWSKA & M. HARCIAREK. Language As A Moderator Of Memory Processing In Children With Attention Deficits Hyperactivity Disorder And Dyslexia Comorbidity.

Objective: It has been repeatedly shown that language function may affect memory performance, partly explaining why children with developmental dyslexia often present with memory deficits on psychological testing. Nonetheless, up to 40% of children with dyslexia have comorbid attention deficits hyperactivity disorder (ADHD), and ADHD-associated symptoms may modify the relationship between language and memory function. The goal of this study was to test if language function may differentially moderate memory performance in developmental dyslexia, ADHD, as well as dyslexia comorbid with ADHD.

Participants and Methods: A battery of memory and language tests was applied to 60 children diagnosed with dyslexia and co-morbid ADHD (mean age=11.6) as well as to three age, sex, and IQ matched control groups: 60 children with ADHD, 60 children with dyslexia, and 60 healthy pupils without any deficits.

Results: Overall, language and memory performance of all clinical groups was consistently below that of healthy controls. Nonetheless, when the impact of language on memory was investigated, it was particularly strong in children with isolated developmental dyslexia, especially in verbal tasks based on phonological aspects of language. For children with isolated dyslexia, no association emerged between language and visuo-spatial function, however. In contrast, in the ADHD group, comprehension significantly predicted verbal memory scores, whereas semantic fluency moderated the performance on visuo-spatial tasks. Further, although in subjects with comorbidity of dyslexia and ADHD language contributed to both verbal and visuo-spatial memory, its impact was significantly more pronounced in verbal domain.

Conclusions: Our study shows that language differentially moderates specific memory domains in isolated developmental dyslexia, ADHD, as well as developmental dyslexia comorbid with ADHD. Moreover, visuo-spatial problems in children with comorbidity of dyslexia and ADHD do not seem to be related to dyslexia-associated language impairment.

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G. OGRIM, J. KROPOTOV & K. HESTAD. The QEEG Theta/beta Ratio in ADHD and Normal Controls: Sensitivity, Specificity, and Behavioral Correlates.

Objective: Some research studies report a very high accuracy of the QEEG theta/beta ratio in discriminating ADHD patients and controls. Other studies do not confirm this and some report several patterns of deviance in the QEEGs of ADHD patients. The functional meaning of the ratio is not clear. The purpose of the present study was to determine if the theta/beta ratio, and theta and beta separately, correlate with behavioral parameters, and if these QEEG measures discriminate between children and adolescents with ADHD and gender /age-matched healthy controls.

Participants and Methods: Sixty-two patients and 39 controls participated in the study. A continuous performance test (CPT), a GO/NOGO test and two rating scales were used to measure behavior in the patient group. EEG spectra were analyzed in eyes-closed and eyes-opened conditions, and in a GO/NOGO task in both groups.

Results: Neither the theta/beta ratio, nor theta and beta separately discriminated significantly between patients and controls. When each patient was compared with healthy individuals significant elevations of theta were found in 25.8% of the patients and in only one healthy control subject (2.6%). In the ADHD group, theta at CZ site was positively correlated with inattention and executive problems and negatively correlated with hyperactivity/impulsivity. Beta correlated with good attention in the healthy control group, but with ADHD symptoms in the patients. Omission errors in the GO/NOGO test discriminated between patients and controls with an accuracy of 85%. For theta at CZ, the accuracy was 62%.

Conclusions: Significantly elevated theta characterized a subgroup of ADHD and correlated with inattention and executive problems. Finding this deviance in a patient can be seen as objective support for an ADHD diagnosis, and a reason for further examination of executive functions.

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G. OGRIM & K. HESTAD. Effects of Neurofeedback versus Stimulant Medication in ADHD. A Randomized Pilot Study.

Objective: The purpose of this pilot study was to compare the effects of 30 sessions of neurofeedback (NF) and stimulant medication (methylphenidate or dexamphetamine) on ADHD patients.

Participants and Methods: Thirty-two ADHD patients from a neuropsychiatric clinic, ages 7 to 16, were randomized to NF (N=16) or drug treatment (N=16). Other actions such as parent management training, information, or support in school were given as needed, with no differences between the groups. All participants were assessed before treatment on two rating scales, each with parent and teacher forms; on quantitative EEG (QEEG); and with event-related potentials (ERPs), which included behavioral data from a GO/NOGO test. NF training took place in the clinic over a period of six to nine months, and was followed by a repeat of the same assessment tools. Treatment was completed by 14 patients in the NF group and 15 in the stimulant medication group (Med group). Two members of the Med group did not use medicine on a daily basis. The 18 DSM IV symptoms of ADHD were used as the primary outcome measure.

Results: Analysis of covariance of ADHD symptoms revealed a significant difference between the groups at evaluation in favor of medication, with a large effect size. This picture was confirmed by other outcome measurements. The QEEG spectral power in the theta and beta bands did not change in either group. In ERP, the P3NOGO component increased significantly in 8 of 12 patients who had a clinically relevant medication effect, but did not increase in the medication patients failing to show this effect or in the NF group.

Conclusions: Our study supports a clear effect for stimulants, but not for NF. Effects of NF may require thorough patient selection, frequent training sessions, a system for excluding nonresponders, and active transfer training. The P3NOGO ERP component may be a marker for treatment response.

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A. BELÍSIO, S. HERNÁNDEZ, B. MEDELLÍN, C. AZEVEDO, F. LOUZADA, C. RAMÍREZ, A. GARCÍA & P. VALDEZ. Analysis of the Components of Attention in Children from 4 to 6 Years Old.

Objective: Attention has four components: tonic alertness, phasic alertness, selective attention and sustained attention. The objective of this study was to analyze the components of attention in children from 4 to 6 years of age.

Participants and Methods: Ten children participated, 5 girls and 5 boys, all right-handed. A continuous performance task was used, consisting of 4 visual stimuli: a heart, a ball, an arrow and a star. When the heart appeared on the computer screen, participants had to press key number 1, the percentage of correct responses and reaction time to this stimulus were taken as indices of tonic alertness. When the ball appeared, participants had to press key number 2, the percentage of correct responses and reaction time to this stimulus were taken as indices of selective attention. When the arrow was followed by a star, participants had to press key number 3, the percentage of correct responses and reaction time to the star were taken as indices of phasic alertness. The linear regression of correct responses and of reaction time during the task, were taken as indices of sustained attention.

Results: For tonic alertness, the percentage of correct responses, was 64.14 ± 14.82 % and the reaction time was 496.57 ± 110.90 ms, for selective attention, the percentage of correct responses was 63.50 ± 18.72 % and the reaction time was 589.95 ± 170.60 ms, for phasic alertness, the percentage of correct responses was 53.00 ± 27.91 % and the reaction time was 590.65 ± 225.90 ms and in sustained attention the linear regression of correct responses was -0.07 ± 0.43.

Conclusions: In conclusion, it is possible to evaluate the components of attention with a continuous performance task in children from 4 to 6 years of age. These results are relevant to the analysis of attention disorders in children of this age.

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A.S. ROSSI, C.B. MELLO, T.G. CARDOSO, T.S. RIVERO, M. MUSZKAT & O.F. BUENO. Hot and Cold Executive Functions in ADHD.

Objective: The attention deficit hyperactivity disorder (ADHD) is one of the most frequent neurodevelopmental disorders, with an estimated occurrence of 5 to 8% in childhood. The aim of this study was to compare ADHD inattentive subtype children to controls in respect to cold and hot executive functions. We supposed that the ADHD group would present a worse performance on both types of executive functions.

Participants and Methods: 12 children with ADHD inattentive subtype and 11 typically developing children (control subjects) were assessed. All participants were submitted to a battery of neuropsychological tests focusing on cold and hot executive functions. Working memory, selective and sustained attention were considered as components of cold executive functions, being measured by Digit and Corsi Span forward and backward, Omissions errors and Hit Reaction Time Block Change of Conners' Continuous Performance Test (CCPT). The inhibitory control (CCPT Commissions errors) and the capacity of delay reward (Iowa Gambling Test – IGT) were taken as components of hot executive functions.

Results: The performance of children of the ADHD group was significantly lower than the control group on most of the neuropsychological tests. In what refers to measures of cold executive functions, the verbal working memory tests showed a high magnitude of effect (Digits Span Forward δ = -0,53**; Digits Span Backward δ = -0,57**). It was found a moderate magnitude of effect for tests of visual working memory (Corsi Span Forward δ = -0,38*), selective attention (CCPT omissions errors δ =0,42*) and sustained attention (CCPT Hit Reaction Time Block Change δ =0,30*). No significant difference was found on measures of hot executive functions - CCPT commissions' errors and General tendency on IGT.

Conclusions: The evidences obtained reinforces the idea that, in what regards to executive functions, the ADHD inattentive subtype presents deficits related mainly to the cold ones. Financial support was received from AFIP and CNPq.

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C. SARI, O.M. ALHASSOON, C. WIDEQVIST, J. KÄLLSTRAND & A. JOHANSON. Validation of the adult ADHD self-report scale in a Swedish sample - A pilot study.

Objective: Although the Adult ADHD Self-Report Scale (ASRS) has been translated to Swedish, very little research has been done on validating this instrument. The aim of this study is to examine the sensitivity and specificity of the Swedish version of the ASRS.

Participants and Methods: We recruited a convenience sample (N = 15) of people diagnosed with ADHD, from three different outpatient clinics at major hospitals in Sweden. A gender and age-matched sample of control subjects were recruited from universities and the general community (N = 15). The patient group was diagnosed with ADHD by a licensed psychologist or psychiatrist at the outpatient clinics.

Results: The two groups were not significantly different on age, $t(28) = -0.97$, $p = 0.92$, or gender distribution, $\chi 2(1, N = 30) = 0.00$, $p = 1.00$. The sensitivity of the ASRS when used for screening, was found to be 66.7% while specificity was 93.3%. However, when the total score was used a higher sensitivity (80.0%) and specificity (93.3%) was found using the cut-off score 31, $p < 0.0001$, produced with an ROC-curve.

Conclusions: These values are very similar to the sensitivity (56.3 %) and specificity (98.3%) reported in a sample of US patients and controls (Kessler et al., 2005). This indicates that the Swedish version of ASRS is equivalent to the English version. The results also suggest that the whole scale is more effective in screening for ADHD than only the denoted screening part of the test.

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G.Y. TÉLLEZ, H. ROMERO, L. RIVERA, B. PRIETO, J. BERNAL, E. MAROSI & M. RODRÍGUEZ. Cognitive Functions in Attention-Deficit/Hyperactivity Disorder in Hyperactive-Impulsive and Combined Types and its Relationship with Hyperactive-Impulsive Behavior in a Sample of Mexican Children.

Objective: Several studies have reported that attention-deficit/ hyperactivity disorder (ADHD) children show disturbances in different cognitive functions, however, discrepancies exist about if these findings are also related to comorbidity with learning disorders. The objective of this study was to realize a comprehensive assessment of cognitive functions on ADHD children, hyperactive-impulsive and combined types, without learning disabilities, in order to reveal their neuropsychological characteristics and to analyze if these characteristics are related to hyperactive-impulsive behavior.

Participants and Methods: Neuropsychological Battery was applied to 51 children between 7 and 12 years old (25 controls and 26 ADHD) without learning disabilities.

Results: ADHD children showed worst performance in: sustained attention, rapid serial naming of figures and colors, comprehension of written instructions, word dictation, number comparison, arithmetical problems, visual working memory, and long term memory. Variables related to hyperactivity-impulsivity were: errors and decreased velocity in rapid serial naming of colors and figures, comprehension of written instructions and arithmetical problems.

Conclusions: ADHD children show a great variety of cognitive deficiencies and these are no due to comorbidity with learning disorders. These deficiencies are related to hyperactive-impulsive behavior.

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M. GUERRERO, A. GARCÍA, C. RAMÍREZ, J. CORTEZ & P. VALDEZ. Effects of the Simultaneous Performance of Two Tasks on the Components of Attention of Each Task.

Objective: Attention has a limited capacity, thus, efficiency decreases when two tasks are simultaneously performed. Attention is a basic cognitive process that has four components: tonic alertness, selective attention, phasic alertness and sustained attention. The objective of this study was to determine the effect of the simultaneous performance of two tasks on the components of attention of each task.

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Participants and Methods: Participants were 9 volunteers, 5 males and 4 females, with a mean age of 19.22 ± 2.1 years. A Continuous Performance Task (CPT) was used to assess the components of attention. First, participants responded the visual CPT, then they responded the auditory CPT and finally, the visual CPT and the auditory CPT simultaneously.
Results: Participants showed a lower percentage of correct responses on three components of attention when they responded the visual CPT and the auditory CPT simultaneously. Tonic alertness (visual CPT 97.30 ± 1.37 %, auditory CPT 95.83 ± 1.88 %; visual and auditory CPT simultaneously: visual 70.90 ± 2.62 %, Wilcoxon T = 0, p<0.01, auditory 60.45 ± 4.19 %, T = 0, p<0.01). Selective attention (visual CPT 74.22 ± 7.94 %, auditory CPT 73.09 ± 5.95 %; visual and auditory CPT simultaneously: visual 50.20 ± 6.96 %, T = 0, p<0.01, auditory 25.51 ± 3.71 %, T = 0, p<0.01). Phasic alertness (visual CPT 86.21 ± 4.16 %, auditory CPT 90.84 ± 3.04 %; visual and auditory CPT simultaneously: visual 40.74 ± 3.59 %, T = 0, p<0.01, auditory 42.59 ± 4.03 %, T = 0, p<0.01). There were no significant differences on the index of sustained attention used in this study.
Conclusions: Simultaneous performance of two tasks decreases the efficiency on three components of attention: tonic alertness, selective attention and phasic alertness on both tasks. The decrease in these components of attention could explain errors and accidents on simultaneous performance of two tasks.
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H. VAN DER ZEE, N. VERPALEN, M. HARTONG & B.A. SCHMAND. Detection of Malingering in Assessment of Adult Attention-Deficit/Hyperactivity Disorder.
Objective: Since a decade clinicians have become aware of the possibility of malingering in adult attention-deficit/hyperactivity disorder (ADHD) assessment leading to an increasing demand for normative data of usable symptom validity tests. In this study we evaluated the utility of ratings scales, cognitive tests and symptom validity tests to detect suboptimal effort and symptom overreporting. We hypothesized that malingerers will endorse more symptoms on rating scales, cognitive tests and symptom validity tests than ADHD patients and controls. Furthermore we hypothesized that ADHD patients who are assumed to exert normal effort will succeed for the symptom validity tests similar to the control group.
Participants and Methods: The performance of 26 ADHD patients receiving treatment in a center for mental health care was compared to 48 undergraduate psychology students who were asked to simulate ADHD (malingerers) and to 51 control subjects in a single blind experimental design.
Results: ANOVA and post-hoc Dunnets' C analysis indicated that malingerers endorse more symptoms than ADHD patients and controls on all measures. Malingerers easily produced ADHD specific profiles on ADHD self-report scales and cognitive measures. Symptom validity tests had a moderate sensitivity to detect malingering with a high specificity in the controls. However, specificity in the ADHD group was lower than in the control group, and varied among the different symptom validity tests. New cutoff scores for assessing malingering in ADHD were calculated for the different symptom validity tests.
Conclusions: Combining two or more failures on different symptom validity tests increased sensitivity and resulted in robust specificity for the control group and the ADHD group as well, minimizing the risk of false positives. The risk of false positive classification of ADHD patients as malingerer is substantial and should be taken into account in assessment of malingering in adult ADHD.
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E. VIERIKKO & P. NIEMINEN. The Relationship Between Mothers' and Fathers' Parenting and Children's Attentional and Behavioral Problems.
Objective: The first aim of this study was to examine differences between mothers and fathers in parenting of children with attentional problems. The second aim was to study the associations between child's attentional problems, behavior, parenting practices and experiences of parenthood.
Participants and Methods: Participants were 38 families referred to neuropsychological group intervention for children with attentional and executive function problems at the Psychology Clinic at the University of Tampere, Finland. Parents of children (aged 7-11) completed The Strengths and Difficulties Questionnaire (SDQ) and The Five to Fifteen parent questionnaire (FTF) to assess child's attentional problems and behavior. Parenting practices and experiences of parenthood were assessed by a questionnaire developed in co-operation with Niilo Mäki Institute and the Department of Psychology, University on Jyväskylä.
Results: Preliminary results show that both mothers and fathers of children with attentional problems enjoyed parenthood. However, mothers were more exhausted, restrictive and controlling, but also more nurturing compared to fathers. Increased parenting stress was associated with child characteristics and in particular, with externalizing behavior problems. Parent's exhaustion was related to child's low tolerance of frustration, hyperactivity and poor social skills.
Conclusions: The results indicate that parenting of a child with attentional problems is exhausting both physically and emotionally and it can challenge parenting resources and coping of both parents. Therefore, the parents need special support and may benefit from sessions with other parents with similar problems.
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E. WAALER, J. JOKINEN & T. HIRVIKOSKI. Psychoeducation in Group for Adults With ADHD and Their Significant Others : a Pilot Study.
Objective: To evaluate feasibility, acceptability and efficacy of a new psychoeducative intervention for adults with ADHD and their significant others in a psychiatric outpatient context.
Participants and Methods: 17 adults with ADHD and their 20 significant others attended 8 psychoeducative 2.5 hour sessions in a closed group. Feasibility was evaluated regarding suitability of the intervention at a psychiatric outpatient clinic; attendance at the sessions; and completion of the intervention. Treatment acceptability was evaluated after each session using questionnaires, and efficacy with self-report instruments at baseline, at post-intervention and at 6 months follow-up using open trial within-group design. The main statistical analysis method was repeated measures ANOVA, performed as intention to treat (ITT) analysis with last observation carried forward (LOCF).
Results: The course was considered to be a treatment option for > 90% of the individuals with ADHD as their main neurodevelopmental diagnosis. Regarding attendance at the sessions and treatment completion, feasibility was good among the participants with ADHD, and acceptable among the significant others. Treatment acceptability was good for both individuals with ADHD and their significant others. Knowledge about ADHD increased and relationship quality improved from baseline to post-intervention. Among the significant others there was a reduction in subjective burden of care such as worry and guilt. The treatment results remained at 6 months follow-up.
Conclusions: Psychoeducation for adults with ADHD and their significant others was well tolerated, significantly increased knowledge about ADHD, improved relationship quality and reduced burden of care among significant others. Treatment feasibility was good for individuals with ADHD and acceptable for their significant others. The results from this pilot study needs to be further evaluated with larger groups and in a randomized design.
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Autism Spectrum Disorders

G.A. STEFANATOS, K. O'CONNOR, G. O'HERRON & N. GOTTIER. Distinctive features of the natural history of regressive autism.
Objective: Autistic disorder (AD) is an etiologically heterogeneous condition associated with diverse biological and behavioral phenotypes. Recent studies have suggested an association of RA with accelerated brain growth and early onset of developmental milestones. We therefore compared the natural history of early motor and language development in children with regressive autism (RA) or the more common pattern of early onset (EOA).

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Participants and Methods: We examined the medical records of children with a history of RA or EOA and used specially designed retrospective interviews and questionnaires to document the age at which major motor and language milestones were obtained.
Results: Onset of milestones such as sitting alone and crawling were comparable in the RA and EOA, while more advanced motor milestones such as walking independently were delayed only in the EOA group. Children with RA were not advanced in their motor milestones compared to typically developing children. Over one-third of the RA children had less than five words in their expressive vocabulary at follow-up while less than one quarter of the EOA children were similarly nonverbal.
Conclusions: These results suggest that there are distinct features in the natural history of RA. They demonstrate normal rather than accelerated early development. At about 18 month, their history diverges from normal development. Decrements in function tend to span social, language and motor development. In childhood, children with RA were more likely to be nonverbal. The EOA group had normal onset of early motor milestones but diverged from the RA group by about 1 year. Implications for the basis of AD are discussed.
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P. SURÉN, C. STOLTENBERG, M. BRESNAHAN, D. HIRTZ, K. KVEIM LIE, W. LIPKIN, P. MAGNUS, T. REICHBORN-KJENNERUD, S. SCHJØLBERG, E. SUSSER, A. ØYEN, L. LI & M. HORNIG. Head Growth in Autism: A Population-Based Cohort Study.
Objective: To study head circumference (HC) growth in children with ASD using longitudinal data from the Norwegian Mother and Child Cohort, a prospective, population-based child cohort in Norway.
Participants and Methods: HC measures from children in the study sample (n=90,159) were obtained prospectively from birth until age 12 months. On average, 4.1 HC measures per child were available. Head growth trajectories in ASD cases and non-cases were estimated using Reed first-order models.
Results: ASD had been diagnosed in 249 children (0.28%), 203 boys and 46 girls. For ASD boys, the growth trajectory for mean head size overlapped with the general trajectory for boys. They had an increased prevalence of macrocephaly (HC>97th cohort percentile), by 11.8% at age one year (95% CI, 6.2-19.6%); however, after adjustment for length the proportion above the 97th percentile was only 2.0% (95% CI, 0.2-6.9%). Correspondingly, the prevalence of microcephaly (HC<3rd cohort percentile) was 2.9% at one year (95% CI, 0.2-8.4%), but increased to 6.9% (95% CI, 3.2-6.4%) after adjustment for length. In ASD girls, mean head growth was reduced, with mean HC 0.4 cm below that of other girls at birth (p=0.05) and 0.7 cm below at age one year (p=0.001). ASD girls also had an increased prevalence of microcephaly, with 7.3% of HC measures below the 3rd cohort percentile (95% CI, 3.8-12.4%). For both sexes, mean head growth in ASD children was reduced relative to body growth.
Conclusions: Head growth patterns in ASD children diverge from those of other children, and the differences are sex-specific. Previous findings of accelerated mean head growth in ASD were not replicated.
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Learning Disabilities/Academic Skills

S. ARAÚJO, A. REIS, K. PETERSSON & L. FAÍSCA. The Relationship Between Rapid Automatized Naming and Reading Performance: A Meta-analysis.
Objective: The association between rapid naming (RAN) and reading performance is highly documented in the literature; however, there is substantial disagreement on the magnitude of this relationship. In this study, we conducted a meta-analysis of the correlational evidence on the relationship between RAN and reading performance, in order to: (a) determine the overall strength of this relationship (b) identify variables that systematically moderate this relationship and may explain variations in results between studies.
Participants and Methods: One-hundred fifty four independent experiments, comprising 21,706 participants, were included in the meta-analysis. We first computed the mean effect size for the whole sample of studies and, then, for clarification of differences between effect sizes, we proceeded with a subgroup analysis to test the moderator variable effects, using a mixed-effects model.
Results: . It was observed a moderate relationship between RAN and reading performance (r =.44); there was a significant and large variation in correlations between studies (I2 = 71.19). RAN stimulus type, reading outcome, subjects' grade, and consistency of orthography were the factors with the greatest moderator effect on the magnitude of the RAN-reading relationship, while the role of type of reading measure, and samples' reading status (impaired vs. normal readers) was less evident.
Conclusions: Some factors that have varied between the many experiments that have investigated RAN appear particularly important in understanding some divergent research findings on the size of the RAN-reading relationship; these should be taken into account when looking for research evidence on this topic.
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J. NUKARI, E. SERVICE, J. KORKEAMÄKI & S. HAAPASALO. How Does the Neuropsychological Performance Relate to the Difficulties Experienced by Adult Dyslexics?
Objective: The study was part of the Learning to Learn –project that developed services for adults with learning disabilities. The aim of the study was to investigate how the self reported difficulties adult dyslexics experience relate to their performance in the neuropsychological examination.
Participants and Methods: The participants were 44 adults (mean age 37) who took part in the project 2006–2009, looking for services for their learning disabilities. They were diagnosed with dyslexia based on the neuropsychological examination. Before the examination they were given questionnaires concerning problems in reading, writing, remembering etc.
Results: The experienced difficulties correlated mostly with the visual components of the neuropsychological examination and less with the verbal and executive measures. The combined experienced difficulties in reading, writing, foreign languages and arithmetic did not correlate with the dyslexia tests, WAIS-III, or measures such as Stroop or Word fluency. They correlated with 3 visual subtests of WMS-R ($p<0.01$–$p<0.05$). More in line with expectations, the combined experienced difficulties in drawing, manual skills and sports correlated with 2 WAIS-III performance subtests ($p<0.01$–$p<0.05$), WMS-R Visual Span ($p<0.05$), and also Stroop ($p<0.05$). The combined experienced difficulties in memory and concentration correlated the most with the verbal measures. The neuropsychological examination predicted better problems experienced in studies than in work, which may reflect under-representation of verbally demanding occupations in the sample.
Conclusions: The performance in the visual measures of the neuropsychological examination correlate more with the difficulties adult dyslexics report than performance in the verbal or executive measures. Interestingly, experienced difficulties in reading did not correlate with the actual dyslexia measures, suggesting that the availability of compensatory capacities and strategies are more important than variation in reading skill within a dyslexic sample.
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B. ORRIOLS, R. COLOMÉ, X. CALDÚ, J. SERRA GRABULOSA, A. LÓPEZ-SALA, C. BOIX & A. SANS. Neuropsychological Profile in Children with Nonverbal Learning Disorder (NLD) and Asperger Syndrom (AS).
Objective: The nonverbal learning disorder (NLD) is a neurodevelopmental disorder that affects motor coordination, visuospatial and visual perception functions, school learning, and social relations. The NLD has no consensus diagnostic criteria.
There is a discussion about the differences and similarities of NLD and Asperger Syndrome (AS). Research suggests that both are the same disorder but evaluated by different systems: the neuropsychological and psychiatric.

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Other authors argue that the profile of the NLD can show either as primarily form or as a parallel or co-morbid neuropsychological profile of various neurological conditions (TEA. ..).
Participants and Methods: We analyze the cognitive profile on the WISC-IV in a sample (approximate) of 11 subjects with NLD, 8 subjects with AS and 16 controls aged from 8 to 14.
Results: For the group with AS, the NLD test results are lower in block design task, comprehension of social situations and vocabulary.
The NLD group performs below the control group in all tasks. In contrast, the AS obtained a lower yield in the subtest of comprehension of social situations (Fig. 2), letter-number sequencing (Fig. 4) and coding.
Conclusions: We found that patients with NLD and AS obtained different cognitive profiles on the WISC-IV. The NLD have a poorer outcome in non-verbal functions.
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J. SERRA-GRABULOSA, X. CALDÚ, M. PÉREZ-PÀMIES, S. SIDDI, J. TOR, A. ADAN, S. ANDRÉS-PERPIÑÁ, J. CASTRO-FORNIELES, R. COLOMÉ, A. LÓPEZ-SALA, C. BOIX, A. SANGUINETTI & A. SANS. Neuropsychological Profile of Mathematical Difficulties.
Objective: Mathematical learning difficulties can be related to different neuropsychological and behavioural profiles. In order to differentiate these different profiles, we performed a neuropsychological evaluation in a sample of children with a specific very low mathematical performance at school.
Participants and Methods: Seventy-three subjects with a history of low mathematical performance at school were initially included in the study. The final sample included 48 subjects, as 25 of them were discarded: 1 had epilepsy, 19 had a low IQ and 5 had a diagnosis of a behavioural problem. The neuropsychological evaluation included a specific number processing evaluation (ZAREKI-R), and a general cognitive evaluation: evaluation of IQ (WISC-IV), attention (Stroop's test, Conner's Continuous Performance Test, Children's Colour Trails Test), visuospatial and visuoperceptive function (Benton Face Recognition Test, Benton Visual Retention Test and Benton Judgement of Line Orientation Test) and verbal and semantic fluency.
Results: After the analysis of the neuropsychological data, 27 subjects were diagnosed of developmental dyscalculia (DD): 9 of them had pure DD, 13 had DD and dyslexia, 3 had DD and ADHD, and 2 of them had DD, dyslexia and ADHD. On the other hand, 21 subjects had mathematical (MD) difficulties but did not meet criteria for dyscalculia: 11 of them had MD, 3 had MD and dyslexia, 5 had MD and ADHD and 2 of them had MD, dyslexia and ADHD. In comparison to children with MD, children with DD showed a specific lower performance in the Zareki-R test. No other differences were observed between DD and MD groups. Moreover, no differences were observed within the DD group.
Conclusions: Our study suggests that there is not a specific profile related to pure DD, and distinct of DD with ADHD or dyslexia. However, studies with larger samples are necessary to confirm our findings.
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T.D. TOLAR, L. FUCHS & J.M. FLETCHER. Cognitive Profiles of Mathematical Problem Solving Learning Disability (MPSD) for Different Definitions of Disability.
Objective: There is a large body of research on reading disability (RD) definitions. IQ-Achievement discrepant RD students do not appear to reliably differ from low achieving RD students. It is not clear if the same is true for math disability (MD) definitions. MD definition comparisons are typically based on varying cut points on standardized math measures (usually calculation). This study compares IQ discrepant and low achieving definitions of math problem solving disability (MPSD).
Participants and Methods: Third grade students were assigned to one of four groups based on IQ and math problem solving (MPS) achievement: LD - IQ discrepant (N = 20, LDIQ), LD – low achievement only (<= 10%ile, N = 31, LDA), low achieving (>10%ile, <=25%ile, N = 42, LA), and typically achieving (TA, N = 473). The groups were evaluated and compared on achievement and cognitive/behavioral abilities. Profile analysis was used to determine if the level and/or shape of the achievement and cognitive profiles differed by group.
Results: Two-way ANOVAs indicated differences in level (main effects, $p < .05$) and shape (interactions between achievement/cognitive dimension and LD group, $p < .05$). Univariate follow up analyses showed TA higher than other groups on all measures, LA higher than LDA on working memory (WM), and LDA higher than LDIQ on word reading fluency. Canonical correlations suggest that working memory may distinguish LA from LDA (.60) and word reading fluency may distinguish LDA from LDIQ (.57).
Conclusions: Regardless of definition, MPSD and MPS low achieving students show lower achievement in math and reading and lower cognitive abilities than TA students. Low WM and word reading fluency may distinguish MPSD and low achieving groups. Whereas the WM finding is consistent with other research the word reading fluency finding is not. More research needs to be conducted to determine if this is an anomalous finding.
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R. MARTIN, S. HERNANDEZ, E. GARCIA-MARCO & E. VERCHE. Working Memory in Learning Disabled Adolescents.
Objective: Widely evidences support that learning disabilities are associated with impairments in working memory (WM). It is generally accepted the existence of verbal working memory (VeWM) deficits in this population. However there is not agreement about the existence of impairments in the visual–spatial working memory (VsWM) of reading disabled children and adolescents. Objective: To study verbal and visual-spatial immediate memory (VeIM, VsIM) and WM profile in reading disabled adolescents.
Participants and Methods: 19 normal readers (NR) and 19 reading disabled (RD) Spanish adolescents aged 14-19 years old, with normal IQ and without other psychiatric on neurological disorders; were assessed using Digit Span (WISC-R) and Spatial Span (WMS-III).
Results: MANOVA showed significant differences among NR and RD in forward digit span [$F(1,36) = 4.78$, $p<.05$, $d= 0.73$]; backward digit span [$F(1,36) = 9.69$, $p<.01$, $d = 1.10$]; and backward visual span [$F(1,36) = 6.02$, $p<.05$, $d = 25.85$]; with better performance in the NR group. No significant differences exist for forward spatial span [$F(1,36) = 9.69$, $p = 0.38$, $d = 0.3$].
Conclusions: NR outperformed the RD on VeIM, VeWM and VsWM spans; with similar temporary spatial storage capacity (VsIM). In our work, WM is altered in RD with independence of the information modality, suggesting central executive difficulties. On the other hand, storage difficulties are specific for verbal information.
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Language and Speech Functions/Aphasia

F. ANZAKI, S. YAMAMOTO, S. ISHIMOTO, Y. TAKEDA, M. INOUE & M. OTA. Brain Activation during Different Recovery Stages in Patients with Pure Word Deafness using Functional Near-Infrared Spectroscopy.
Objective: Patients with pure word deafness (PWD) reportedly suffer damage to the side of the brain opposite to the ear displaying deafness, as measured by speech audiometry and consonant discrimination. However, during the course of recovery from PWD, 1 of 2 patients claimed that his hearing was better in the right (Rt.) ear, whereas the other claimed that hearing was better in his left (Lt.) ear, despite both of them having a left-sided brain lesion. Thus, our research objective was to clarify their sound recognition and brain activation using functional near-infrared spectroscopy.
Participants and Methods: Participants were 2 male PWD patients, both Rt.-handed, and one normal, healthy, Rt.-handed, 24-year-old man. Case 1 was 77 years old and had suffered a stroke 22 months before ; he claimed that hearing was better in his Rt. ear. Case 2 was

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50 years old and had undergone surgery 5 months before; he claimed that hearing was better in his Lt. ear. Lesions in both participants involved the Lt. temporoparietal area. Participants were instructed to listen to Japanese speech at a fixed sound intensity of 60 dB via audiometry using the Rt. ear and repeat it. Ten seconds of white noise was interposed between each 30 s of recorded speech. The same tasks were then performed using the Lt. ear. We measured the relative changes in oxyhemoglobin during the white noise interludes and calculated the t-values.

Results: The normal participant showed Lt. superior temporal gyrus (STG) activation while using either ear for every task. Case 1 exhibited maximum activation in the Lt. STG while using the Rt. ear to listen. In contrast, Case 2 exhibited maximum activation in the Rt. temporal area while using the Lt. ear to listen.

Conclusions: Saur (2006) reported that bilateral activation was observed in the subacute stage of patients with aphasia, while in the chronic stage, activation was purely on the Lt. side of the brain. Our PWD patients' sensory perceptions were dependent on their brain recovery.

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A. FRANCISCO & L. FAÍSCA. Interactions Between Vocabulary and Phonological Competences in Adulthood: a Correlational Study.

Objective: Vocabulary has long been recognized as a key factor in language development. Recent studies on this topic are mainly focused on childhood and on the initial steps of first or second language acquisition. Nonetheless, vocabulary continues to develop throughout the life span, under the influence of several factors. In a correlational study, we aimed to explore the associations between different conceptual dimensions of vocabulary and phonological competences.

Participants and Methods: Vocabulary, phonological awareness and phonological representations were evaluated in a sample of 60 university students. Vocabulary was assessed with three measures, reflecting different levels of word knowledge and two vocabulary dimensions. To evaluate phonological awareness, we have developed a set of tasks in which subjects had to blend, manipulate, segment and sequence phonemes, identify rhymes and read pseudowords. We have also assessed two distinct dimensions of phonological representations: access and precision.

Results: Results show that higher levels of vocabulary knowledge are associated with higher awareness of phonemes, specifically in tasks that require blending and segmentation. A good performance on these tasks reflects the existence of segmented phonological representations, as the subjects have to be aware of each of the word phonemes. This result seems to be in line with the Lexical Restructuring Analysis (Metsala, 1997): higher levels of vocabulary are reflected in more segmented phonological representations and, therefore, in a more fine-grained phonological awareness.

Conclusions: General results can be interpreted as a bidirectional association between vocabulary and phonology and suggest that both competences continue to significantly influence each other during adulthood. This work was supported by national Portuguese funding through FCT - Fundação para a Ciência e a Tecnologia, project ref. PEst-OE/EQB/LA0023/2011; grant ref. SFRH/BD/64042/2009.

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M. HIGASHIKAWA, Y. SHIMODAIRA, W. HATA, Y. HARA, N. YASUDA, I. ISHIZAKA, K. HADANO & T. HATTA. The Recovery Courses of Three Japanese Aphasics with Neologistic Jargon Speech.

Objective: The first aim of this study was to analyse the speech content characteristics in three Japanese aphasics who showed jargon speech with many neologisms in the acute term, and that speech changed into speech without neologism in the subsequent term. The second aim of this study was to examine the mechanism of disappearing neologisms, and the mechanism explaining the recovery of their semantic and phonological system.

Participants and Methods: Three aphasics who showed jargon speech with many neologisms in the naming tasks at the acute term but later showed no neologism were examined. The analysis of speech had been performed by separating it into phrases and categorizing the content word in each phrase into 8 groups. The 8 groups were 1) neologism, 2)the fragmental syllable, 3)semantic paraphasia, 4)phonological paraphasia, 5)word included in the circumlocution, 6)word belonging to empty phrases, 8)irrelevant word.

Results: Case 1 had showed neologistic jargon in the acute term, but after 2 months later, neologisms were decreased and only one kind of irrelevant word, "Jii-chan"(granpa), was produced stereotypically. Case 2 had also showed many neologisms, but after 5 months later, neologisms were decreased and many kinds of semantic paraphasias were produced. And Case 3, after 3 months later, neologisms were also decreased and many phonological paraphasias were produced.

Conclusions: The recovery courses of these 3 aphasics were various. There are some theses as to the observation of the recovery course of neologistic jargon. The three-step hypothesis of jargon aphasia by Alajouanine (1956) shows neologistic jargon evolves into semantic jargon, and some reports show neologistic jargon evolves into conduction aphasia (ex.; Buckingham, 1981). The recovery courses of these 3 cases suggest neologistic jargon evolves into several groups according to the recovery type of the semantic system and the phonological system.

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B. BELTRÁN, E. MATUTE, A. ARDILA & M. ROSSELLI. Language Development across the Preschool years.

Objective: The purpose of this research was to study early language development in two to four year-old Mexican children.

Participants and Methods: Using a cross-sectional design, a language neuropsychological assessment was conducted in 90 children divided in three age groups: 2.0-2.5 years, 3.0-3.5 years and 4.0-4.5 years (30 children in each group: 15 girls and 15 boys) with similar social and family backgrounds. All children were selected from preschool centers in Guadalajara (Mexico). Participants were assessed using eight different language tests: (1) Story telling (to retell a story previously narrated by the examiner, containing 54 words and five ideas); (2) Story comprehension: after recalling the story, each child was asked to answer five questions targeting the story five ideas; (3) Following instructions: three different commands with an increasing level of difficulty were presented; (4) Identification of body parts: To point to six different body parts; (5) Naming: to name 11 body parts; (6) Semantic verbal fluency: recalling animal names in one minute; (7) Sentence repetition: to repeat 12 sentences with increasing length (from 2 to 13 words; (8) Understanding spatial terms (on top of, below, at the side, in between). ANOVAs were conducted to compare the age groups and partial Eta2 were calculated to estimate the effect sizes.

Results: It was found that age had a significant effect (≥0.50) in all the different tests; standard deviations were larger than the means in the first age group, suggesting a significant variability in early language development. Percentages were used to illustrate the frequency of the children that resolved each task successfully.

Conclusions: Results support the assumptions that there is a significant variability in language development in this age range.

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E.D. MEIRELLES. Verbal Fluency in Teenagers from Rio de Janeiro – Brazil.

Objective: As a cognitive function, language is a developing process through the whole life. There is some ways to assess it. This work aimed to evaluate: 1) the gender effect in the verbal fluency in a Brazilian adolescents sample from Rio de Janeiro; and 2) the difference between letters and category tasks to evaluate the verbal fluency.

Participants and Methods: Thirty adolescents from both gender (N=15, each sex) between 15 and 18 years-old (Mean= 16.93; EPM= 0.19) were assessed in a verbal fluency task, including naming words initialized with the letters F, A and S (FAS test), and the category (animals). They were instructed to say as many words they could in one minute, for each test. The total number of words for each letter or category was counted. The errors like intrusion, perseveration, repetition and derivation were considered and discounted from the total. Means were compared in a Student-t test.

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Results: There were no differences between the two groups in the total words in the category verbal fluency test (animals) (Male: mean=17.07; EPM=1.54; Female: mean=17.21; EPM=1.37; p=0.94). However, in the FAS test, the number of word spoken by the male group were lower than the female group (Male: mean=28.47; EPM=2.52; Female: mean=36.76; EPM=2.81; p<0.05). There was no significant difference between the groups in relation to the number of errors in the tests (p>0.05).
Conclusions: Here, the Female group showed higher levels of verbal fluency than the Male group, in adolescents between 15 and 18 years. However, this result was not strong, once in the category test there was no difference between groups. In this work, it was clear the difference between these two ways to evaluate the verbal fluency. Regarding the literature, when compared to other tests of verbal fluency, assessing the category (animals, clothing items, vegetables, or fruits) have been demonstrated to be superior to others (such as words beginning with specific letter).
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K. POLANOWSKA, M. LITWIN, I. PIETRZYK & J. SENIÓW. Recovery of Crossed Apraxia of Speech after Right Hemisphere Lesion.
Objective: Apraxia of speech (AOS) is a nonlinguistic disorder of planning, programming, and executing sequences of muscle movements specific for speech production. Common manifestation is effortful speech with utterances, and articulatory and prosodic errors with self-correct attempts. Because it is most frequently associated with brain damage to the hemisphere dominant for language (including left BA 44, parietal, insular cortex, thalamus or basal ganglia), individuals with AOS usually exhibit non-fluent aphasia. Isolated AOS is very rare and gives an opportunity to study its symptoms not interfered by aphasia.
Participants and Methods: A 83-year-old man, premorbidly functioning independently, was hospitalized after sudden loss of speech and slight paresis of the left hand due to cortico-subcortical infarct in the right precentral gyrus. Clinical examination showed aphonia, oral and speech apraxia (assessed using Apraxia Battery for Adults), but no weakness of muscle involved in speech articulation. It also revealed no abnormalities in writing or understanding of spoken and written language as well as preserved awareness of speech problems. The patient had left-sided laterality of eye and hand. He participated in two-month speech therapy (5 times/week, 1 hour of progressive training including imitation of speech sound, words, and short reduplicating phrases supplemented by tactile and visual cues) and was re-examined 1 month after therapy completion.
Results: During three-month recovery period, symptoms of oral and speech apraxia diminished. In the follow-up assessment, the patient was able to produce whole sentences, but with incorrect prosody and single articulatory errors.
Conclusions: It is likely that atypical hemispheric dominance for speech and language was responsible for the occurrence of isolated crossed AOS in our patient. As a result of early speech post-stroke reorganization, assisted by impairment-based training, patient's speech difficulties decreased to a level of functional verbal communication.
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G. ROBINSON & B. LAW. An Investigation of Verbal Idea Generation: The Effect of Prompts on Narrative Speech.
Objective: Language generation is crucial for conversation and social interaction. Verbal generation impairments have been documented in case studies of dynamic aphasia (e.g., Robinson et al, 1998, 2005, 2006) and group studies of patients with left inferior frontal lesions (e.g., Robinson et al, 2010). Accounts of verbal generation deficits include a failure in selection for word/sentence production and a deficit in fluent sequencing of novel ideas for discourse production. Prompts have been effective in facilitating novel idea generation (e.g., Linebarger et al, 2007). The current study aimed to further investigate the role of prompts in discourse production.
Participants and Methods: Stroke patients (N = 20) and matched controls (N = 20) completed baseline cognitive and narrative speech tests. The narrative speech test comprised topic discussion tasks that varied in the number and nature of prompts. Performance of Stroke patients and controls was compared on narrative speech measures (quantity, novelty and coherence). Patients with Left Frontal lesions (N = 5) were analysed as a case series.
Results: The Stroke patients produced fewer words and novel ideas than healthy controls and there was less evidence for coherence in the content of narrative speech samples. Prompts were inconsistently effective and there was no effect of selection demands on narrative speech.
Conclusions: This study confirms discourse production impairments following Stroke with the most severe deficits following Left Frontal lesions. The results suggest that prompts are important although selection may not be crucial for discourse production. The results are discussed with reference to current accounts of verbal generation impairments and the rehabilitation implications for use of prompts to facilitate narrative speech.
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C. ROTH, P. MAGNUS, S. SCHJØLBERG, C. STOLTENBERG, P. SURÉN, I.W. MCKEAGUE, G. DAVEY SMITH, T. REICHBORN-KJENNERUD & E. SUSSER. Folic acid supplements in pregnancy and severe language delay in children.
Objective: Context: Prenatal folic acid supplements reduce the risk of neural tube defects and may have beneficial effects on other aspects of neurodevelopment.
Objective: To examine associations between mothers' use of prenatal folic acid supplements and risk of severe language delay in their children at age 3 years.
Participants and Methods: The prospective observational Norwegian Mother and Child Cohort Study recruited pregnant women between 1999 and December 2008. Data on children born before 2008 whose mothers returned the 3-year follow-up questionnaire by June 16, 2010, were used. Maternal use of folic acid supplements within the interval from 4 weeks before to 8 weeks after conception was the exposure. Relative risks were approximated by estimating odds ratios (ORs) with 95% CIs in a logistic regression analysis.
Main Outcome Measure: Children's language competency at age 3 years measured by maternal report on a 6-point ordinal language grammar scale. Children with minimal expressive language (only 1-word or unintelligible utterances) were rated as having severe language delay.
Results: Among 38,954 children, 204 (0.5%) had severe language delay. Children whose mothers took no dietary supplements in the specified exposure interval were the reference group (n = 9052 [24.0%], with severe language delay in 81 children [0.9%]). Adjusted ORs for 3 patterns of exposure to maternal dietary supplements were (1) other supplements, but no folic acid (n = 2480 [6.6%], with severe language delay in 22 children [0.9%]; OR, 1.04; 95% CI, 0.62-1.74); (2) folic acid only (n = 7127 [18.9%], with severe language delay in 28 children [0.4%]; OR, 0.55; 95% CI, 0.35-0.86); and (3) folic acid in combination with other supplements (n = 19,005 [50.5%], with severe language delay in 73 children [0.4%]; OR, 0.55; 95% CI, 0.39-0.78).
Conclusions: Among this Norwegian cohort of mothers and children, maternal use of folic acid supplements in early pregnancy was associated with a reduced risk of severe language delay in children at age 3 years.
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V. SAAR, M. LAASONEN, M. HAAPANEN & S. LEVÄNEN. Specific Language Impairment in Finnish children aged 2-6 years.
Objective: The aim of the study was to define indicators of Specific Language Impairment (SLI) in Finnish children aged 2-6 years with Wechsler Preschool and Primary Scale of Intelligence (WPPSI). In clinical assessment, WPPSI-R and WPPSI-III, are widely used for diagnostic purposes. However, they seem to result in somewhat different cognitive profiles in SLI children.
Participants and Methods: Altogether 485 children were assessed and diagnosed by a multi-professional team, with specialists in phoniatrics, speech-language-pathology, and neuropsychology. The ICD-10 SLI diagnosis F80.1 was given for 178 children with expressive language difficulties and F80.2 for 307 children with receptive and expressive language impairment.

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Results: Within-group comparisons showed that many standard scores were lower in WPPSI III than in WPPSI-R. However, the difference between VIQ and PIQ, typically used as a diagnostic criterion for SLI, was significant in both test versions. Between-group comparisons indicated that F80.1 children outperformed F80.2 children in both test versions and IQ scores. Most interestingly, VIQ was dispro-portionally poorer than PIQ in F80.2 children in both test versions.
In principal component analyses for the WPPSI-R, conducted separately for the two diagnostic groups,
both groups had two components: verbal and visual. Arithmetics loaded on both components. In WPPSI III, those with F80.2 exhibited three clear components: verbal, visual, and processing speed. Notably, picture concepts loaded also on the verbal component. In F80.1, the component structure was less clear, possibly due to their additional motor problems.
Conclusions: The new test version gives lower scores in both diagnostic groups. Still, both tests show the diagnostic difference: poorer VIQ and better PIQ. Overall, F80.2 children perform worse. The relations between the subtests differed in-between the test versions and diagnostic groups.
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S. SAITO, C. ITOI, K. HIROMITSU, Y. TABEI, R. YAMADA, Y. ONDA, N. SHINOURA & A. MIDORIKAWA. Sentence comprehension and short-term memory: consideration from patients with prefrontal lobe lesion.
Objective: Studies have examined syntactical processing in sentence comprehension. Recent studies have obtained conflicting results regarding whether auditory sentence comprehension is related to short-term memory. In addition, syntactic function differs across languages, so it is necessary to investigate syntactic tasks. This study compared the connection between syntactic processing and short-term memory in two patients.
Participants and Methods: Case 1 was a 33-year-old right-handed woman. Case 2 was a 25-year-old right-handed man. Both patients spoke fluent Japanese and had no aphasia. Both patients had brain tumors in the left prefrontal lobe. The patients completed the Token test for auditory sentence comprehension and digit span test for short-term memory.
Results: Case 1 had poor results in both spoken sentence comprehension and auditory short-term memory, while case 2 had poor results in the spoken sentence comprehension test only, and a higher auditory short-term memory test score.
Conclusions: It appears that sentence comprehension does not depend on short-term memory. In both cases, it is possible that the basis of particles and the subjunctive is in the left prefrontal lobe, based on errors the patients made.
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R. STARRFELT, S. NIELSEN, T. HABEKOST & T. ANDERSEN. How Low Can You Go: Spatial Frequency Sensitivity in Pure Alexia.
Objective: Pure alexia is a seemingly selective deficit in reading, following focal lesions to the posterior left hemisphere. The hallmark feature of pure alexia is a word length effect in single word reading, where reaction times may increase with hundreds of milliseconds per additional letter in a word. Other language functions, including writing, are intact. It has been suggested that pure alexia is caused by a general deficit in visual processing, one that affects reading disproportionally compared to other visual stimuli. The most concrete hypothesis to date suggests that pure alexia is caused by a lack of sensitivity to particular spatial frequencies (e.g., Fiset et al., 2006), and that this results in the characteristic word length effect, as well as effects of letter confusability on reading times.
Participants and Methods: We have tested this hypothesis in a patient with pure alexia (LK). LK shows significant effects of word length and letter confusability on reaction times in single word reading, while her writing and other language skills are intact. In two experiments, we investigate LK's performance with simple patterns of different spatial frequency (Gabor patches), and compare this to normal controls.
Results: We find that both in a detection and a classification paradigm, LK shows normal sensitivity for all spatial frequencies.
Conclusions: On this basis we conclude that neither the word length effect, nor the effect of letter confusability on reading times, can be explained by a lack of sensitivity to particular spatial frequencies. Thus, the explanation for the reading performance of patients with pure alexia is likely to be found at a higher level of processing.
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Y. UNO. Impaired discourse after aneurysmal subarachnoid hemorrhage.
Objective: Cognitive impairment is a common consequence of aneurysmal subarachnoid hemorrhage (SAH), usually relating to intracerebral hemorrhage or cerebral infarction due to vasospasm. In this prospective study, we investigated discourse function in patients with SAH who were not compromised with cerebral hemorrhage or infarction.
Participants and Methods: Twenty-three consecutive patients with SAH at the chronic stage (at least 3 months after SAH) and 24 controls matched to age and education participated in this study. Discourse function was evaluated with two oral description tasks using a picture (Cookie theft) and four-frame cartoons. Patients' description was analyzed with the rating system of Test for Right Brain Damaged People. In qualitative analysis, patients' description was divided into two concepts, the literal concept, literal meaning of the cartoon, and the interpretive concept, its contextual interpretation. Standard neuropsychological examinations, including Mini Mental States Examination (MMSE), Trail Making Test (TMT), phonological verbal fluency test, WAIS-III and WMS-R, were performed.
Results: In the description tasks, the total number of clauses and that of interpretive concept are significantly decreased in the patient group, especially in patients with an aneurysm at the anterior communicating artery with marked confabulated responses. The total number of utterances was significantly decreased in patients with hydrocephalus. The IQ of WAIS-III and memory indices of WMS-R in patients remained within the normal range.
Conclusions: Discourse function in SAH survivors without complications was impaired. They had difficulty in describing interpretive concept based on the context, which was most prominent in patients with an aneurysm at the anterior communicating artery. It is clinically important to assess the discourse function, which could influence the social adjustment of the patients at the chronic stage.
Correspondence: *Yuki Uno, Master, Department of Clinical Neuroscience, Yamagata University Graduate School of Medicine, 2-2-2 Iida Nishi, Yamagata-city 990-9585, Japan. E-mail: u.yuki@med.id.yamagata-u.ac.jp*

Y. UNO, S. SAITO, R. KONDO & K. SUZUKI. Impaired discourse after aneurysmal subarachnoid hemorrhage.
Objective: Cognitive impairment is a common consequence of aneurysmal subarachnoid hemorrhage (SAH), usually relating to intracerebral hemorrhage or cerebral infarction due to vasospasm. In this prospective study, we investigated discourse function in patients with SAH who were not compromised with cerebral hemorrhage or infarction.
Participants and Methods: Twenty-three consecutive patients with SAH at the chronic stage (at least 3 months after SAH) and 24 controls matched to age and education participated in this study. Discourse function was evaluated with two oral description tasks using a picture (Cookie theft) and four-frame cartoons. Patients' description was analyzed with the rating system of Test for Right Brain Damaged People. In qualitative analysis, patients' description was divided into two concepts, the literal concept, literal meaning of the cartoon, and the interpretive concept, its contextual interpretation. Standard neuropsychological examinations, including Mini Mental States Examination (MMSE), Trail Making Test (TMT), phonological verbal fluency test, WAIS-III and WMS-R, were performed.
Results: In the description tasks, the total number of clauses and that of interpretive concept are significantly decreased in the patient group, especially in patients with an aneurysm at the anterior communicating artery with marked confabulated responses. The total number of utterances was significantly decreased in patients with hydrocephalus. The IQ of WAIS-III and memory indices of WMS-R in patients remained within the normal range.

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Conclusions: Discourse function in SAH survivors without complications was impaired. They had difficulty in describing interpretive concept based on the context, which was most prominent in patients with an aneurysm at the anterior communicating artery. It is clinically important to assess the discourse function, which could influence the social adjustment of the patients at the chronic stage.
Correspondence: *Yuki Uno, Master, Department of Clinical Neuroscience, Yamagata University Graduate School of Medicine, 2-2-2 Iida Nishi, Yamagata-city 990-9585, Japan. E-mail: u.yuki@med.id.yamagata-u.ac.jp*

B. VUGS, J. CUPERUS, L. VERHOEVEN & M. HENDRIKS. Working Memory Deficits in Preschool Children with SLI.
Objective: Specific language impairment (SLI) is characterized by a selective failure to make normal progress in language acquisition while there is no evidence of an intellectual, hearing or psychiatric impairment. However, recent evidence indicates that the disorder may not be completely 'language specific'. One factor that has attracted increasing interest is working memory (WM). Especially, at young age WM and language may interact as substantial language growth occurs during the preschool years. The goal of the present study is to explore this relation in young children.
The WM problems exhibited by children with SLI are divers, involving different mechanisms of WM. It might be expected that children with SLI are impaired on phonological storage (verbal STM) and verbal WM. Furthermore studies report specific problems in the central executive component of WM, which is responsible for the coordination of activities in WM and the control of attention. Some evidence exists for specific impairments in the visuospatial domain of WM, although research is sparse on this component.
Participants and Methods: The present study includes 60 children with SLI and 60 TD children aged 4:0 – 5:11 years. All children are tested on WM (Automated Working Memory Assessment), intelligence (SON-R 2½ -7) and language (Peabody, Reynell, Schlichting). In addition parents completed the BRIEF-preschool and the Strengths and Difficulties Questionnaire.
Results: Analysis of the results shows significant differences between the SLI and control group on all WM factors: verbal STM ($p = .000$), verbal WM ($p = .000$), visuospatial STM ($p = .000$) and visuospatial WM ($p = .001$). Both verbal as well as visuospatial aspects of WM are significantly related to language measures (vocabulary and language comprehension) at $p = .01$ level.
Conclusions: We conclude that young children with SLI have smaller storage and processing capacities for both verbal and visuospatial information, suggesting that SLI is associated with 'domain general' impairments in WM.
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Hemispheric Asymmetry/Laterality/Callosal Studies

B.A. SANT'ANNA, C.B. MELLO, M. MUSZKAT & O.A. BUENO. Corpus Callosum's Malformations and the Impact of the Cognition Development: a Case-Control Study.
Objective: To contribute to a better understanding of the impact of malformations of the Corpus Callosum (CC) on cognitive and behavioral development, by means of a case-control clinical study.
Participants and Methods: Eighteen children and adolescents diagnosed with CC malformations and sixteen typically developing subjects matched by age (6-18 year olds), sex and school type (public or private), were submitted to the Wechsler Scales (WISC-III and WAIS-III) for assessment of intellectual level. For behavioral assessment it was used the Child Behavioral Checklist – CBCL, completed by subject's parents. Participants were selected through parents' enrolment in a Brain Damage Outpatient Sector (CPN-São Paulo, Br). General Linear Model were adopted for group comparisons, with significance level of 5% ($p < 0.05$).
Results: Groups differed on intellectual performance ($F=47.28$, $p=0.00$), with control group showing higher and larger variation of IQ scores. CBCL data revealed significant differences regarding withdrawn/depressed symptoms ($F=12.23$, $p=.002$, eta square=0.32, observed power=0.919), somatic complaints ($F = 12.58$, $p = .002$, eta = 0.33 square, observed power = 0.92), social problems ($F = 19.33$, $p = .00$, eta square = 0.43, observed power = .98), thinking problems ($F = 17.87$, $p = .00$, eta square = 0.41, observed power = 0.98), attention problems ($F = 15.88$, $p = .001$, eta square = 0.38, observed power = 0.96), rule-breaking behavior ($F = 9.7$, $p = .005$, eta square = 0.28, observed power = 0.84) and aggressive behavior ($F = 5.79$, $p = .024$, eta square = 0.18, observed power = 0.63).
Conclusions: Although general worse performance, the great variability of results concerning intellectual performance indicates that children with CC malformation may develop with typical cognitive development. Behavioral problems seem to be more frequent and may reflect a greater rule of white matter structures on mood modulation then in cognitive performance.
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G. VINGERHOETS, A. ALDERWEIRELDT, P. VANDEMAELE, Q. CAI, L. VAN DER HAEGEN, M. BRYSBAERT & E. ACHTEN. Atypical Language Dominance Predicts Atypical Praxis Dominance, an fMRI Study.
Objective: We determined the neural correlates of word generation and tool use pantomiming in individuals with typical (n=10) or atypical (n=10) language dominance to investigate similarities in activation pattern and hemispheric specialization between language and praxis.
Participants and Methods: Blood oxygenation level-dependent contrast images were acquired with 3T fMRI while the volunteers pantomimed the use of visually presented tools. In ten of these volunteers previous fMRI research with a word generation paradigm revealed atypical (right) language dominant activation over the anterior language area. The other ten participants were matched for age, gender, and handedness revealed typical (left) language dominance during word generation. Random effects contrast analyses were performed applying a threshold of $p<.05$ corrected for multiple comparisons.
Results: All left language dominant volunteers also revealed left hemisphere activation during tool use pantomiming in prefrontal, premotor, and posterior parietal regions. All atypical language dominant participants displayed right hemisphere activation for tool use. Co-lateralization of the language and praxis networks was observed on group and individual level, regardless of handedness. Activation maps of both paradigms displayed overlap in five cortical regions: supplementary motor area, dorsal and ventral premotor cortex, dorsolateral prefrontal cortex, and posterior parietal cortex. Individual lateralization indices were calculated for each region and revealed significant positive group correlations between .51 and .95 with every other region within the paradigms. Cross-task correlations ranged between .72 and .97.
Conclusions: Our findings illustrate that the strength of hemispheric specialization of one task significantly predicts the side and degree of lateralization of the other task, suggesting a functional and topographic link between language and praxis. The data also support models that link gestures and speech to explain the evolution of human language.
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HIV/AIDS/Infectious Disease

J.Z. CALDWELL, A. GONGVATANA, K.T. TASHIMA, N. BRADFORD, L.H. SWEET & R.A. COHEN. Abnormalities in Neural Activity During Verbal Working Memory in the Context of HIV and Hepatitis C Infections.
Objective: HIV and hepatitis C (HCV) infections have been linked to neurocognitive impairment, including working memory. Using FMRI, we examined changes in neural activity underlying HIV-associated verbal working memory abnormality and explored potential effects of HCV coinfection.
Participants and Methods: Forty-three HIV seropositive (HIV+) individuals (mean duration of illness 13 years; 32 on Highly Active Antiretroviral Therapy), including 11 with HCV coinfection and 35 demographically-matched healthy comparison participants, received FMRI scans to examine BOLD response during an N-back verbal working memory task. FMRI data were analyzed using FSL FEAT. N-back performance was indexed by percent correct responses, reaction time, and reaction time variability. Group means were compared to assess differences in performance and neural activity.

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Results: HIV+ individuals had poorer performance ($p<.05$) and slower reaction times ($p<.01$) than controls. Both groups showed BOLD response in regions associated with working memory: inferior parietal lobule (IPL), supplementary motor area (SMA), Broca's Area, and dorsolateral prefrontal cortex. HIV+ individuals showed greater BOLD response than controls in regions including bilateral SMA, middle temporal gyrus, and posterior occipital regions; right orbitofrontal cortex, insula, and putamen (voxelwise $p<.01$; cluster corrected $p<.05$). HIV+ individuals with HCV coinfection showed a trend towards greater BOLD response than HIV-monoinfected individuals in regions including SMA and IPL.
Conclusions: We found HIV-associated increases in neural activity in brain regions including but not limited to those previously associated with verbal working memory. This pattern may suggest decreased efficiency or compensatory neural activity in HIV-infected people. Marginal effects of HCV coinfection were found in frontal and parietal regions; however, additional data are necessary to provide adequate power to examine this variable.
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Birch Lecture: Primary Progressive Aphasia and the Language Network

Speaker: Marsel Mesulam

4:00–5:00 p.m.

M. MESULAM. Primary Progressive Aphasia and the Language Network.
Dementias can be classified as amnestic, comportmental or aphasic, according to the nature of the major impairment. Alzheimer's disease typically leads to an amnestic dementia where memory loss is the major cause of impaired daily living activities. This is consistent with the hippocampal/entorhinal location of the initial neurodegeneration. The frontotemporal Lobar Degenerations (FTLD) constitute the second major class of dementias. The neuropathology is characterized by focal neuronal loss, gliosis, tau inclusions, or TDP-43 inclusions. FTLD can lead to pure cognitive changes as in primary progressive aphasia (PPA) and the behavioral variant of frontotemporal dementia (bvFTD).
The principal focus of this talk will be PPA, a focal neurodegenerative syndrome characterized by an isolated and gradual dissolution of word finding and word usage. The language disturbance is initially the most salient deficit and the major obstacle to the execution of daily living activities. This does not mean that there are no deficits other than the aphasia, but that such additional deficits are relatively minor in the first two years following symptom onset. Some patients develop prominent agrammatism, others profound word comprehension (semantic) deficits. The speech output in PPA can be fluent or non-fluent. Memory, visual processing and personality remain relatively preserved during the initial stages. Terms such as progressive non fluent aphasia (PNFA) and semantic dementia (SD) have been used to denote subtypes of PPA.
Structural and physiological neuroimaging confirms the selective predilection of PPA for language-related cortices of the left hemisphere. The majority of the autopsies in PPA have shown the neuropathology of FTLD but approximately 30% of PPA can be caused by atypical forms of AD neuropathology. The mechanisms that determine the initial selectivity of the cognitive impairment and the asymmetry of atrophy in PPA remain to be elucidated. This syndrome also offers unique opportunities for exploring the cognitive architecture of language processing and the neurobiological fingerprints of the language network.
Learning Objectives:
1. Summarize the major theoretical underpinnings of the language network
2. Recognize differences in subtypes of primary progressive aphasia
3. Apply basic neuropathological associations and dissociations in the diagnosis of non-Alzheimer dementia subtypes
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FRIDAY MORNING, JUNE 29, 2012

Invited Symposium: The Neuropsychology of Culturally-Dependent Cognition

Presented by The Federation of European Neuropsychological Societies

8:00–9:30 a.m.

G.W. HUMPHREYS & N. DEMEYERE. The Neuropsychology of Culturally-Dependent Cognition.
Symposium Description: In this symposium we will present results on neuropsychological disorders of cognitive processes that have been established based on culturally-dependent influences, including disorders of mathematics, culturally-specific gestures and hand-writing, and we will review some of the implciaitons of these and other results for education.
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N. DEMEYERE. Disruptions to number bisection: A spatial numeric or working memory deficit?
Objective: The aim of this study was to investigate the mechanisms underlying the number bisection bias in a chronic neuropsychological sample. Are there differential contributions of neglect and working memory? In addition, what are the lesion areas associated with impaired number bisection performance?
Participants and Methods: Twenty-six chronic brain injury patients (mostly stroke) took part in the behavioural experiments. For twenty five we collected 3T MRI scans. We analyzed data on the number bisection task, line bisection, apple cancellation, Corsi block tapping and digit spans. We also used an automated voxel-based correlational method to relate behavioural scores on the number bisection task to changes in grey and white matter as detected on T1 MRI scans.
Results: Behaviourally, scores on the number bisection task did not correlate reliably with any of the other tasks. Furthermore, patients showing a large number bisection bias did not differ significantly on any of the other tasks with patients not showing any number bisection bias. This suggests that neglect alone cannot explain the number bisection bias, but equally working memory deficits alone are also insufficient. Interestingly, the VBM results show both frontal and parietal areas involved in bisection bias when the number interval is presented in the reversed order, but only parietal areas when number intervals were presented in the correct order.
Conclusions: We conclude that, while both neglect and working memory problems may contribute to impaired number bisections (both from a behavioural and lesion-mapping perspective), there can also be deficits that may be specific to numeric computation distinct from more global spatial and working memory impairments..
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O. TUCHA. Handwriting in Children with Attention Deficit Hyperactivity Disorder.
Objective: To assess the nature of the problems in handwriting associated with ADHD
Participants and Methods: Children with ADHD were assessed on handwriting undre medicated and non-medicated conditions.

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Results: Studies revealed that the quality of handwriting specimens of children with ADHD is poorer than those of typically developing children. The comparison of handwriting movements of children on and off stimulant medication revealed that medication resulted in improved handwriting quality, but also in an impairment of movement execution during handwriting as assessed by kinematic analysis.
Conclusions: Children with ADHD appear to apply their improved attention to focus on tasks, such as handwriting, that are independent of attentional control or that may even be impaired by conscious control. The findings indicate that stimulant drug treatment alone is not sufficient in the treatment of handwriting difficulties in children with ADHD. Handwriting of children with ADHD may benefit from simple training procedures preventing attentional control during movement execution.
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M. CHECHLACZ. Distinct and Common Neural Correlates of Apraxia for Transitive and Intransitive Gestures: An investigation using Voxel-Based Morphometry (VBM).
Objective: Previous neuropsychological investigations suggest that intransitive, culturally-determined communicative gestures are typically maintained better than transitive gestures after brain lesion. However it is not still clear which are the common and distinct neural mechanisms that underlie the production of those two types of gestures. The present study tried to clarify this issue in a lesion-symptom analysis (voxel-based morphometry, VBM) based on transitive and intransitive gestures performed by a large group of acute stroke patients and using their clinical computed tomography scans.
Participants and Methods: Patients at a sub-acute stage of stroke were tested on the BCoS screen which measures the domains of language, memory, attention and executive function, praxis and number processing. VBM analyses were performed on the ability of the patients to perform transitive and intransitive gestures.
Results: At behavioural level, the analyses of the patients' scores revealed significantly higher performance for transitive gesture production. This contrast with prior results may reflect a difference between gesture production to name (used here) and imitation (used previously). At neural level, VBM analyses revealed that, on average, producing a gesture on verbal command involves inferior parietal areas on the left. However distinct regions of neural change were also associated with each key symptom. Impairments in intransitive gestures were associated with damage to left inferior parietal cortex, while deeper brain regions including the left insular cortex were related to transitive gestures to objects.
Conclusions: All together, the behavioural and neural data suggest the possibility that both common and discrete neural mechanisms are involved when transitive and intransitive gestures have to be performed.
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M. VAN DER SCHOOT. How to bring together research on cognitive neuroscience and education?
Objective: To review the key questions facing the development of educaitonal neuroscience.
Participants and Methods: Review of work on the devleopment of educational neuroscience
Results: The results have indicated difficulties in linking findings from cognitive neuroscience to classroom applications.
Conclusions: Particular conceptual and methodological framework are proposed to bring together research on cognitive neuroscience and education. Thereby, a focus will be put on (deficits in) culturally related cognition.
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Invited Symposium: New Frontiers in Pediatric Traumatic Brain Injury: Working Together to Improve our Understanding of Child Outcomes

Chair: Vicki Anderson

8:00–9:30 a.m.

V. ANDERSON. New Frontiers in Pediatric Traumatic Brain Injury: Working Together to Improve our Understanding of Child Outcomes.
Symposium Description: Over the last few decades the pediatric brain injury field has established the major consequences of early traumatic brain injury (TBI). The natural history of pediatric TBI has been extensively studied, and we have a working understanding of the acute and long-term effects of injury for the child and family. At the group level, research has demonstrated that milder injuries generally lead to good recovery. With increasing severity, recovery tends to be less complete, and those with severe injury are at elevated risk for ongoing difficulties across a range of physical, cognitive and socio-emotional domains. Disappointingly, these group findings do not translate well to the individual level, where it seems that gross severity measures and standard cognitive tools are inadequate to precisely explain children's short- or long-term outcomes, leading to uncertainty with respect to prognosis, and uncertainties in determining high-risk children and effectively allocating limited resources. One explanation for these current limitations is the focus on "uni-dimension approaches", where the neuropsychologist or the animal researcher work in isolation, with little opportunity for integration of findings. To date, progress using this narrow focus has been disappointing, suggesting that a more multi-dimensional model is required to advance knowledge, where researchers across disciplines come together with a more holistic perspective of the child. In this symposium we present examples of such collaborative research and argue that this model has the potential to translate into better quality care for victims of child TBI.
Learning Objectives:
1. explain a multidisciplinary perspective of child brain insult
2. List vulnerabilities of the young brain to insult
3. Discuss converging findings from animal research, neuroimaging and behavioural studies of childhood brain insult.
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H. LEVIN, G. HANTEN, M. NEWSOME, R. SCHEIBEL & E. WILDE. Social Cognition After Moderate to Severe Traumatic Brain Injury in Adolescents: Relation to Structural and Functional Brain Imaging.
Objective: Disruption of social function, including development and maintenance of peer relations, is a persistent problem following moderate to severe traumatic brain injury (TBI). Approaches to characterizing alteration in social functioning and associated deficits have included studies by Yeates et al (Janusz et al., 2002; Yeates et al., 2007) showing reduced social problem solving ability in children and adolescents which Hanten et al (2011) extended to a virtual reality social problem solving task using avatars. Related studies also demonstrate that moderate to severe TBI alters the adolescent's capacity to accurately process the intentions and emotions of others (Dennis et al., 1998; Levin et al., 2011), a deficit that has been linked to poor social functioning. Functional brain imaging (fMRI) has identified social cognitive networks, including medial prefrontal cortex, temporal parietal junction, superior temporal sulcus, and fusiform face area, that are activated in healthy subjects during social cognitive tasks (Adolphs, 2011). Using fMRI, our group has shown that the patterns of brain activation during social perspective taking (Newsome et al., 2010) and a social attribution task (Scheibel et al,., 2011) are altered in adolescents with moderate to severe TBI, including reduced medial prefrontal activation and greater posterior cortical activation than control subjects. Altered patterns of social brain activation and decreased social problem solving performance are related to reduced integrity of white matter tracts and

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brain lesion volumes in relevant regions (Hanten et al., 2011; Scheibel et al., 2011). Evidence from arterial spin imaging (Newsome et al., 2011) suggests that chronic changes in cerebral blood flow may be a mechanism involved in the alteration of social brain activation following serious TBI. This paper will synthesize findings from the social cognitive and brain imaging literature, critically evaluate current knowledge, and propose future directions.

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K.O. YEATES, E. KAIZAR, B. BANGERT, A. DIETRICH, K. NUSS, J. RUSIN, M. WRIGHT & G. TAYLOR. Using Reliable Change to Identify Post-Concussive Disorder in Children with Mild Traumatic Brain Injury.

Objective: Reliable change methods may help to identify a subgroup of children with mild traumatic brain injury (MTBI) who demonstrate post-concussive disorder. This study sought to examine whether reliable increases in PCS after mild TBI can be predicted by acute injury factors and are associated with poorer health-related quality of life (HRQOL).

Participants and Methods: Participants included children aged 8-15 years with mild TBI (n = 186) or mild orthopedic injuries (OI, n = 99). They were recruited prospectively from emergency departments at two large children's hospitals. Acute injury information was collected from medical records. Parents rated PCS at an initial assessment within 3 weeks of injury and again at 3 and 12 months post-injury. They also rated pre-injury symptoms retrospectively at the initial assessment. They rated HRQOL at the initial assessment and at 3 and 12 months post-injury. Standard regression-based methods were used to predict post-injury ratings of PCS from retrospective ratings of premorbid symptoms in the OI group, and cutoffs for reliable increase were established at each post-injury assessment.

Results: Children in the mild TBI group were significantly more likely than those in the OI group to display reliable increases in PCS. Reliable increases in PCS were more likely among children with mild TBI who displayed more acute medical risk factors (e.g., loss of consciousness, disorientation). Reliable increases in PCS predicted significantly poorer HRQOL at 3 and 12 months post-injury.

Conclusions: Following mild TBI, a subgroup of children with post-concussive disorder can be identified using reliable change methods. The subgroup can be differentiated based on acute injury factors and displays significant functional disability.

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C. GIZA. Is Being Plastic Fantastic? Traumatic Brain Injury, Environment and Development.

Objective: It has long been known that the developing brain possesses remarkable potential for neuroplasticity and recovery from injury. The young brain is more readily adaptable to changes in the environment, a phenomenon known as experience-dependent plasticity. Furthermore, the immature brain generally recovers better from focal injuries than the mature brain. Traumatic brain injury (TBI) is the most common cause of acquired brain injury in children and adolescents, but recent clinical and experimental studies suggest that immaturity does not confer benefits and, in fact, is associated with worse outcomes following developmental TBI. This lecture will also discuss age-at-injury effects of experimental focal brain injuries, including the Kennard Principle and the concept of "growing into the lesion". Age-related differences in experience-dependent plasticity manifest as structural and functional changes induced by rearing in an enriched environment. This type of neuroplasticity has good human correlates. Diffuse biomechanical TBI has multiple distinctions from focal brain injury, and clearly interferes with normal developmental experience-dependent plasticity. Furthermore, diffuse TBI sustained early in development results in worse outcomes in both animal models and in human clinical experience. Ultimately, an understanding of these principles surrounding brain injury, development and plasticity can inform better prognostication of post-injury outcome, delineation of biological mechanisms of recovery, and the development of rational therapeutic interventions for optimizing recovery of function.

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Invited Symposium: Mechanisms of Plasticity and Change

Chair: Kristine B. Walhovd

8:00–9:30 a.m.

K.B. WALHOVD, T. JERNIGAN, A. ENGVIG & H. JOHANSEN-BERG. Mechanisms of Plasticity and Change.

Symposium Description: In this symposium, new findings are presented on mechanisms of plasticity and change in brain and cognition. The presenters have all used a combination of neurocognitive behavioral data and Magnetic Resonance Imaging (MRI) techniques to test and document the potential for human change. The chair introduces with a backdrop of data from more than a thousand persons aged 4-95 years on lifespan development and change. How does the brain develop and change, enabling and limiting cognitive changes? New findings are presented, e.g. on trajectories for development of the hippocampi and their subfields indicating a prolonged volumetric growth with a breaking point evident in the early teens, and especially pronounced reductions evident in older adulthood. Similarly, age interactions are also evident in cortical areas. How can these developments and changes be seen in relation to brain plasticity, learning effects and neurocognitive aging? A series of presentations on plasticity and change from different perspectives in the field follow. Professor Terry Jernigan, University of California, San Diego, will based on their recent studies talk about how genes, brains, and behavior work to form human individuality in development. Andreas Engvig, University of Oslo, presents fresh findings on how brain structural characteristics can determine and underlie cognitive behavioral training gains in an intervention with patients with memory complaints. Finally, professor Heidi Johansen-Berg, University of Oxford will discuss new data on brain plasticity with different types of training, including physical exercise, and in health and recovery from damage.

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T. JERNIGAN. The ontogeny of individuality: genes, brains, and behavior.

Objective: Human individuality can be thought of as reflecting underlying behavioral phenotypic variability, that is, relatively persistent behavioral attributes distinguishing otherwise demographically similar individuals, such as emotional or cognitive biases, accumulated domain-specific knowledge, or level of fluency of mental skills. Behavioral phenotypes are modified over time within the individual, and thus they are meaningful only within a developmental context. For example, a given proficiency level for a specific skill may be high among age peers in the culture at one age but low at another. Thus, a behavioral phenotype emerges from the cumulative effects of factors influencing it over the life of the individual. There is incontrovertible evidence that most forms of expertise depend upon practice and training - whether formal or informal. Thus phenotypic domain-specific expertise of a developing child is best predicted by the additive and nonadditive effects of 1) the hypothetical skill-relevant neural genotype, 2) environmental effects on the neural apparatus relevant to the skill (e.g., early brain damage or toxicity), 3) cumulative experience encountering and manipulating material in the domain, and 4) any interactions between these factors. Note that the first factor is likely to be correlated with the third, thus increasing the measured heritability of the phenotype. Examples of findings from our recent studies that are relevant to this working model will be presented, including associations of genetic variation with brain architecture and of the latter with behavior in children. The challenges associated with interpreting these results will be discussed with a specific focus on the role of gene-experience correlations.

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A. ENGVIG, A.M. FJELL, L.T. WESTLYE, ØYVIND. SUNDSETH & K. WALHOVD. Memory training in patients with memory complaints –predictors and neural substrates of training effects.
Objective: Positive effects of cognitive intervention can be observed in healthy aging and in patients with memory complaints. Knowledge of the neural substrate of these effects, as well as individual differences of importance to training benefits, is lacking. Magnetic resonance imaging (MRI) may illuminate these questions. We hypothesized that structural properties of areas in the episodic memory network would be associated with memory performance changes following training, and that positive changes could be observed with MRI in these areas following training.
Participants and Methods: Three participant groups were matched for age (range 42-76 years) and sex: 1) Patients with subjective memory complaints (n= 19) assigned to memory training, 2) Healthy adults assigned to memory training, (n = 21), and 3) healthy adults assigned to a control group (n = 20). All participants underwent MRI and neuropsychological testing and the patients and one group of healthy adults then followed an eight weeks memory training scheme, whereupon in all groups, MRI and neuropsychological assessment were repeated.
Results: We have previously found that in healthy adults, training-associated changes in cortical thickness and fractional anisotropy were observed in select regions. New data for the patient group showed that larger whole hippocampal volumes before training were related to greater recall improvements. Subfield volumetry revealed specific correlations between memory improvement and select pre-training volumes (left CA2/3 and CA4/DG). In addition to hippocampal volume, depressive symptoms uniquely predicted intervention benefit. Patients with more depressive symptoms benefited more from training. Data are also indicative of an increase in entorhinal cortical thickness after training.
Conclusions: We conclude that MRI analyses illuminate the neural substrate and determinants of cognitive training gains and may possibly be utilized in intervention programs.
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H. JOHANSEN-BERG. Brain plasticity with training and recovery from damage.
Objective: In this presentation, studies testing for brain plasticity with training and with recovery from damage are discussed. These include a longitudinal study on a physical exercise intervention which reveals that increases in hippocampal volume with exercise are age-dependent, with greater effects seen in older individuals. Studies on learning new skills in healthy young people reveal structural changes not only in grey matter, but also in white matter pathways. Studies using MR spectroscopy reveal associations between learning and modulation of GABA. Studies in people with limb amputation reveal that sensorimotor representations are strongly dependent on arm use and the presence of phantom pain. Finally, studies using non-invasive brain stimulation to modulate learning in healthy subjects, and recovery in stroke patients, will be discussed.
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Poster Session 4: Assessment/Psychometrics, Executive Functions/Frontal Lobes

8:00–9:30 a.m.

Assessment/Psychometrics/Methods (Child)

K. BESPANSKAYA-PAWLENKO. Assessment of Development Level of The Leading Mental Functions of Children.
Objective: The aim of the study was to develop the diagnostic techniques on detection of leading mental functions for children of preschool (3–7 years) and primary school (7-11 years) age. Methodological base of this research is the function-stage model of ontogenetic development (Yuri N. Karandashev, 1981). In this model a child's mental development is considered as a development of system of mental functions. In preschool age the following leading mental functions are: realization, relation, understanding and reflectation. In primary school age the following leading mental functions are: generalization, systematization, abstraction, schematization.
Participants and Methods: 120 children of preschool (3–7 years) age and 120 children of primary school (7-11 years) age took part in research.
For each leading mental function were designed diagnostic technique. Were counted psychometric indexes criteria of validity and reliability by yardstick of internal conformity. Statistical methods of data processing: descriptive statistics, the correlation analysis, factor analysis.
Results: Psychometric indicators of validity and reliability of techniques are statistically significant ($p < 0,05$).
Conclusions: Pursuant to the obtained outcomes it is possible to draw a conclusion that techniques meet on complexity to preschool and primary school age and can be used for diagnostic of leading mental functions in preschool and primary school age.
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E. CANCELLIERE & A. CANCELLIERE. Boston Naming Test Norms for Ages 16 and 17: University or College Stream Matters.
Objective: The Boston Naming Test (BNT) is a very popular test of visual naming ability with norms for children and adults. However, there is a gap in the norms between age 14 and 17 (Strauss, Sherman and Spreen, 2006). The current study addressed the upper half of this gap in a sample of high school students. It also looked at the level or stream of the high school course that the students were drawn from (university or college prep). Schmitter-Edgecombe et. al. (2002) collected BNT scores from 26 undergraduates ages 18-22 (mean age 18.93). It was hypothesized that University prep high school students would score better than college prep students.
Participants and Methods: The BNT was administered to 73 students (ages 16 or 17) from a suburban high school in Toronto, Canada. Three students were excluded (immigrated to Canada after age 9). Students were from the following grade 12 classes: AP English (n= 20), English literature (optional University prep class, n=15), media studies (mixed university and college prep, n=22) and English (college prep, n=13).
Results: The total mean (n=70) BNT score was 50.55 (S.D. 4.93). There were declining scores on the mean BNT from the most demanding university prep course (AP English, 54.1 +/-3.67) to the college prep course (47.07 +/-4.5). This was a statistically significant difference. The mean of the AP English students was similar to that of the undergraduates of Schmitter-Edgecombe (53.54 =/-3.39) whereas the English college prep students performed at a much lower level.
Conclusions: The current data provide a limited normative base for interpreting BNT scores at ages 16 and 17. It calls into question the use of Schmitter-Edgecombe data in individuals other than university undergraduates or realistic university stream high school students. It is well known that education is related to BNT scores. When testing high school students with the BNT, the academic stream of the high school student would appear to be a prime consideration in obtaining an accurate classification.
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P.A. KULESZ, D.J. FRANCIS & J.M. FLETCHER. Relations Between Attentional Structure and Attentional Function: Utilization of Alternative Statistical Approaches.
Objective: Structure-function relations in the domain of attention are not well understood. Limited research findings may stem from problems in estimating these relations in small samples combined with data distributions that do not conform to the assumptions of the statistics used to estimate the relations. We examined the utility of using alternative statistics to estimate structure-function relations in a small mixed sample.

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Participants and Methods: Participants were 61 children (43 spina bifida, 18 normal controls) evaluated in a larger study examining cognitive and neurobiological variability in spina bifida and related disorders. We used three approaches to estimate correlations: the Pearson's Correlation, the Percentage Bend Correlation, and the Skipped Correlation, and examined relations between brain structures related to Posner's attention networks and behavioral measures from the Test of Everyday Attention for Children.
Results: Different approaches to estimation yielded comparable results for particular structure-function relations. Specifically, negative associations were found between the anterior cingulate cortex and conflict resolution, as well as the right inferior frontal gyrus and alerting. Positive relations were found for the thalamus and orienting, as well as for the thalamus and sustained attention. A consistent lack of associations between attention networks and other behavioral measures across estimators suggests limited relatedness and/or low power due to sample size limitations rather than problems stemming from violations of assumptions.
Conclusions: Using alternative approaches to estimate relations can assist investigators when confronted with small samples and multivariate non-normal data. The similarity of estimates across methods suggests that the lack of structure-function relations is not easily attributed to violations of assumptions.
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N. RAHMANI, H. ALIPOUR & K. AKBARNATAJ. Assessment and Comparison of Self-Esteem and Depression in War Handicapped and Non-War Handicapped Children of Shahed Guidance Schools in Sari City 2011-12.
Objective: Family is the most important social institution in human societies and it has the main role of character development and children nurturing .The aim of this research is comparative assessment of self esteem and depression in war handicapped and non war handicapped children at shahed guidance school in Sari city 2011-12.
Participants and Methods: Present research is a descriptive study. Questionnaire completed by 200 war handicapped and non war handicapped children that had sampels profile. Sampling has been done census and randomly. Self Esteem assessed by Cooper Smith self esteem Questionnaire and Depression assessed by Beck Depression Inventory. Data collected and analyzed by spss software.
Results: The results in this investigation showed that war handicapped and non war handicapped girls and boys self esteem have significant difference with (P<0/05). Mean and standard deviation of self esteem indicators showed self esteem in the group of war handicapped with a mean and standard deviation 29/76(6/39) and non war handicapped group with a mean and standard deviation 28/05(4/82) have significant difference. This means that self-esteem in war handicapped group is more than non war handicapped. The results showed that there is no significant difference in depression in war handicapped group with mean and standard deviation 14/38(9/54) with non war handicapped group with mean and standard deviation 11/91(6/20).
Conclusions: The results show that children of war handicapped have higher self-esteem than non war handicapped children and there is no significant difference between the two groups in depression .
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M. ROSE, K. STEDAL, I. FRAMPTON, N.I. LANDRØ & B. LASK. The Neuropsychology of Anorexia Nervosa - What The Ravello Profile Teaches Us.
Objective: The Ravello Profile is a standardised test battery which aims to investigate whether neuropsychological impairments consistently identified in Anorexia Nervosa (AN) group together to form distinct neuropsychological profiles.
Participants and Methods: The battery has now been used on upward of 250 cases of AN. In this paper the authors will present: 1) a descriptive analysis of the cohort to date, 2) a history of the Ravello factor analysis, and 3) a preliminary hierarchical cluster analysis.
Results: The descriptive analysis demonstrates wide variability of neuropsychological performance. Factor analyses indicate instability of factors as our sample size has increased. Preliminary cluster analysis suggests at least three distinct neuropsychological profiles- a normal neuropsychological profile, a weak visuo-spatial processing profile and a generalised abnormal neuropsychological profile.
Conclusions: Categorisation of AN by neuropsychological profiles may have important clinical implications. It is possible that the relatively poor prognosis is due to the failure to address in treatment the different neuropsychological profiles. Our findings show promise. However, factor analysis must stabilise before clinically meaningful cluster analyses can be obtained. This is of particular relevance given the possibility of clinical subsets that benefit from novel treatments such as Cognitive Remediation Therapy (CRT).
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Assessment/Psychometrics/Methods (Adult)

K. ERDAL. Neuropsychological Testing for Sports-related Concussion: How Athletes Lowball their Baseline Testing without Detection.
Objective: Neuropsychological baseline testing of athletes has become commonplace in the assessment and treatment of concussion; however, the integrity of baseline test data is essential if post-concussion test results are to be used in return-to-play decisions. Evidence of incomplete effort and recent admissions of "lowballing" the baseline test have given new interest to baseline test integrity. The aim of this study was to see to what extent athletes would be able to perform intentionally poorly on baseline testing without tripping test validity indicators.
Participants and Methods: 75 undergraduate athletes who had completed their athletic careers were asked to re-take the ImPACT 6.0, which they had taken previously to establish neuropsychological baseline functioning, but to try to perform more poorly than they had at baseline without tripping any of the "red flags" or validity indicators.
Results: The participants' true baseline data were compared to their experimental baseline data. Eight participants (11%) were able to successfully fake lower scores without detection by the ImPACT's five validity indicators and four "red flags." "Successful" fakers were compared to unsuccessful fakers both quantitatively and qualitatively. The Reaction Time Composite and the Three Letters Total Letters Correct were the only variables on which the successful fakers chose not to perform significantly more poorly, suggesting their lack of effectiveness in detecting a "lowballer." Concussion history was not related to performance.
Conclusions: The successful fakers tended to use more mild faking strategies which naturally facilitated errors than did the unsuccessful fakers. The data suggest that "lowballing" the baseline, even under conditions involving motivation, instruction, and experience with the test, is difficult to accomplish without being detected.
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G.L. IVERSON, D. MCINTOSH & K. KJERNISTED. Reliability and Validity of the British Columbia Cognitive Complaints Inventory in Depression.
Objective: Subjective cognitive impairment is a cardinal diagnostic feature of major depressive disorder. This study examines the reliability and validity of the British Columbia Cognitive Complaints Inventory (BC-CCI) in patients with depression.
Participants and Methods: Forty-seven outpatients with depression were enrolled in a treatment study. Their average age was 44.4 years (SD=12.4), average education was 13.3 years (SD=1.5), 51% were men, 77% were Caucasian, and 64% were employed. They were administered the BC-CCI (a six-item self-report questionnaire), CNS Vital Signs (a computerized cognitive screening battery), the 17-item Hamilton Depression Rating Scale (HDRS), Montgomery-Asberg Depression Rating Scale (MADRS), and the Hamilton Anxiety Rating Scale twice—with an average test-retest interval of 6.4 days (SD=2.9, range=2-16).

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Results: Total scores for the BC-CCI were 11.6 (SD=3.8) and 11.4 (SD=4.4) for time 1 and time 2, respectively. Internal consistency reliability (Cronbach's alpha) was .82 at time 1 and .87 at time 2. Pearson test-retest coefficients were: BC-CCI=.74, HDRS=.70, MADRS=.72, and HARS=.78. The standard error of the difference for the BC-CCI was 3.0, and the 70%, 80%, and 90% confidence intervals for reliable change were 3.1, 3.8, and 4.9 points, respectively. At time 1, the correlations between the BC-CCI and the HDRS, MADRS, and HARS were .58, .65, and .46, respectively. At time 1, the BC-CCI was not correlated with any of the domain scores from CNS Vital Signs, and at time 2 it was negatively correlated with only the Memory Domain ($r=-.33$, $p<.03$).
Conclusions: The BC-CCI has high internal consistency reliability and moderately high test-retest reliability in patients with depression. It has medium correlations with measures of depression severity, and was essentially uncorrelated with neurocognitive functioning measured by CNS Vital Signs. This screening measure is well-suited for monitoring subjectively-experienced cognitive problems, but it cannot replace neurocognitive testing.
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G.L. IVERSON, B.L. BROOKS & J.A. HOLDNACK. How Often Do Healthy Older Adults Get Low Memory Test Scores?
Objective: The diagnosis of mild cognitive impairment (MCI) relies on objective memory testing. Several recent studies have illustrated methodological limitations with the psychometric criteria for MCI, leading to problematic rates of false positive and false negative diagnostic errors. The purpose of this study is to examine the relation between intelligence, level of education, and the prevalence of low memory scores in healthy older adults.
Participants and Methods: A sample of 500 healthy older adults (65-90 years of age) who were part of the Wechsler Memory Scale – Fourth Edition (WMS-IV Older Adult Version; Wechsler, 2010) standardization sample was used for these analyses. Three WMS-IV tests of learning and memory (Logical Memory, Verbal Paired Associates, and Visual Reproduction) that provide six age-adjusted immediate and delayed memory scaled scores were analyzed simultaneously. Base-rate analyses stratified by ToPF-demographic predicted intelligence and years of education are presented.
Results: Considering the 5th percentile as a cutoff (SS≤5), one or more low memory subtest scores occur in 23.8% of healthy older adults. When stratified by predicted intelligence, one or more scores <5th percentile occurs in 46.7% with low average, 23.5% with average, and 14.7% with high average predicted intelligence. When stratified by years of education, one or more scores <5th percentile occurs in 44.6% with ≤8, 30.8% with 9-11, 23.9% with 12, 13.7% with 13-15, and 15.2% with 16+ years.
Conclusions: It is common for healthy older adults to obtain one or more very low scores when given a battery of memory tests (e.g., three tests each having immediate and delayed memory components). The prevalence of low scores varies by level of education and by level of intelligence. The assessment of memory in older adults can be refined if criteria for memory impairment are adjusted in relation to a person's predicted premorbid intelligence and the number of tests that are administered.
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M.A. AL-ZAHRANI & M.S. KHALIL. Neuropsychological & Executive Dysfunction In Sub-Groups Of Substance Abuse Patients in Saudi Arabia.
Objective: This study is part of a project which aimed to assess the effects of substance abuse on some neuropsychological functions. The data reported here will summarize the psychometric properties of some specific tests of executive functions and visual spatial skills, with preliminary results about their discriminant validity.
Participants and Methods: Participants included a convenience volunteer sample of 254 male subjects from the outpatient and inpatient units in Al-Amal Complex of Mental Health in Dammam, Saudi Arabia. This sample included 100 healthy subjects selected from the family members accompanying the patients, and 154 substance abuse male patients, with age ranged between 18 and 55 years (M=29.7, SD=6.9). Materials: The following neuropsychological tests were used: The Colored Trial Making Test (CTT); The Stroop Test, The Symbol Digit Modalities Test (SDMT), and Arabic version of Verbal (VF) and Design Fluency (DF) tests. All tests have been adapted so that all instruction, administration and scoring procedures were Arabicesed.
Results: All tests have shown acceptable and adequate internal consistency (Alpha Cronbach), and test re-test reliability, which were all significant at $p<0.01$ and $p<0.001$. Rotated Factorial analysis for all tests have revealed three distinct factors which accounted for 72% of the variances. Discriminant validity was examined through MANCOVA and showed acceptable discriminant value for all tests, in that most of the indices discriminated well between healthy and substance abuse patients, as well as discriminating between subgroups of substance abusers.
Conclusions: These neuropsychological tests have shown acceptable validity and reliability scores, which could formulate a baseline for the development of comprehensive Arabic normative data. The clinical utility of these tests will be outlined.
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L. KRAMSKA. Psychometric characteristic of the Czech National Adult Reading Test.
Objective: Reading of irregular words represents one of the most often used method for evaluation of premorbid intellectual performance in neuropsychology. The aim of this study was to construct a Czech version of the NART and to examine its reliability and validity on healthy controls and patients after SAH. Whereas the Czech pronunciation has fixed rules, Czech NART was constructed using loaned words.
Participants and Methods: The proposal of the Czech version of the NART is discussed in a view of previously published works as well as linguistic possibilities of the Czech language. Healthy subjects (454) and patients after SAH (78) were tested by the Czech NART. In addition, performance in the Czech NART was correlated with WAIS–R in 35 healthy subjects.
Results: The item analysis was undertaken with 100 words. We selected 50 acceptable words for the Czech NART. The Czech NART has favorable psychometric characteristics: internal consistency, high correlation with the education and intellect in healthy subjects and patients, as seen in its anglo-saxon version. We obtained a significant model for prediction of premorbid IQ using the Czech NART.
Conclusions: The Czech NART is able to become an important diagnostic tool for assessment of premorbid intellect in Czech neuropsychology. This standardization study could be a good solution for future scientific research in different diagnostic groups of patients.
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E. LORENTZEN, B.T. OLSNES & K. TROLAND. The Changing Methods: Comparison between WAIS-III results with WAIS-IV results in patients with mild mental retardation.
Objective: Hypothesis: Are the results on the new WAIS-IV different from the results on the former WAIS-III?
Participants and Methods: Participants: The sample consists of 17 participants, aged 21-66, with a known diagnosis of mild mental retardation, for whom WAIS-III data from a prior assessment were available (Lorentzen og Troland, 2010). The WAIS-III data were collected 5-6 years before the WAIS-IV assessment.
Method: Testing with WAIS-IV and WAIS-III in patients at Dept. of Neurohabilitation, OUS, Ullevål.
All participants were volunteers. The project was approved by the local ethical commitee.
Results: The data from WAIS-III and WAIS-IV were analyzed with descriptive and parametric statistical methods. Demographics variables: N=18, Age min:21, max:66, Mean 37.7, SD=13.9. Gender: 58% females
Conclusions: The results indicate that there is an overall tendency towards lower scores on the WAIS-IV than on the WAIS-III on comparable tests. For FSIQ and and Prosessing speed, as well as the subtests Matrix reasoning, Digit span and Comprehension these differences are significant. Because the sample is small our results are tentative, and further research is required in the field.

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D. LEITNER, J. PIERCY, H.B. MILLER & G. DOCHERTY. Comparison of the California Verbal Learning Test-II and the Selective Reminding Test in an Acquired Brain Injury Sample.

Objective: The California Verbal Learning Test-II (CVLT-II) and the Selective Reminding Test (SRT) are frequently used to assess verbal learning and memory in patients with acquired brain injury (ABI). To date, there have been no direct comparisons between performance on the CVLT-II and the SRT. We examined the relationships between learning and memory scores on these tests and assessed whether the standard scores calculated from the CVLT-II and the SRT normative samples resulted in different classification of impairment in patients with ABI.

Participants and Methods: Participants included 104 consecutive ABI outpatients (mean age = 47, SD= 13.9; mean education = 13, SD = 3.7). Each subject received both the CVLT-II and the SRT in a counter balanced design and these tests were separated by at least 2 and no more than 5 hours. Standardized scores were used for the CVLT-II and the SRT for all analyses. Pearson correlations examined the relationships between learning and retention scores and t-tests with Bonferroni corrections examined group differences. Chi squared analyses assessed severity classification differences in learning and memory scores.

Results: There was no order effect for the CVLT-II or the SRT. Learning and memory indices for the CVLT-II and SRT were significantly correlated ($r = .51$, $p<.001$; $r = .57$, $p<.001$). Standardized learning scores ($t(104) = 10.36$, $p<.001$) and retention scores ($t(104) = 8.74$, $p<.001$) were higher on the CVLT-II compared to the SRT. Further, there was a significant difference for classification, with the SRT more frequently categorizing patients in the impaired range on measures of learning ($\chi^2 = 12.06$, $p<.001$) and memory ($\chi^2 = 23.24$, $p<.001$) compared with the CVLT-II.

Conclusions: Patients performed better on the CVLT-II than the SRT when compared with published norms. These results argue for careful consideration of test choice in the clinical assessment of learning and memory and provide evidence that standardized scores for these verbal memory measures are not interchangeable.

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M. MÖLLER, C. NYGREN DEBOUSSARD, C. OLDENBURG & A. BARTFAI. Assessment of Cognitive Fatigue in Mild Traumatic Brain Injury Patients with Persisting Complaints.

Objective: Fatigue is common among mild traumatic brain injury (mTBI) patients but its assessment and conceptualization is still unclear. The aim in this study was to investigate correspondence of subjective and objective measures of cognitive fatigue in mTBI patients and to compare different neuropsychological tests for capturing attention fatigue, executive fatigue and, psychomotor fatigue.

Participants and Methods: 24 mTBI patients (12 men and 12 women; mean age 35.7±9.8 yrs) and 31 healthy controls (13 men and 18 women; mean age 36.7±8.8 yrs) were investigated with Fatigue Severity Scale (FSS), Hospital Anxiety and Depression Scale (HADS), Pittsburgh Sleep Quality Index (PSQI). Questions regarding pain and medications were included in the study. Psychomotor fatigue was assessed with WAIS-III Digit Symbol Test, attention fatigue with Ruff 2 & 7 test and executive fatigue with the Stroop test.

Results: mTBI patients scored higher on FSS ($p<.001$) HADS ($p<.001$), pain ($p<.001$), and PSQI ($p<.001$), and performed worse on tests of psychomotor (-.7±3.2 vs. 2.2±3.0, $t = -3.48$, $df=53$, $p=.001$) and executive fatigue (5.3±4.2 vs. 2.3±4.3, $t = 2.56$, $df=50$, $p=.01$) compared to controls. Subjective fatigue and sleep disturbances were not associated with psychomotor fatigue. Regression analyses showed that mTBI was the strongest predictive factor for psychomotor fatigue. Males performed worse than females. The results were not associated with incidental memory, education level, medication or depression. Regarding executive fatigue, mTBI was not a predictive factor after controlling for depression or education.

Conclusions: mTBI patients experienced more fatigue and performed worse on test of psychomotor fatigue than healthy controls. Depression was associated with subjective fatigue but not with psychomotor fatigue. WAIS-III Digit Symbol fatigue measure was strongly related to mTBI and could therefore be a suitable instrument for capturing cognitive fatigue among mTBI patients.

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C. NAGAI & H. YOSHIZAWA. Application of a novel clock drawing/reading test for investigating the constructive disabilities in a case of semantic dementia.

Objective: Constructive abilities in semantic dementia patients can be preserved until advanced stages. The purpose of this study was to determine how the deterioration of the abilities would finally occur during the progression of the disease using a novel clock drawing/reading test.

Participants and Methods: A 54-year-old woman visited our hospital because of progressive naming difficulties for two years. Neuropsychological assessment indicated semantic dementia. Language function became progressively worse for three years and, finally, unable to communicate. Although the constructive ability score in Western Aphasia Battery (WAB) had used to be perfect for three years, it reduced for the first time four years after her first visit. We investigated her constructive abilities three and four years after first visit using the novel clock drawing/reading test consisted of two components : 1) View a digital clock and draw corresponding clock hands on an analog clock (DA test); 2) View an analog clock and write the digital time representation (AD test). Each test consisted of two sets with 16 items. The test was performed in a DA1-AD1-AD2-DA2 order and accuracy and error type were evaluated.

Results: In DA tests, accuracy remarkably decreased (0.98 to 0.54). However, in AD tests, the change was relatively mild (1 to 0.88). Reversed clock hands errors (e.g. 11:05 for 1:55) and number simplification errors (e.g. a clock short hand indicates 9 for 9 :30) were frequently observed in DA tests and the same tendency was observed in AD tests.

Conclusions: Even a case of semantic dementia reveals drawing errors during progression. The results suggested that fronto-temporal dysfunction, such as stimulus-bound response and overgeneralization, would be reflected on the constructional disabilities, which the clock drawing/reading test could detect the errors.

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C. RUIS, E. VAN DEN BERG, H. VAN STRALEN, I. HUENGES WAJER & M. VAN ZANDVOORT. Symptom Checklist 90 Revised in Neurological Outpatients.

Objective: The SCL-90-R is an international widely used self-reported list of multidimensional complaints, with normative data for healthy control subjects and psychiatric patients. Neuropsychologists often add this questionnaire to their neuropsychological assessment to examine the psychiatric and psychosomatic symptoms of their patients. However, neurological patients can report more cognitive or somatic complaints that are directly related to their neurological disease instead of a result of underlying psychopathology. Using the normative data for healthy control subjects may cause misinterpretations of the complaints and symptoms.

Participants and Methods: In this study, the self-reported symptoms of patients from a neurological outpatient clinic (n=600) are analysed and compared to the existing normative data of the healthy control group. In a secondary analysis we divided the group in 5 subgroups (dementia, cerebrovascular disease, epilepsy, brain tumours, and traumatic brain injury) to analyse if specific neurological diseases may also result in more specific scores on the SCL-90-R.

Results: This neurological outpatient group showed significant different scores on the SCL-90-R in comparison the healthy control group. Especially the scores on the subscales Depression (DEP), Somatization (SOM) and Inadequacy of thinking and acting (IN) were substantially higher in the neurological patients. Dividing the patient group in different subpopulations was not contributing; scores on the subscales were highly comparable between the different specific neurological diseases. The current data could therefore be regarded as representative for the general neurological population.

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Conclusions: This study underlines the possibility of misinterpretations when using the normative data for healthy control subjects in a neurological population. Neuropsychologist should be aware of the specific answers tendencies of neurological outpatients on the SCL-90-R.
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K. VANCLEEF, K. TORFS, C. LAFOSSE, J. WAGEMANS & L. DE-WIT. L-POST: A Screening Test for Assessing Perceptual Organization.
Objective: Neuropsychological diagnostic tests of visual perception mostly assess high level processes like object recognition. Object recognition however, relies on distinct mid-level processes of perceptual organization that are only implicitly tested in classical tests. Therefore, we developed the Leuven Perceptual Organization Screening Test (L-POST) in which a wide range of processes of perceptual organization are measured as independently as possible.
Participants and Methods: The L-POST consists of 20 subtests screening for various aspects of perceptual organization, e.g. figure-ground segregation, contour integration, perceiving congruent action configurations, object localization, embedded figure detection, modal completion, biological motion, perceptual grouping, local and global processing, scene segmentation and texture segmentation. To reduce cognitive load a matching-to-sample task is used for all test items: Participants have to indicate which of three alternatives is most similar to the target stimulus. The computerized test can be administered in 30-45 minutes, and a neglect-friendly version is available. The test was piloted on 5 brain-lesioned patients and 14 healthy control subjects.
Results: There was a significant difference between the total score on the L-POST for the healthy controls subjects and the brain-lesioned patients ($t = 2.17$, $df = 13$, $p = 0.03$). Correlations between different subtests were not significant suggesting that these subtests measure independent processes.
Conclusions: The L-POST is a potentially valuable screening test for perceptual organization. In clinical practice the L-POST can be administered to differentiate between mid-level deficits in perceptual organization and high-level deficits like object recognition. In addition, it offers a useful tool for researchers in identifying patients for neuropsychological research. The L-POST will be freely available online, and the collection of normative data is in progress.
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S. WALVOORT, A. WESTER & J. EGGER. Neurocognitive dysfunctions implicated in alcohol use disorder: Rethinking MMPI-2 assessment.
Objective: Treatment planning of patients with Alcohol Use Disorders (AUD) is often preceded by the assessment of psychopathology and personality with the Minnesota Multiphasic Personality Inventory (MMPI-2). However, in the acute phase of abstinence, AUD patients present physical and cognitive problems, which will partially resolve during abstinence. These problems can cause temporarily elevations on multiple clinical scales of the MMPI-2 that may easily result in inadequate interpretation and treatment planning. Over the past years, several correction procedures were developed to correct for these problems in different neurological disorders, but until this date, there are no published data available on correction procedures or its use in AUD patients. In the absence of such a correction procedure in AUD patients, the usefulness of existing MMPI-2 correction procedures is examined.
Participants and Methods: An extensive literature search was performed in Pubmed, Medline, and Psychinfo for the period from 1975 through October 2011. Thirty-five studies on MMPI and MMPI-2 correction procedures and their use in clinical practice were studied.
Results: Review of the literature demonstrates that, given the similarity between cognitive deficits found in AUD patients and in Traumatic Brain Injury (TBI) patients, it seems justified to use a correction procedure in order to avoid the risk of inadequate treatment planning during the acute phase of abstinence.
Conclusions: In AUD patients, while assessed in the acute phase of abstinence, the application of an MMPI-2 correction procedure is compulsory. From there on, adequate and individualized treatment planning requires repeated, neuropsychological, evaluation of a patients' emotional and cognitive functioning. Further investigation should focus on the development and validation of such a correction procedure and its relation with the development c.q. recovery of cognitive functions.
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E. WINGBERMUHLE, J. KOOT & J.I. EGGER. Symptom Validity in a Neuropsychiatric Sample.
Objective: Mental effort is often diminished in psychiatric disorders, which may result in lowered symptom validity and cognitive underperformance (Gorissen et al, 2005). In this study, symptom validity was examined in a neuropsychiatric sample, in order to evaluate the prevalence of underperformance in this patient group. Subsequently, performance on the symptom validity test was related to achievements on measures of intelligence, executive functioning and working memory.
Participants and Methods: The Word Memory Test (WMT) was employed to assess symptom validity in 34 Dutch patients (aged 18-70) with neuropsychiatric disorders. The National Adult Reading Test (NART) was administered to estimate intelligence, the Fluid Intelligence Index (FIQ) of the Kaufman Adolescent and Adult Intelligence Test (KAIT) was used as a measure of executive functioning and the Digit Span of the Wechsler Adult Intelligence Test was used to assess working memory. The prevalence of underperformance was defined by the frequency of scores below a cut-off of 82.5 on WMT-IR, WMT-DR, or WMT-CONS. Correlation and multiple regression analyses were performed to study the relationship between WMT and the neuropsychological variables.
Results: Twenty-one percent of the patients failed the WMT. Correlation analyses revealed significant correlations between WMT-DR and WMT-CONS on the one hand and NART-IQ and KAIT-FIQ on the other hand. Regression analyses showed that WMT-scores were not predicted by NART-IQ, KAIT-FIQ or Digit Span performance.
Conclusions: Reduced symptom validity is found in this neuropsychiatric sample, in line with previously found prevalence rates (20-30%). Performance on the WMT seems to be related to intelligence and executive functioning, but to be independent from working memory. This may lead to a re-evaluation of the use of Digit Span as a symptom validity test. The results emphasize the need for caution in the interpretation of neuropsychological test results of neuropsychiatric patients.
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Executive Functions/Frontal Lobes

N. ALBEIN, J. MARTÍNEZ GONZÁLEZ, ÓSCAR. LOZANO ROJAS & A. VERDEJO GARCÍA. Executive function in cocaine dependent individuals with comorbid personality disorders: Preliminary results.
Objective: We aim to explore executive deficits in cocaine dependent individuals (CDI) with dual diagnosis (substance dependence+Axis II), as compared to CDI without comorbidities, pathological gamblers (as a group of addiction without toxicity), and non-drug using controls.
Participants and Methods: We recruited five groups of participants as they joined community outpatient treatment: CDI without comorbid psychopathology (n=42), CDI with comorbid Cluster B personality disorders (n=25), CDI with comorbid Cluster C personality disorders (n=15), pathological gamblers (n=25), and controls (n=27). We assessed them using neuropsychological measures selected to tax three executive function components: updating (N-back), inhibition (Stroop and d2) and shifting (Category Test). To test differences between groups on the performance indices from these tests, we conducted Analyses of Variance (ANOVAs) followed by post-hoc Tukey tests using SPSS software.
Results: ANOVAs showed a main effect of group for N-back, Stroop and d2. Paired post-hoc contrasts showed that CDI with comorbid Cluster B personality disorders performed poorer than controls on Stroop and d2 Variation Index, whereas CDI with comorbid Cluster C personality disorders performed poorer than controls on N-back hits. D2 Efficiency and Concentration indices yielded significant differences between all the addicted groups and the non-drug using control group.

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Conclusions: These results indicate that comorbid personality disorders relate to specific profiles of executive dysfunction in CDI: patients with comorbid Cluster B disorders have deficits on inhibition and attention regulation, whereas patients with comorbid Cluster C disorders have deficits on working memory updating. Both substance and non-substance addictive groups have broader attentional efficiency deficits.

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A. BOCHYNSKA. Executive functions and social skills. A case study of a patient with frontal lobes damage.

Objective: Frontal lobes are considered to be a brain area responsible for planning, organization of behavior, attention, inhibition and logical inference. Recently it became a focus of considerable interest whether they are also involved in social interactions, thinking about others' beliefs and solving moral dilemmas. Studies show that abilities like mentalizing, empathizing or the social usage of the language can be compromised after a damage to particular areas in the frontal lobes.

Participants and Methods: The patient L.G., at the time of the examination, was a 60 year old man with a damage to the left frontal lobe after a stroke. A case study examination included a qualitative description of the patients' behavior and the results from the tests measuring executive functions and social skills.

Results: Patient L.G. showed specific impairment of executive functions with indication to severe problems with planning and concentration, measured with Tower of London test (TOL), Color Test Trials (CTT) and the nonverbal version of the Wechsler Scale (WAIS-R). The patients' recognition of emotions, measured with emotional intelligence test (SIE-T) and the emotions recognition tasks was also compromised. Patient showed distinct problems with the social usage of the language, which was indicated by the result in RHLB-PL test. The recognition of the others' beliefs, measured with false beliefs tasks, was nevertheless preserved.

Conclusions: The results show that the left frontal lobe is neither sufficient nor necessary for identifying the beliefs of others and reasoning about others' false beliefs, while it is still crucial for other social skills. They also contribute to the discussion about the relation between executive functions and theory of mind, supporting the thesis that they are not that strongly dependent from each other as many researchers would indicate.

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D. BRITO & F.S. OSTROSKY. Influence of parenting style in executive functions of preschool age children.

Objective: The purpose of the present study was to explore the differences between perceived parenting style of the children (authoritative, democratic, and permissive) and their executive function performance.

Participants and Methods: 130 children (Latinoamerican, from Mexico City) between 3 and 6 years old (85 female) were assess with the Perceived Parenting style scale, children version: (Jiménez, 2000) And the Neuropsychological Executive Functions Test for Preschool Age (Ostrosky, et al, 2008). According to the style perceived, children was separated in 3 groups: 1 (children that perceive an authoritarian style), group 2 (children that perceive a democratic style, and group 3 (children that perceive a permissive style). Groups were compared using an ANOVA test to analyze the effects of parenting style in the executive function performance.

Results: In work memory measures the ANOVAs show significant differences between all groups in the total score executive function. Post hoc (Tukey) show differences between group 2 vs groups 1 and 3 ($p < 0.017$).

Conclusions: The democratic parenting style perceived by preschool-age children improves performance in work memory task.

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F. CONSTANTINIDOU, M. CHRISTODOULOU & J. PROKOPIOU. The Effects of Age and Education on Executive Functioning and Language Performance in Greek Cypriot Adults: Findings from the Neurocognitive Study on Aging.

Objective: Age, educational experiences, language and culture can affect cognitive-linguistic performance. The Neurocognitive Study on Aging is the first systematic longitudinal project investigating cognitive aging in Greek Cypriot adults. The present study focuses on the interplay between executive functioning (EF) and language performance in two subgroups of adults over 60.

Participants and Methods: Three hundred and sixty participants were included, a group of young-old, ages 60-75 years (n=231) and a group of old-old participants 76 years and older (n=129). Participants in each age group were grouped into three education groups; 0-4 years (n=50), 5-9 years (n=198), and 10 years of education and higher (n=111). Participants were administered an extensive neuropsychological battery which included five measures of executive functioning along with measures of receptive vocabulary and confrontational naming.

Results: An executive functioning (EF) composite was constructed with the 5 EF measures. There was a significant relationship between the EF composite score and all language measures. MANOVA ($\alpha = .05$) indicated significant age and education effects on most measures of EF and language. Performance on receptive vocabulary and cognitive shift remained stable across age groups, but was mediated by education.

Conclusions: As anticipated, education plays a significant role on all measures requiring semantic organization, speed of information processing, cognitive shift, mental flexibility, receptive vocabulary and confrontational naming. Furthermore, strategic thinking has a role in semantic knowledge, word retrieval and semantic access in healthy aging. It concludes with clinical implications and assessment considerations for clinical populations with aphasia

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A. EASTVOLD & Y. SUCHY. The Lack of Convergence Between Objective and Self-Report Measures of Executive Functions.

Objective: The Behavioral Rating Inventory Executive Function (BRIEF®) is a self-report questionnaire that is commonly used in neuropsychological assessments to assess executive functions. Investigations examining the relationship between the BRIEF and objective neuropsychological measures of executive functions have produced little evidence of convergence, although the majority of such studies have utilized clinical pediatric populations. The objective of this study was to examine the correlation between objective performance measures and the BRIEF.

Participants and Methods: Participants were 89 neurologically healthy adult criminal offenders (mean age = 32.4 [SD = 7.8]; mean education = 12.5 [SD = 1.6]). Participants completed a battery of neuropsychological tests as part of a larger study (Eastvold, Suchy & Strassberg, 2011). Neuropsychological variables were combined to create seven executive subscales: Switching, Inhibition, Abstraction, Working Memory, Fluency, Planning, and Attention. The BRIEFsubscales assessing cognition included: Working Memory, Initiate, Plan/Organize, Task Monitor, and Organization of Materials.

Results: All neuropsychological subscales and all BRIEF subscales were significantly correlated with each other. However, bivariate Pearson correlational anaylses between neuropsychological and BRIEF subscales yielded only one small statistically significant correlation between the neuropsychological Fluency and BRIEF Working Memory subscales ($r = 0.21$, $p < .05$).

Conclusions: The absence of correlation between objective and self-report measures of executive functions raise questions regarding the construct validity of the BRIEF. These results suggest behavioral ratings should not be assumed to be an accurate proxy for neuropsychological tests in clinical practice and highlight the importance of how self-report data is used and interpreted in the context of clinical assessments.

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M. ENNOK, T. SAARUP, L. VAHTER & K. GROSS-PAJU. Conceptual Analysis Errors in Patients with Parkinson's Disease.

Objective: Previous studies in Parkinson's disease (PD) have demonstrated deficits in conceptual analysis tasks (e.g. finding and applying rules and using feedback to switch rules). However there is some controversy on the possible factors that influence this process in PD (shifting a response set or maintaining it). Our objective was to assess this issue with two categorization tasks.

Participants and Methods: Preliminary results were obtained from a sample of 13 PD patients (8 men, 5 women) with mean age of 71.8 years (SD=7.3) and mean education of 12.3 years (SD=2.6). Their results were compared with 12 healthy control subjects (4 men, 8 women) with mean age of 73.9 years (SD=4.7) and mean education of 12.6 years (SD=2.4). All subjects were administered the Odd-One-Out test (OO) and the Hukok test of Logical Thinking Matrices (HT). In both tests the subject is asked to find and use an abstract principle (to find an odd item out of a set of stimuli in OO, and to solve matrices by applying and combining categorization rules in HT).

Results: In OO the number of categories used to find an odd item did not differ between groups but PD patients made more sorting errors compared to control subjects (failed to maintain a response set, Z_{adj}= 2.89, p<.004). Patients also gave more perseverative responses but the difference was not significant. Similarly the number of categories achieved in the HT was not different between groups but the response pattern showed a more unstable performance of PD patients who completed fewer items when applying a categorization rule (Z_{adj}= -2.0, p<.05). Correlation between these scores was also significant (rho = -.48).

Conclusions: Our results favor a set maintenance deficit account of PD patients in solving conceptual analysis tasks. Both patients and controls showed the same level of abstractioning ability but patients made more errors in applying a selected categorization rule in both tests.

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L.R. ARROYO, D. JUÁREZ, A. GARCÍA, C. RAMÍREZ & P. VALDEZ. Disorders of Prevision in a Traumatic Brain Injury Patient: a Case Study.

Objective: Prevision is the capacity to anticipate the conditions required to solve a problem. The objective of this study was to identify disorders of prevision in a patient with traumatic brain injury using a map task.

Participants and Methods: The patient was a 40 year old woman, who suffered closed head injury in a car accident, resulting in damage to the frontal, parietal and occipital lobes. Twenty years after the accident, the patient had recovered most of her neuropsychological functions, but the following sequels remained: mild paralysis of the left foot, disorders in the recognition of space and in executive functions. Five undergraduate students were also recorded (2 female and 3 male) they were 23.60 ± 3.65 years of age and had no neuropsychological or psychiatric disorders. Six maps were used to analyze prevision: each map had an area of 20 x 18 cm, four entrances at the top and four exits at the bottom, and had different figures drawn to simulate a city with "blocks" and "streets". Numbers 1-6 were distributed inside the map. Participants had to draw the shortest path as quick as possible from an entrance to an exit, passing next to each number in consecutive order. Also, they were required not to: lift the pencil from the paper, omit numbers, cross lines or use the same path twice.

Results: Students anticipated that drawing a line to connect the first numbers could become an obstacle to arrive to the next numbers or to the exit, therefore they chose indirect paths to go to the first numbers. The patient used a different strategy, she tried to follow a direct path from one of the entrances to the first number and then to each of the numbers, thus blocking the access to the last numbers and the exit. Students solved all the maps, while the patient could not finish any map.

Conclusions: The results suggest that prevision could be affected in patients with traumatic brain injury, probably due to frontal lobe damage.

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M.A. GARCIA-BARRERA, J. FRAZER & C. ARESHENKOFF. Theoretical Derivation and Empirical Validation of an Integrative Neuropsychological Theory of Executive-Related Abilities and Component Transactions (INTERACT).

Objective: The elusive term "Executive Function (EF)" has remained controversial in neuropsychology, and sounded theoretical models that attempt to define it have failed during their validation efforts. As an exception (i.e., Miyake et al, 2000), parsimonious statistical approaches using latent variables have prevailed and succeeded to considerable extent. Garcia-Barrera (2012) proposed INTERACT, an extension of Miyake et al's three-component approach to examine EFs, in which the interactions between five specific executive systems permit the emergence of executive control. Therefore, EFs are defined theoretically not only as a series of unitary byproducts of these interactions, but also in terms of a diversity of distinguishable functional systems: problem representation, updating working memory, and attentional-, emotional- and inhibitory control. This study aimed to introduce the derivation of such theory and to examine its validity as a feasible model of EF. It was hypothesized that INTERACT would meet criteria for goodness of fit at a higher level than alternative models.

Participants and Methods: 218 university students (163 females; mean age = 21.04 ± 3.92) completed 15 computerized tasks designed and ran in E-prime (aprox. 1h30min). Full Information Maximum Likelihood estimation method was selected for the purposes of the Structural Equation Modeling.

Results: Criteria for normality and missing data were met. Three tasks were eliminated a posteriori due to low reliability indexes. Overall model fit was excellent, $\chi 2$ = 36.38, df = 44, p = .786; CFI = 1.00; RMSEA = .000. INTERACT was superior to six alternative measurement models. Factor scores were further used to examine the interactions of the model components in predicting overall executive control.

Conclusions: To this end, the results of this study supported the theoretical underpinnings of INTERACT, and provided strong evidence that it is a viable model for this elusive construct. We are implementing INTERACT in an ongoing clinical study in sports concussions.

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I. GARCÍA-GARCÍA, M. GAROLERA, I. MARQUÉS-ITURRIA, B. SEGURA, R. PUEYO, M. VERNET, M.J. SENDER, E. TOR, M. ARIZA, A. NARBERHAUS & M.A. JURADO. Morbid obesity but not mild-to-moderate obesity is associated with differences in prefrontal function: a case control study.

Objective: Obesity may be related to vulnerability of the prefrontal cortex. Supporting this view, increasing evidences show that participants with obesity perform worse on cognitive tasks implying prefrontal function. However, difficulties in the group of obesity are not systematically found. To save this discrepancy, it may be helpful to differentiate between two types of obesity: mild-to-moderate and morbid obesity.

Participants and Methods: 28 obese participants aged 16-40 years took part in the study. They were subdivided in two groups based on their Body Mass Index (BMI): mild-to-moderate (n=14; BMI between 30 and 39.9); and morbid obesity (n=14; BMI equal or higher than 40). 28 lean participants, paired for age and gender, constituted the control group. They completed the Wisconsin Card Sorting Test (WCST), the California Verbal Learning Test 2nd edition (CVLT-II) and an n-back task. An ANOVA test was conducted between the three groups entering the following variables as dependent variables: perseverative errors (WCST), total learning scores (CVLT-II), free immediate recall (CVLT-II), free delayed recall (CVLT-II), hits rate (2 and 3 back), false alarms rate (2 and 3 back) and reaction time (2 and 3 back).

Results: Groups were equivalent on age, gender, years of education and estimated intelligence. ANOVA reported differences in total learning scores, free immediate recall and free delayed recall from the CVLT-II and reaction time from the 2-back test. Post-hoc tests revealed that participants with morbid obesity performed worse than lean participants in the three variables of the CVLT-II. In addition, this group performed worse than mild-to-moderate obese participants in free delayed recall (CVLT-II) and reaction time from the 2-back test.

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Conclusions: The present results suggest that morbid obesity is a condition that relates to poorer cognitive outcome in tasks implying prefrontal functions. The consideration of different subtypes of obesity may be crucial in order to understand its possible cognitive implications.
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H. HJELMERVIK, R. WESTERHAUSEN, B. OSNES, C.B. ENDRESEN, K. HUGDAHL, M. HAUSMANN & K. SPECHT. Intra-individual differences in cognitive control across the menstrual cycle assessed with the dichotic listening paradigm.
Objective: Introduction
Estradiol is found to modulate lateralization. Additionally, it has been suggested that estradiol enhances cognitive control. The current study aims to investigate dichotic listening across the menstrual cycle and thereby targets both lateralization (non-forced condition) and cognitive control (modulation of the ear advantage in the forced left condition) within the same paradigm.
Participants and Methods: Fifteen male and fifteen female subjects were tested three times within a month period, whereby the women were tested in their menstrual, follicular, and luteal phase. Stimuli involved six consonant-vowel syllables (36 combinations) dichotically presented. Three different instructions were used: Non-forced (NF) to report the sound heard best; Forced right (FR) to report from right ear; Forced left (FL) to report from left ear. A repeated measures ANOVA (sex, phase and condition) was conducted with laterality indexes (LI) as dependent variable.
Results: An interaction of sex, phase, and condition was found ($F(4, 112)=2.53$; $p=0.044$, $\eta2=0.08$). Only for the FL condition a post-hoc ANOVA yielded a significant sex×phase interaction ($F(2,56)=3.95$; $p=0.025$, $\eta2=0.12$), which was due to significant differences between the follicular phase and the two other phases in the female group. A negative correlation ($r= -0.71$, $N=15$, $p<0.01$) was found between the change in FL LI and the change of estradiol levels from the follicular to the menstrual phase.
Conclusions: The study found no change in lateralization per se across the menstrual cycle, but rather that only the attentional modulation in the FL condition was affected. This reduction in LI in the follicular phase was also negatively correlated with the increase in estradiol, which indicates that estradiol enhances cognitive control. The study also emphasizes the importance of considering cognitive control demands of a given task when lateralization across the menstrual cycle is being investigated.
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A. HOVLAND, S. PALLESEN, ÅSA. HAMMAR, A.L. HANSEN, J.F. THAYER, M.P. TARVAINEN & I.H. NORDHUS. The Relationships among Heart Rate Variability, Executive Functions, and Panic-Related Variables in Patients with Panic Disorder.
Objective: Heart rate variability (HRV) is reduced in patients who suffer from panic disorder (PD). Reduced HRV is related to hypoactivity in the prefrontal cortex (PFC), which negatively affects executive functioning. The present study assessed the relationships between vagally mediated heart rate variability at baseline and measures of executive functioning in patients with panic disorder. Associations between these physiological and cognitive measures and panic-related variables were also investigated.
Participants and Methods: 36 patients with PD were assessed. Vagally mediated HRV was measured using HF-power (ms2), and executive functions were assessed with the Wisconsin Card Sorting Test (WCST) and the Color-Word Interference Test (CWIT) from the Delis-Kaplan Executive Function System (D-KEFS). Panic-related variables comprised frequency of panic attacks, panic-related distress and disability, and duration of PD.
Results: Significant correlations between performance on the neuropsychological measures and vagally mediated HRV were found; specifically, performance was positively related to HRV. Both panic-related distress and duration of PD showed significant and inverse relationships with both measures of HRV as well as with measures of cognitive inhibition.
Conclusions: Clinical development of PD is related to physiological functioning and cognitive inhibition. The current findings support the purported relationship between vagally mediated HRV and executive functioning involving the prefrontal cortex.
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A. JANSARI, C. EDMONDS, R. GORDON, U. NWOSU & T. LEADBETTER. Towards a Novel Ecologically-Valid Assessment of Executive Functions in Children and Adolescents: Could Virtual Reality be the Answer?
Objective: Childhood and adolescence is a time of rapid cognitive change. As the prefrontal cortex expands, associated improvements in executive functions are especially marked. Most executive function assessment is laboratory based. JAAM© provides a novel ecologically-valid assessment of executive functions in adults using virtual reality to assess impacts of traumatic brain injury and chemicals such as alcohol and nicotine (Jansari, 2011). The current study aimed to develop and evaluate a children's version, (JAAM-C©) to assess executive function in children and adolescents in an ecologically valid setting.
Participants and Methods: JAAM-C© was designed to assess eight cognitive constructs; planning, prioritisation, selection, creative-thinking, adaptive-thinking, action-based prospective memory (PM), event-based PM and time-based PM. Resembling a computer game, participants roleplay, running their own birthday party. Thirty typically-developing children aged 10-12 (5F, 7M), 13-15 (3F, 6M) and 16-18 (5F, 4M) completed JAAM-C©.
Results: Significant positive correlations of age with prioritisation, event and time based PM and total score were found. Further, a one-way MANOVA on performance revealed a significant multivariate main effect of age (Wilks' $\lambda = .151$, $F(18, 38) = 3.3$, $p < .005$). Therefore, JAAM-C© demonstrated a robust ability to accurately identify differences in individual cognitive constructs and overall executive function as a function of age during adolescence.
Conclusions: JAAM-C© offers a thorough assessment of executive function and its developmental trajectory providing a detailed profile across a range of cognitive constructs that current assessments cannot. Further, it is the first ecologically valid tool for assessing executive functions in childhood and adolescence. There is potential to use JAAM-C as an assessment tool for typical and atypical development or executive dysfunction due to traumatic brain injury.
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H. KAFADAR. Mental Flexibility, Reasoning, Focused Attention, Planning and Fluid Intelligence: A Latent Variable Approach.
Objective: Executive function and fluid intelligence, problem-solving ability to contain the definition of these two concepts in common. For this purpose, WCST, Stroop, the relationship between LK and RSPM, tried to be examined in this study, the literature is intended to be additive in this respect. In order to analyze different aspects of the relationship between both concepts, the research carried out and the relationship between tests were analyzed by means of structural equation modeling (SEM).
Participants and Methods: 78 healthy university students as subjects participated in this study. RSPM, WCST, Stroop TBAG version and the TOL was used as measuring tool. RSPM applied as a group, WCST, Stroop TBAG and TOL were applied in the individual sessions.
Results: According to the research hypotheses, the data obtained were analyzed by means of structural equation modeling, the findings showed that significant values of harmony. Coefficients between these indicators and latent variable shown in SEM: $X2=75.06$, $df=47$, $p=.005$, $X2/df=1.60$, $CFI=.97$, $RMSEA=.08$, $NFI=.93$ $PNFI=.56$, $PCFI=.58$.
Conclusions: According to the findings from the research WCST, concept formation, and consolidated the rule of the participant to leave and find a new rule to measure whether or not flexible enough. Fluid intelligence in measuring RSPM participant to solve the problem and establish the concept and application of this test to find the correct answer should reflect the mental flexibility to be successful. These two processes also involves focused attention and a successful planning process. Executive functions, is a reflection of general intelligence, executive functions, which suggests that individual differences represent the considered opinion is supported.

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D. BERTENS, D. BOELEN, L. FASOTTI & R.P. KESSELS. Ecological Validity and Reliability of a Modified Six Elements Test.

Objective: Ecological valid tasks such as the Six Elements Test are widely used to assess executive impairments. However, its predicting value for everyday executive function is unclear. Furthermore, measuring changes over time could be influenced by learning effects. The objective of this study is to examine ecological validity, test-retest reliability and parallel-forms reliability of two newly designed parallel forms of a modified Six Elements Test (MSET) to contribute to a better assessment of executive functioning of patients in neuropsychological rehabilitation.

Participants and Methods: Thirty healthy adults enrolled in the study (8 males, mean age: 31.6, sd 13.3, mean estimated IQ: 108.3, sd 4.3). Both parallel forms of the MSET were administered with a 1-2 week interval. To examine executive functioning in daily life the Executive Function Index (EFI-NL) self-report questionnaire was administered as well. MSET's ecological validity was examined by correlating its test scores with the EFI-NL. Both the test-retest reliability and the parallel-forms reliability were evaluated calculating smallest detectable differences (SDD).

Results: Results showed a moderate correlation between the MSET scores and the EFI-NL (r=.34). Test-retest reliability was adequate (p=.318, SDD=26.61). Parallel-form reliability was sufficient (p=.035, SDD=24.97). None of the participants' performance crossed the SDDs.

Conclusions: The present study shows that self-reported executive functioning in healthy adults correlates with the performance on a complex planning task, indicating accurate ecological validity of this test in this sample. Test-retest reliability and parallel-forms reliability are sufficient to measure executive functioning over time. Future research will focus on the validity between the MSET and everyday executive dysfunction in patients.

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Y. MEGURO, K. HIRAYAMA, T. TSUKIURA, H. WATANABE & T. FUJII. A Case of Nurturing Syndrome Caused by Bilateral Frontal Lobe Hypoperfusion after Subarachnoid Hemorrhage.

Objective: Nurturing syndrome is a delusional behavior in which patients take care of dead person as if dead person is still alive. To date, this syndrome was reported in patients with neurodegenerative pathology such as Alzheimer's disease (AD) or Dementia with Levy Body disease (DLB). We report a patient who showed the nurturing syndrome after subarachnoid hemorrhage.

Participants and Methods: The patient was a 64-year-old right-handed woman who underwent a clipping surgery of an aneurysm for the treatment of subarachnoid hemorrhage. After discharge, her main complaint was that she often felt that her farther-in-law (already dead), her sister-in-law (already dead), and her son (living in another town) were coming up in a room on the second floor of her house. In her actual life, she provided meals for them. We conducted comprehensive neuropsychological assessments and neuroradiological examinations.

Results: On the WAIS-R she showed the verbal IQ of 102, the performance IQ of 88, and the full IQ of 96, which was within normal range. On the other hand, she showed impaired memory function; WMS-R yielded General Memory Index (MI) of 66, Verbal MI of 65, Visual MI of 83, and Delayed recall of 70. In addition, she showed mild frontal lobe dysfunction on the verbal fluency test, the Trail Making test, and the Behavioural Assessment of the Dysexecutive Syndrome (BADS). Brain CT revealed a low density area in bilateral orbitofrontal region. IMP-SPECT showed reduction of blood flow in the frontal are bilaterally.

Conclusions: Although the Nurturing syndrome was so far reported in patients with AD or DLB degenerative dementia, the present report demonstrate that the Nurturing syndrome was caused not only by neurodegenerative disease but also by other etiologies including SAH. This delusional syndrome might result from the combination of episodic memory deficits with reality monitoring deficits due to the frontal lobe damage.

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C.V. MENON, D. JAHN, C. MAUER & S. O'BRYANT. Executive Functioning as a Mediator of the Relation Between Reading Ability and Health Risk Behaviors in Rural-dwelling Cohort: A Project FRONTIER Study.

Objective: Health risk behaviors have been shown to influence neurocognitive decline, yet research has not investigated the reverse impact of neurocognitive impairment on health risk behaviors in multiethnic elderly populations. This cross-sectional study examined the relationship between reading ability (AMNART), executive functioning impairment (EXIT25), and health risk behaviors including alcohol use (AUDIT), smoking, compliance with recommended cancer screenings, and obesity (BMI).

Participants and Methods: Data were analyzed from a sample of 456 English-speaking, non-Hispanic White and Hispanic participants recruited as part of Project FRONTIER, an ongoing epidemiological study of health among rural-dwelling individuals. Regression analyses were conducted to test the indepedent effects of executive functioning and reading ability on health risk behaviors, as well as the mediating role of executive functioning between reading ability and health risk behaviors.

Results: Results supported the hypothesized mediating role of EXIT25 on relations between AMNART and smoking and AMNART and cancer screenings in both cognitively impaired and healthy subgroups. Follow-up analyses comparing the relative predictive value of AMNART and years of education revealed that AMNART is a stronger predictor of these constructs.

Conclusions: This study advances knowledge regarding the relations between executive functioning, reading ability, and health risk behaviors in diverse groups, and also confirms that reading ability may represent a stronger predictor of health and neurocognitive outcomes than years of education. Overall it appears that both reading ability and executive functioning affect health risk behaviors, and that executive functioning does act as a mediator of relations between reading ability and certain health risk behaviors.

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X. ORTIZ, A. GARCÍA, C. RAMÍREZ, M. GUERRERO & P. VALDEZ. Cognitive Inhibition and Flexibility in Children and Adolescents.

Objective: Cognitive inhibition and flexibility are two components of executive functions that depend on the development of the frontal lobe. The objective of this study was to determine developmental changes in cognitive inhibition and flexibility in children and adolescents using a Stroop task.

Participants and Methods: Participants were 514 children and adolescents (8-19 years of age), 211 male and 303 female, with no history of neurological, psychiatric or developmental disorders. The Stroop task used in this study contained 48 words printed in incongruent colors. A random half of the words had a point on the left. Participants were required to do four actions: (1) read the words, (2) name the color in which the words were printed, (3) read the words marked with a dot and name the color of the unmarked words, and finally (4) name the color of the words marked with a dot and read the unmarked. The time required to name the color was considered an index of inhibition, while the time required to perform the last two sections (changing criteria) was considered an index of flexibility.

Results: Time to read the words decreased with age until they were 12 years old ($F=67.02$, $df=5$, $p<0.05$). Time to name the color decrease with age until 16 years of age ($F=94.13$, $df=5$, $p<0.05$), and time to perform the last two sections (changing criteria) decreased until 14 years of age ($F=64.63$, $df=5$, $p<0.05$).

Conclusions: The highest developmental level for each component of executive functions was attained at a different age: cognitive inhibition reached this level at 16 years of age, while flexibility reached this level at 14 years of age.

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S. SIGURDARDOTTIR, N. ANDELIC, E. WEHLING, C. ROE, T. ADER & A. SCHANKE. Olfactory dysfunction in relation to set-shifting performance after severe traumatic brain injury: A Norwegian population-based study.

Objective: Olfactory dysfunction (complete or partial loss of smell) is a common effect of severe traumatic brain injury (TBI) and may reflect problems with executive functions. This study investigated odor identification in patients with severe TBI one year after injury. We hypothesized that patients with olfactory dysfunction would show greater deficits on set-shifting tasks compared with patients with normal smell function.

Participants and Methods: Preliminary neuropsychological data are available for 59 participants (aged ≥16 years) admitted to trauma centres in Norway in 2009. A comparison was made of two groups with severe TBI that differed with respect to odor identification measured by the Brief-Smell Identification Test (B-SIT). Patients with normal smell function (B-SIT>8) and olfactory dysfunction (B-SIT<9) were administered the Trail Making Test (TMT), Color-Word Interference Test (CWIT), and Verbal Fluency/Switching tasks of the Delis-Kaplan Executive Function System.

Results: The two groups were comparable in age, gender, education, and injury severity. Results indicated that patients with olfactory dysfunction (n=18) performed significantly slower on the Number-Letter Switching condition of TMT (t[57]=3.1; p=0.003) and made more Errors on the Inhibition/Switching condition of CWIT (t[57]=2.6; p=0.01) relative to patients with normal performance (n=41). The Inhibition/Switching condition of CWIT showed a near-significant difference between the groups (p=0.06). In addition, odor identification score was positively correlated with the Number-Letter Switching performance on TMT (r= .54, p<.001), Errors on the Inhibition/Switching condition of CWIT (r= .41, p=0.004), and Inhibition/Switching performance on CWIT (r= .35, p=0.008).

Conclusions: Olfactory dysfunction after severe TBI appears to be associated with deficits in set-shifting and support the notion of more severe executive dysfunction in this group. Olfactory dysfunction seems to be a non-cognitive marker of subsequent impairment of executive functions.

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K. SØRENSEN, J.R. LIVERØD, B. LERDAL, I.E. VESTRHEIM & J. SKRANES. Program Intensified Habilitation - Strenghtening Executive Functions In Preschool Children With Cerebral Palsy.

Objective: Limited research has been done concerning training of executive functions in preschool children with cerebral palsy (CP). In Program Intensified Habilitation (PIH) at Sørlandet Hospital, Kristiansand, preschool children with CP and their parents receive a multimodal intensive habilitation intervention during four inpatient group training sessions of 1-2 weeks during the program period of one year. The focus of intervention for the children is motor, communication and executive functions skills. Studies show that impairments in executive functions and attention are common in children with CP (Bottcher et al, 2009). This study aims to find if the PIH intervention is likely to strengthen executive functions skills among children with CP.

Participants and Methods: From 2007 to 2011 children with CP (age 3-5), mainly spastic unilateral type, have been assessed before and after PIH, using the Behavior Rating Inventory of Executive Functions – Preschool version (BRIEF-P). Parents and preschool teachers / assistants (total n=30) have filled out the questionnaire twice.

Results: Results show a relatively low level of executive skills difficulties among the participants. Nevertheless, after participation in PIH paired samples analysis shows a significant decrease on the "Shift" and "Plan / Organize" subscales of the BRIEF-P. Details of these findings will be presented at the INS Midyear Meeting 2012.

Conclusions: The results indicate that it is possible to strengthen executive functions skills at this early neurobiological stage of executive functions development. A focus on executive functions during the preschool years can identify an important difficulty among preschool children with CP. Realising the importance of executive skills in social participation, communication and academic settings, a focus on strengthening these functions for children with CP could prevent several secondary difficulties later in life, not related to the motor or communication challenges.

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Symposium: Accelerated Long-term Forgetting in Patients with Epilepsy.

Chair: Suncica S. Lah

Discussant: Laurie Miller

9:45–11:15 a.m.

S.S. LAH, L. MILLER, S. LAH, M. GASCOIGNE, Z. THAYER, M. RICCI & A. JANSARI. Accelerated Long-term Forgetting in Patients with Epilepsy.

Symposium Description: Accelerated long-term forgetting (ALTF) is characterised by rapid forgetting of recently learned information over long delays despite normal retention over short delays typically employed on clinically used memory tests. Underpinings of ALTF are poorly understood, and assessment procedures are underdeveloped. This symposium presents a set of papers examining cognitive mechanisms and pathophysiology of ALTF as well as newly developed assessment procedures that may increase diagnostic accuracy in a clinical setting.

It has been proposed that in patients with epilepsy, ALTF may be secondary to (i) the mesial temporal seizure focus/pathology, (ii) seizures disrupting the interaction between the mesial temporal and neocortical sites and/or (iii) the presence of pathology in the neocortical storage sites. These hypotheses have been assessed in studies of long term memory formation in children and adults with generalised and partial (temporal and extratemporal) epilepsy presented by Lah and Gascoigne. Moreover, Thayer examined the role of clinical and subclinical epileptic discharges on ALTF in patients with epilepsy who underwent continuous ambulatory EEG monitoring and cognitive testing concurrently. Development of new tasks is essential for research into ALTF, and for accurate clinical diagnosis. Ricci and Jansari considered which task features are critical for detection of ALTF. In addition, while Ricci examined how ALTF relates to recall of information from the past, Jansari developed a new assessment tool that has a potential to capture the rapid forgetting within a single clinical session.

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S. LAH, A. MOHAMED, Z. THAYER, L. MILLER & K. DIAMOND. Accelerated Long-term Forgetting of Verbal Information in Patients with Temporal and Extratemporal Partial Epilepsy.

Objective: Long-term memory formation requires interaction between temporal and extratemporal cortical networks, yet to date, accelerated long-term forgetting (ALTF) has been attributed to seizure foci in the temporal lobes. We investigated the impact of site of epilepsy focus (temporal or extratemporal) and length of delay on recall of a word list learned to criterion.

Participants and Methods: In this prospective study patients with partial epilepsy [temporal (TLE, n=23), extratemporal (ETLE, n= 15)], and healthy control subjects (NC, n=29) completed a test of verbal learning (to criterion), short- (20-30 minutes) and long-term (1 and 7 days) recall. The percentage of words recalled relative to the last learning trial was used as a measure of retention.

Results: A repeated measures (Group x Delay) ANOVA revealed a significant interaction (F = 5.69, p<.01). Post-hocks showed significant between group differences at long, but not short delays: TLE < NC at 1 day and TLE & ETLE < NC at 7 days. In the TLE group, the percentage of words recalled dropped significantly after 1 day (and remained low at 7 days), relative to 30 min. In the ETLE group, a drop in the percentage of words recalled was gradual, reaching significance after 7 (but not 1) days compared to 30 min. The effects of length of

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delay ($F(1, 64) = 33.16$, $p < .01$) and group ($F(2,64) = 5.72$, $p<.01$) were also significant. Significantly fewer words were recalled after long delays (1 and 7 days) compared to the short delay. Both epilepsy groups recalled a significantly smaller percentage of words compared to the NC group.
Conclusions: Our study provides evidence of ALTF in patients with extratemporal partial epilepsy, similar to temporal lobe epilepsy. This is consistent with the notion of distributed necortical networks participating in long-term memory formation. Moreover, it highlights that memory tests which employ only short delays can lead to under-diagnosis of impairment, especially in patients with extratemporal epilepsy.
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Z. FITZGERALD, Z. THAYER, J. BOSERIO, A. MOHAMED & L. MILLER. Examining the Role of Epileptiform Activity and Sleep in Accelerated Long-term Forgetting.
Objective: The current study aimed to investigate Accelerated Long-term Forgetting (ALF) in epilepsy patients undergoing continuous ambulatory electroencephalography (EEG) monitoring to determine the relationship between EEG characteristics and the magnitude of memory consolidation failure.
Participants and Methods: EEG, sleep and memory data were collected from 41 patients who were diagnosed with epilepsy or probable epilepsy and who underwent 5 days of continuous EEG monitoring. Fifteen healthy control subjects were assessed neuropsychologically. Participants were taught a word-list and a design-list to criterion. Recall of both lists was tested at 30 minutes, 1 day and 4 days.
Results: The significance of differences between groups was assessed with independent-sample t tests and analysis of variance (ANOVA) with Bonferroni-adjusted post hoc tests when appropriate. Two separate repeated measures ANOVA's were used to analyse group differences across time delays on the two memory tests: Group x Time interactions (Words: $F=2.34$, $p=.044$; Designs $F=3.17$, $p=.007$) showed ALF for verbal and nonverbal material in patients who had generalised discharges. Patients with normal EEGs over the study period did not demonstrate ALF on either task. The Occurrence of overt seizures also showed no association with ALF. Pearson correlations were used to examine sleep variables and memory performance at 24 hours. Analyses of aspects of sleep architecture and quantity of discharges during sleep revealed no association with retention over the first 24 hour post-learning period. Patients who took a daytime nap retained more of the designs over the first 24 hours than those who did not nap ($F=5.74$, $p=.02$). Naps did not influence word retention.
Conclusions: Overall, the results indicate that ALF in epilepsy correlated with subclinical discharges but not overt seizures or sleep disturbance.
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A. JANSARI, T. MCGIBBON & N. KAPUR. Attempting to Capture Accelerated Long-term Forgetting (ALF) within One Clinical Visit: Towards a New Assessment of ALF.
Objective: Accelerated Long-term Forgetting (ALF) has typically been evaluated using paradigms that require repeated recall of the same materials during multiple testing sessions, therefore requiring that the patient attend a clinic on multiple occasions. This creates a problem in clinical practice as it is often difficult to see a patient on two successive days. The primary aim of the current study was to develop a new, sensitive assessment tool that could capture the rapid forgetting within one clinical visit. Research has demonstrated the benefit of repeated recall on 'protecting' memories in a patient with marked ALF (Jansari et al., 2010). A secondary aim of the current study was to further investigate this benefit.
Participants and Methods: In this single-case study a novel paradigm requiring learning of word-pairs to criterion followed by later cued-recall was used. Some word-pairs were recalled only once; others were recalled at multiple time-points. Analysis compared memory for repeatedly and non-repeatedly recalled material. The performance of a patient, RY, with temporal lobe epilepsy and well-documented ALF was compared against that of five age and IQ-matched healthy controls.
Results: Analysis used Crawford and Garthwaite's (2002) method of comparing a single case with a group of control participants. It was found that for repeatedly-recalled material RY's performance was the same as that of the controls. However, for material that was not repeatedly-recalled he was significantly impaired within one hour of presentation.
Conclusions: It is concluded that while current clinical tests are unable to capture ALF this may be possible, at least in some classes of patients, with this new paradigm. This new assessment could therefore have implications for detecting deficits within one clinical visit. Replication in other ALF patients is required in further studies.
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R. MONICA, G. SAVAGE & L. MILLER. Considering the Impact of Stimulus Modality, Stimulus Type and Encoding Condition on Rate of Longer Term Forgetting in Patients with Epilepsy.
Objective: Memory decay seems to depend on factors such as type of material and level of encoding. This study explored these factors in patients with epilepsy in order to aid interpretation of studies of accelerated long-term forgetting.
Participants and Methods: We enrolled 16 right-handed subjects with epilepsy. We assessed rates of forgetting (over delays of 30min, 24h and 4 days) for verbal and visual material on two new tasks (Face-Facts Associations [FFA] and Stories), each presented in single exposure and learned-to-criterion encoding conditions. Retention of associations and individual details were scored separately. Moreover, we assessed past memory for events and names of people using an Autobiographical Fluency test (AF) to see how anterograde memory scores related to retrograde memory.
Results: A 3-way ANOVA showed an interaction between stimulus modality, encoding condition and delay ($F=4.02$ $p<.03$). Post-hocs revealed a drop at 24h ($p<.05$) of FFA-learned-to-criterion information, but rate of forgetting on the other tasks (Stories on both conditions and FFA-single-exposure) did not differ from what they had learned initially. A 2-way ANOVA between type of material (associations vs individual items) and recall delay showed no interactions, but there was a main effect of type of material ($F=61.03$ $p<.0001$) (associations lost faster than individual details) and delay ($F=5.16$ $p=.01$). Significant correlations were found between AF score for events and single-exposure task retention at 24h ($p<.03$) and 4d ($p<.05$).
Conclusions: Stimulus modality (verbal vs visual), encoding condition (single exposure vs learned-to-criterion) and type of material (associations vs individual items) all influence the rate of forgetting seen over longer delays in patients with epilepsy. Interestingly, anterograde memory for information learned from a single exposure was found to correlate with retention of one-off autobiographical events but not autobiographical name fluency.
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M. GASCOIGNE, R. WEBSTER, B. BARTON, D. GILL, M.L. SMITH, J. ANTONY & S. LAH. Accelerated Long-Term Forgetting in Children with Epilepsy.
Objective: Research on accelerated long-term forgetting (ALTF) has largely focussed on adults with temporal lobe epilepsy (TLE), with relatively little attention given to children. This study aimed to determine the extent of ALTF in children with generalised or partial epilepsy.
Participants and Methods: The study included 35 children with epilepsy [idiopathic generalised epilepsy (IGE, n=23), and temporal lobe epilepsy (TLE, n=12)] and healthy control subjects (NC, n=41), matched on sex distribution, age and SES, but not IQ (IGE and TLE < NC). Participants completed a battery of neuropsychological tests, including learning a list of words to criterion. They were asked to (i) recall the words after short (2 and 30 min) and long (7 days) delays, and (ii) recognize the words after the long delay.
Results: A two-way analysis of covariance (group x time, using IQ as a covariate) found a significant interaction ($p < .05$), a main effect of delay ($p < .001$) but not group. Planned contrasts revealed no between group differences in the reduction of the proportion of words recalled from the 2-min to the 30-min delay. However, compared to the control

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group, the IGE participants (but not the TLE participants) displayed a significant drop in the proportion of words recalled at the 7-day ($p < .01$) relative to the 30 min delay. Both the IGE ($p < .01$) and TLE ($p < .001$) groups made significantly more recognition errors compared to the control group following a 7-day delay.
Conclusions: Surprisingly, ALTF was evident in children who had generalised rather than partial epilepsy, which (i) suggests that generalised seizures may disrupt long-term consolidation, and (ii) raises a possibility that unilateral partial temporal epilepsy may not impact consolidation to the same extent as it does in adults.
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Invited Symposium: Is There Any Hope: Rehabilitation and Brain Plasticity of Frontal Function

Co-Chairs: Donald Stuss, Robert Knight

9:45–11:15 a.m.

D.T. STUSS, R.T. KNIGHT, L. NYBERG, B. VOYTEK & G.R. TURNER. Is There Any Hope: Rehabilitation and Brain Plasticity of Frontal Function.
Symposium Description: This symposium will address practical issues related to rehabilitation of the functions of the frontal lobes, with an emphasis on "executive" functions. There is growing emphasis on the need for development of rehabilitation methods for this brain region, and for understanding the potential mechanisms underlying any efficacy. Thee scientsts will approach the question from three different perspectives. Dr. Brian Levine will provide data on a very practical rehabilitation approach, called Goal Management Training, as related to studies in various populations: aging, traumatic brain injury, focal brain lesions due to stroke or tumour, multiple sclerosis and post-ICU patients. Dr. Lars Nyberg, focusing on an elderly population, addresses a potential mechanim for successful aging related to brain plasiticity. He proposed that enhanced dopaminergic neurotransmission might be an important factor related to the efficacy of cognitive training in older inidividuals. Finally, Dr. Brad Voytek examines a different potential brain plasticity mechanism for improved performance, namely the critical role of the prefrontal cortex to coordinate neuronal processing via modulation of firing rates. Drs. Stuss and Knight will lead an interactive discussion to determine the potential value of these approaches.
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L. NYBERG. A frontal-lobe workout — effects on brain maps and neurotransmission.
Objective: Analyses of inter-individual differences in cognitive performance reveal substantial heterogeneity within the aging population, and brain imaging data suggest that stable rather than declining cognitive functioning is correlated with a "youth-like" brain response. Transitions in the positive direction (i.e. higher performance with increasing age) are rare, but investigations of the effects of directed training show evidence for plasticity in older age. Recent evidence, including results from our group, indicates that one basis for improved cognitive performance after cognitive training could be enhanced dopaminergic neurotransmission. The objective of this work was to examine plasticity of the dopamine D2 system.
Participants and Methods: We used PET and the radioligand raclopride, in conjunction with an updating task, to examine striatal responsiveness before and after 5 weeks of executive functions training, focusing on the ability to update information in working memory. Neuropsychological tests were administered to see whether the training generalized to untrained tasks.
Results: A robust training effect (trained participants > controls) was observed, along with a selective transfer effect to an n-back test of working memory. Updating was found to modulate dopamine D2 binding potential. Critically, 5 weeks of updating training had a significant effect on D2 binding.
Conclusions: These molecular imaging cognitive-training findings will be related to observations of age-related reductions in the responsiveness of the striatal dopamine system to cognitive challenges. Collectively, these findings support the notion of a key role of the fronto-striatal system in cognitive aging, and suggest that targeting the dopamine system is central in attempts at neurorehabilitation in older age.
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B. VOYTEK. The role of neocortical oscillations in coordinating prefrontal functions.
Objective: The prefrontal cortex (PFC) is a critical node in a dynamic, distributed network of brain regions that coordinate information to give rise to complex cognitive processes such as working memory and attention. These behaviors require flexible and dynamic communication between groups of neurons within the PFC, as well as between frontal, subcortical, and sensory regions.
There is a disconnect, however, between our understanding of neocortical physiology and human cognition. By using a variety of techniques including patient psychophysiology, electrophysiology, and computational methods, I outline a physiological framework for PFC functioning wherein neocortical oscillations coordinate neuronal processing via modulation of firing rates.

Results: Across a series of experiments I show that a fronto-striatal network is critical for attention and working memory functions, but that patients with PFC damage compensate via dynamic recruitment of the intact, homologous PFC. These patients show abnormal alpha activity over the visual cortex in the damaged hemisphere, suggesting a long-range, top- down impairment in network oscillatory activity caused by the PFC lesion.
In another experiment, I show that phase/amplitude coupling (PAC) has a preferred coupling frequency in the alpha range in visual cortex, but in the theta range in the PFC. Such PAC is thought to originate via subthreshold shifts in the extracellular membrane potential that bias local neuronal firing probability.
In a final experiment, I show that phase coupling between groups of PFC neurons is associated with PAC at those same sites. This provides a physiological mechanism for PFC functioning wherein long-distance phase coupling coordinates local neuronal firing rates in a behaviorally relevant manner.
Conclusions: These findings have profound implications for our understanding of frontal plasticity, one wherein neuronal oscillations act to dynamically route information between brain regions, as needed, for given task demands.
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G.R. TURNER. Rehabilitation Of Executive Functioning Using Goal Management Training.
Objective: Deficits in executive functioning are a common and costly consequence of brain disease, yet there are no standardized interventions for such deficits. Goal Management Training (GMT) intended to reduce absentminded slips and difficulties with impulsivity, problem solving, and decision making that are common in patients with brain disease or unhealthy aging. It is fundamentally based on theories of attention - especially sustained attention - which supports performance on a variety of tasks and is compromised by damage to the frontal lobes as well as distributed brain damage. A frequent cause of functional deficits in these patients is failure to interrupt ongoing behavior when it is driven by environmental contingencies or habit that oppose higher order goals. A canonical everyday example is having to take a different route on the way home from work to deliver a letter, but instead taking the usual route home out of habit. While such slips are not necessary pathological, they create a serious functional deficit in patients' day-to-day activities. Thus the fundamental skill trained in GMT is to STOP the "automatic pilot" and ask, "What am I doing?"

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Participants and Methods: This presentation will review applications of GMT in aging, traumatic brain injury, focal brain lesions due to stroke or tumour, multiple sclerosis and post-ICU patients.
Mindfulness practice is introduced as a method to bring trainees' attention to the present so that they can evaluate their goal hierarchies and act accordingly in the face of distraction or habit that can take one off the intended path.

Conclusions: GMT is an effective method for reducing absentminded slips and difficulties with impulsivity, problem solving and decision making in a number of patient groups with "executive" dysfunciton.
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Invited Symposium: Pediatric Neurorehabilitation

Co-Chairs: Lucia Braga, George Prigatano

9:45–11:15 a.m.

L.W. BRAGA & G. PRIGATANO. Pediatric Neurorehabilitation.
Symposium Description: This symposium, on Pediatric Neurorehabilitation, addresses the challenges, changes and needs of children and preadolescents with acquired brain injury. The topics of discussion will focus on the parent-child relationship and ways to help the preadolescent with ABI prepare for the future.
Dr. George Prigatano will address the importance of parental involvement in the achievement of meaningful rehabilitation goals. He discusses the compliance issues that accompany the challenge of involving families in their child's rehabilitation, and how to overcome them. The alliance between parents and therapists, significant to the recovery of the child, is also a focus of his presentation. Dr. Prigatano discusses how that alliance must be based on a firm understanding of what the parent-child relationship is after brain injury.
Dr. Lucia Braga focuses on how developing metacognition aids the preadolescent with brain injury develop better self-concept, self-regulation and improved behavior, thereby leading to empowerment in social relationships, so necessary during this crucial time of development. Dr. Braga discusses the changes in family relationships at the start of adolescence, and how teenagers and preteens can better deal with the consequences of the injuries that remain latent until this period of development, when new challenges arise in the individual's life.
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G.P. PRIGATANO. The parent-child relationship after acquired brain injury: Implications for neuropsychological rehabilitation.
Objective: Neuropsychologists involved in various forms of brain injury rehabilitation for children have long recognized the importance of parental involvement to facilitate recovery and to achieve meaningful rehabilitation goals. Braga et al. (2005) and Butler et al. (2008) have demonstrated the importance of family involvement to maximize rehabilitation outcome.
Getting parents involved in their child's neuropsychological rehabilitation after brain injury, and specifically helping parents and the child comply with various rehabilitation activities can be a daunting task. Psychotherapy with adults who have brain injury has emphasized the importance of the working alliance in order for the patient to comply with treatment interventions and to maximize outcome (Prigatano, 1999). Yet, the literature on neuropsychological rehabilitation of children has not adequately discussed the importance of the therapeutic alliance with the parents. Also, it does not provide guidelines for how this alliance can be established in light of understanding the parent-child relationship.
This workshop will review typical problems that the clinical neuropsychologists face when understanding the parent-child relationship after brain injury and involving parents in their child's rehabilitation. Causes of parental distress also will be outlined. The importance of understanding and working with the parent-child relationship in order to facilitate active engagement in neuropsychological rehabilitation will be demonstrated via clinical examples.
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L. BRAGA. Empowering preadolescents with ABI through the development of metacognition: Metacognitive Dimension.
Objective: Children and adults with ABI and their families face many challenges, each unique to the stage of development – or stage of life – of each individual. Although there are numerous studies on both populations, little has been published about preadolescents in particular. This is a unique time in terms of both neurodevelopment and social exploration, with behavioral paradigms shifting in ways that can be bewildering to parents and preteens themselves. New demands/needs surface that require special attention and ABI multiplies these challenges. We present an approach aimed at empowering preadolescents with ABI through the development of metacognition in a project called Metacognitive Dimension. This method was evaluated by an RCT study, with control and experimental groups. Results show that six months of intervention based on cooperative learning and metacognition helped preadolescents with ABI in the experimental group develop metacognitive strategies, improve self-concept, and attain better behavioral self-regulation, helping empower them in social relationships. We also address how to better deal with injuries that occur early in life and can remain latent until preteen and teenage years.
The Metacognitive Dimension involves activities performed after school in pairings/groups, led by college students overseen by qualified professionals in the rehabilitation field. There are support groups for parents and time allocated to family participation. Self-concept and exploring ways to regulate behavior and impulse control are addressed; exercises targeting these skills are developed. It is important for preteens with ABI to receive adjusted rehabilitation that focuses on their changing needs, their bodies and how they view the world. Families also need to accompany these shifts, as it can be difficult for siblings and parents of this preadolescent population to contend with the many challenges that the development into full adolescence can bring.
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Poster Session 5: Behavioral Neurology, Cross Cultural, Cancer, Toxin-Related Disorders, Emotional Processes, Genetic Disorders, Stroke/Aneurysm

10:00–11:30 a.m.

Behavioral Neurology

S. ALDAVOOD, N. ERAM & M. BITARAF. Anxiety Is Most Common Behavioral Problems In Dogs.
Objective: One of most important reason for animals keeping at home is behavioral problems. Behavior problems in cats and dogs manifest themselves in many ways: excessive barking, destructive chewing or scratching furniture, inappropriate urination, aggressiveness, digging, and spraying are just some of the ways animals act out. Nervousness, separation anxiety, fear of loud noises such as fireworks and thunderstorms, stress and general anxiety are common in many pets and can lead to unwanted behavior.
Participants and Methods: In this survey, some demographical information (such as pet breed, sex, age, nutrition status, history of parturition, owner's name, address and phone number), some behavioral problems (such as inappropriate elimination, aggression, fear an anxiety, problems in activity patterns) and some predisposing risk factors (such

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as diet and sleeping problems, moving to a new place, changing the owner and introduce new pet to family), in 90 dogs (32 males and 58 females) referred to the Small Animal Teaching Hospital of Faculty of Veterinary Medicine, University of Tehran from Jan. 2010 to Oct. 2011 were recorded by questionnaire.
Results: Mixed Terrier dogs were the most breed that referred to the Small Animal Teaching Hospital of Faculty of Veterinary Medicine, University of Tehran. 64 dogs had at least one of four behavioral problems. Major problem in patients were: 36 dogs had fear an anxiety, 17 dogs with aggression, 8 dogs showed inappropriate elimination and 3 dogs had inappropriate elimination. All patients showed Anxiety and fear in different levels so it could be root of most behavioral problems.
Conclusions: Anxiety was the most frequent behavioral problems. So education and general learning for dogs owner seems a big necessary challenging to reduce animal behavior problems. Treatment significantly depend to owners cooperation.
21 dogs were recently exposed by predisposing risk factors. So we have to learn about predisposing factors and owner action to those situation changes.
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N. SAVINA. Creativity and Delinquency.
Objective: Correlation between hyperactivity, psychoticism, neuroticism and behaviour
Participants and Methods: Participants - male delinquents. Methods: Eysenck Personality Questionnaire (EPQ), Goodman's Questionnaire
Results: This study was performed on two ethnically homogeneous samples of male adolescents. The delinquent subjects were recruited on voluntary basis from the only juvenile correction centre in Siberia. All delinquents were referred to this institution by a court decision. The control subjects were recruited from among schoolchildren. A comparison between 205 male delinquents and 543 age-matched controls using Eysenck Personality Questionnaire (EPQ), Goodman's Questionnaire showed significant differences. The high level of hyperactivity was positively correlated with antisocial behavior. And the high level of creativity was positively correlated with delinquency. Delinquents who committed nonviolent crimes (thefts) appeared to have a lower level of neuroticism and psychoticism compared with those who committed violent crimes (hooliganism, robbery, rape, and murder).
Conclusions: Delinquents who committed nonviolent crimes (thefts) appeared to have a lower level of neuroticism and psychoticism compared with those who committed violent crimes (hooliganism, robbery, rape, and murder)
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S. VAN DER STIGCHEL, T. NIJBOER, D. BERGSMA, J. BARTON & C. PAFFEN. Measuring Palinopsia: Characteristics of a Persevering Visual Sensation from Cerebral Pathology.
Objective: Palinopsia is a symptom in which images of a visual stimulus persist or recur after its physical disappearance. In spite of numerous case reports, the characteristics of the afterimage and the conditions that evoke it are unknown. In the present study, we describe the properties of palinopsia in a patient with a cerebral lesion. Our patient's immediate-type palinoptic afterimages were confined to the left inferior quadrant. This allowed a unique comparison between afterimages in the intact and the affected part of his visual field.
Participants and Methods: Patient CQ suffered an intra-cerebral hemorrhage five months before testing. In a first set of experiments, we investigated the properties of his negative afterimages in the affected quadrant, in terms of intensity, the strength of the adapting stimulus needed to produce them, and their duration, and compared the results to those of an unaffected quadrant. In a second set of experiments, we quantified his positive palinoptic images along similar lines, measuring the intensity, the strength of the adapting stimulus, and the duration of the afterimage.
Results: Paired sample t-tests showed that the negative afterimages in CQ's affected quadrant were no different from those in his unaffected quadrant. Moreover, the positive palinoptic afterimage could be evoked by an adaptor of relatively low intensity. His positive palinoptic afterimages lasted for over two minutes, 7 to 10 times as long as his negative afterimages, and were systematically displaced from the inducing location, in distinct contrast to the highly retinotopic nature of normal negative afterimages.
Conclusions: These findings reveal distinctions between pathological afterimages of cerebral origin and physiological afterimages of retinal origin. Palinopsia can be explained by damaged connections that prevent inhibition of signals to neural systems subserving vision. The location of the brain lesions in CQ implicate lower visual areas as responsible for these inhibitory mechanisms.
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Cross Cultural

E. MATUTE, B. BELTRÁN, M. ROSSELLI, D. ZARABOZO & A. ARDILA. Age effect on Different Neuropsychological Domains in Mexican Preschoolers.
Objective: To examined age-related changes in Mexican preschoolers on 12 neuropsychological domains; and to identify by age group the associations between memory test scores and scores in other cognitive tests.
Participants and Methods: Ninety children divided in three age groups 2, 3 and 4 year olds (each group n = 30: 15 girls and 15 boys) with similar social and family backgrounds were included. Twelve neuropsychological domains were assessed (visual perception, auditory perception, receptive language, haptic perception, fine motor, constructional abilities, gross motor, expressive language, memory, delayed memory, visuospatial abilities and attention). Two type of analysis were carried out, the first one (ANOVAs) to assess the effects of age on cognitive domains, and the second one (correlations) to identify the associations between memory tasks and the other cognitive tasks.
Results: The results of the first analysis confirmed the main effect of age on all dependent variables, where the older group performed better than the younger ones in all tasks. Standard deviations were larger than the means in the first age group, suggesting a significant variability in early development. The comparisons between the 2 and the 3 year olds disclosed no difference in four cognitive tasks. The results of the second analysis indicated that memory encoding correlated with visual perception, receptive and expressive language, fine and gross motor skills, constructional and visuospatial abilities and attention tasks; whereas delayed memory recall correlated with only visual perception, receptive and expressive language, and attention tasks. Although these correlations were significant for the three age groups, their number decreased in the older group.
Conclusions: At this age range, an important age effect is observed in all neuropsychological domains. The variation of associations across age groups between memory tests scores and scores in other cognitive tests are discussed using cognitive developmental theories.
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T. NIELSEN. Cognitive Testing in Healthy, Elderly Turkish Immigrants.
Objective: Immigrants from Turkey form the largest ethnic minority in Western Europe, and the proportion of elderly within this population is expected to increase drastically during the next 20 years. With the changing composition of ethnic, linguistic and cultural populations in Europe, the availability of methods for accurate assessment of cognitive functioning in patients from diverse backgrounds becomes increasingly important. The objective of this study was to investigate the cross-cultural applicability of the Rowland Universal Dementia Assessment Scale (RUDAS), the Recall of Pictures Test (RPT), the Clock Reading Test (CRT) and supermarket fluency (SF) in elderly Turkish immigrants in Denmark.
Participants and Methods: A random sample of elderly community-dwelling Turkish immigrants was recruited from the greater Copenhagen area. All participants were screened for factors known to affect

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cognitive test performance. Included subjects underwent a one and a half hour assessment, where the RUDAS, RPT, CRT and SF were applied as a part of a comprehensive battery of cognitive tests. A Danish research neuropsychologist administered all cognitive tests with the assistance of an interpreter trained for the purpose.
Results: A total of 72 cognitively healthy participants aged 50 or more were included in the study. The mean years of residence in Denmark was 31.7 years (SD 8.6, range 11-43). The mean years of schooling was 3.8 (SD 4, range 0-16), 35% were illiterate and 36% did not speak Danish. Performance data for the tests are presented. Regression analyses revealed only modest influence of acculturation level and demographic variables on test performances.
Conclusions: We believe that the four tests have great cross-cultural potential, and consider the RUDAS, RPT, CRT and SF to be important cognitive tests for assessment of dementia in elderly patients from ethnic minority migrant populations.
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M. OKUBO. Leftward attentional biases in Framed-line Test among East Asians.
Objective: Kitayama, Duffy, Kawamura, and Larsen (2003) hypothesized that East Asians, relative to Westerners, tend to have larger attentional focus and are less capable of ignoring contextual information. The present study investigated whether or not such attentional characteristics of East Asians affect spatial attention mechanisms in the right hemisphere(RH).
Participants and Methods: Twelve right-handed undergraduates (F =9 M =3) performed a framed-line test originally developed by Kitayama et al. (2003). All the participants were East Asians and reported no lengthy stays overseas. On each trial a square frame with a line inside was presented on the CRT display for 5seconds. The line was printed inside the square frame, extending from the center of one of the three edges (left, right, and upper) of the square. In the absolute task, participants were asked to memorize absolute length of the line with ignoring the frame size. On the other hand, in the relative task, participants were asked to memorize relative length of the line in proportion to the square frame. Participants were then received white paper and reproduced the line from memory on the paper.
Results: Participants significantly underestimated the line length in the absolute task while there was no significant difference from the correct length in the relative task. The underestimation in the absolute task was more exaggerated for the large stimulus set than for the small stimulus set. Most important, the size of the underestimation was larger for the left lines than for the right and the upper lines.
Conclusions: The underestimation for the left lines in the absolute task may reflect the leftward attentional bias brought about by the right hemisphere's dominance for spatial attention. This underestimation, which was more evident for the large stimulus set than for the small stimulus set, supports the Kitayama et al. (2003)'s hypothesis and suggests that the attentional characteristics of East Asians affect the spatial attention mechanisms in the RH.
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C.E. PARANAWITHANA & P. DE ZOYSA. Cross Cultural Adaptation Of The Repeatable Battery For The Assessment Of Neuropsychological Status To A Sinhala Speaking Clinical Population In Sri Lanka.
Objective: Translate the RBANS into the Sinhala language
Assess Judgmental Validity
Assess reliability
Establish convergent, concurrent and preliminary clinical validity in 20 - 50yrs old patients diagnosed with schizophrenia
Participants and Methods: Bilingual translators followed a systematic translation procedure. Then Judgmental Validity was conducted through a Delphi Method. The sinhala RBANS was pre-tested on patients diagnosed with Schizophrenia. The reliability of the Instrument was determined by assessing internal consistency, test-re-test and inert-rater reliability. For preliminary clinical validity, performance of 134 schizophrenia patients and 134 normal controls were assessed. Convergent validity was assessed using Sinhala Mini Mental State Examination. To establish concurrent validity, the study assessed if a patient's performance on the instrument could be used to indicate functional outcome. Functional outcome was measured by the patient's stated competitive employment or unemployment. A Discriminant Function Analysis was performed to assess the extent to which employment status can be associated with the RBANS and to distinguish patients from that of normal controls.
Results: Adequate Judgmental Validity was determined for the Sinhala RBANS. The RBANS demonstrated good internal consistency, intraclass correlation coefficient, testretest reliability, inter rater reliability . Patients performed significantly worse and showed more marked cognitive impairment than healthy controls. A moderate correlation was evident between the Sinhala RBANS and the MMSE. It was possible to correctly classify employment status in 84% of the time by using the RBANS Total score. The Sinhala RBANS was capable of classifying patients from that of controls 93% of the time using the RBANS.
Conclusions: The Sinhala RBANS is shown to be a reliable and valid tool for the neuropsychological assessment in schizophrenia.
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K.A. HESTAD, A. MENON, M. NGOMA, D. FRANKLIN, R. SERPELL, A. UMLAUF & R.K. HEATON. Demographic Effects On Neuropsychological Test Performance In Zambia, Africa.
Objective: To study demographic factors that should be considered in creating neuropsychological (NP) test norms in Zambia.
Participants and Methods: The 2+ hour Western, NP test battery consisted of 17 tests that covered: Verbal Fluency, Attention/working Memory, Processing Speed, Verbal Episodic Memory, Visual Episodic Memory, Executive Function, and Motor skills.
A total of 324 healthy Zambian adults were recruited. They were 157 (48.5%) males and 167(51.5%) females, with an average age of 38.5 years (range 20-65) and an average education level of 11.2 years (range 5-19). A total of 157 (46.9%) had a rural background and 172 (53.1%) were from urban areas.
Results: Higher age was associated with poorer scores, with the strongest relationships being on WAIS-III Digit Symbol (r=-.48) and the Brief Visuospatial Memory Test-Revised (r=.43, p<.01). Education was also highly related to test performance; the strongest associations were with the Zambian Achievement Test of oral reading (ZAT; r=.47) and the three verbal fluency tasks (FAS test r=.45; Animal fluency, r=.42; Action fluency, r=.41. There were no gender differences in age or education, but men tended to perform better on testing, with the largest differences being on Animal fluency and the Paced Auditory Serial Addition Test. Participants from urban areas had somewhat higher education levels (means of 11.7 vs. 10.8 years), but they tended to outperform their rural counterparts even when all other demographic variables were controlled.
Conclusions: Effects of age and education on NP test performances of Zambian adults were as expected based on findings in the West. There was a somewhat better performance of males and participants from urban areas. A Zambian test of oral reading predicted performance on most other NP tests, even when other background characteristics were controlled. Two sets of NP norms were developed for future NP research in Zambia: one was corrected for age, education, gender and urban/rural status, and the other also corrected for ZAT.
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Cancer

E. LOFSTAD, T.H. DISETH, T. REINFJELL & K.A. HESTAD. Neuropsychological Outcome in Children and Adolescents Treated for Acute Lymphoblastic Leukemia with Chemotherapy Only.
Objective: This study was conducted to determine neuropsychological outcome in children and adolescents with Acute Lymphoblastic Leukemia (ALL) in remission, treated with central nervous system prophylactic chemotherapy only (CTO).

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Participants and Methods: Thirty-six children and adolescents, age 8.4 - 15.3 years, in long-term remission from ALL, 4.3 -12.4 years' post diagnosis, without relapse and no pre-diagnosis history of neurodevelopment disorder, were compared with 36 healthy controls matched for gender, age and the parents socio-economic status. The participants completed a large NP test battery.
Results: Survivors treated by CTO obtained significantly lower scores than healthy controls on tests of visual-spatial-perception and constructional ability, working memory and tactile sensory perception. Analyses of the learning process revealed a steeper learning slope with slightly lower achievements when presented for novel stimulus. However, the ALL survivors seem to compensate their initial performance over consecutive trials.
Conclusions: The results indicate neuropsychological long-term sequelae, especially related to processing of novel stimulus. The results however, also indicate that the ALL patients are able to compensate for their initial inferior performance compared to the controls. We suggest on the basis of the present findings that the test performance may reflect that the cancer and the continuing treatment interfere with both later development and maturation of the child.
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Drug/Toxin-Related Disorders (Including Alcoholism)

S. LAARI, S. MUSTANOJA, T. TATLISUMAK & E. POUTIAINEN. Executive Dysfunction in Heavy Social Drinkers after Cerebral Infarction.
Objective: Devastating effects of alcoholism on cognitive functions are well known, whereas effects of social drinking remain more ambiguous. According to cognitive reserve hypothesis cognitive dysfunction only becomes evident when neuronal loss reaches a critical level. We hypothesized possible drinking-related cognitive dysfunction to become evident after an additional stressor, e.g. cerebral infarction. Thus, in order to find even subtle cognitive changes related to social drinking, we studied patients with cerebral infarction by comparing the effects of light, moderate, and heavy social drinking on cognitive functions.
Participants and Methods: Subjects were 18-65 year old consecutive in-patients with first-ever cerebral infarction in Helsinki and Lapland Central hospitals. Alcohol drinking prior to infarction was measured with questions taken from AUDIT (Alcohol Use Disorders Identification Test). Light drinkers (1-2 doses per occasion), moderate drinkers (3-4 doses), and heavy drinkers (5 or more doses) were chosen for analyses comprising a subsample of 196 patients. The neuropsychological examination, three months after cerebral infarction, included measures of immediate (WMS/LM) and delayed (list learning delayed recall) memory, psychomotor speed (TM/A, WAIS/DS), and executive functions (TM/B-A, Stroop/interference time - Stroop/naming time).
Results: Social drinking affected performance in Stroop/interference time - Stroop/naming time (ANOVA, $p<.05$). Light and moderate drinkers both outperformed heavy drinkers ($p<.05$).
Conclusions: In working aged patients with first-ever cerebral infarction, heavy social drinking (5 or more drinks per occasion) resembling bingeing has an adverse effect on executive functions, namely on inhibiting a prepotent response.
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P. RAPELI, H. ALHO, C. FABRITIUS & H. KALSKA. Medication Variables as Predictors of Reaction Time in Multiple Drug-treated Opioid-dependent Patients.
Objective: It is known that use of several psychoactive drugs simultaneously may affect more reaction time (RT) than single drug use, at least when these are used for short-term. However, development of tolerance on negative multidrug effects on RT performance is less well-known. Multiple psychoactive drug regimen is common in patients treated for opioid-dependence with opioid agonist drugs buprenorphine or methadone.
Participants and Methods: We examined if RT performance of opioid-dependent patients in a clinical sample is associated with their medication use variables (type, number, or doses if comparable). Hundred and two patients (age= 33 ±7 years, 64 % male) treated either with buprenorphine or methadone were given several RT tests from the Test for Attentional Performance.
Results: Buprenorphine-treated patients outperformed methadone-treated ones in the combined RT measure ($d = 0.54$, $p = 0.007$). When demographic and substance use variables were entered first into hierarchical regression analysis, medication variables still accounted for an 11 % of additional RT variance (adjusted for population). Having buprenorphine as opioid agonist drug and using no benzodiazepine medication were both significant predictors in the model. The number of other psychoactive drugs had no significant effect in the model.
Conclusions: The results are in line with the idea that opioid and benzodiazepine drugs have pharmacodynamic interaction, and this is stronger for methadone than for buprenorphine. We suggest that when benzodiazepine medication is necessary for a patient in opioid maintenance treatment, and RT performnance is essential to keep at the best level, then buprenorphine is a drug of choice. However, this conclusion is preliminary because the possible effect of psychiatric comorbidity on RT performance was not controlled for, and it should be taken into account before firm conclusion can be made.
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O.M. ALHASSOON, S.S. SORG, M.J. TAYLOR, R.A. STEPHAN, C. SARI, B.C. SCHWEINSBURG & I. GRANT. Recovery of executive functioning among abstinent alcohol-dependent patients.
Objective: Previous research has demonstrated the impact of alcohol on executive functioning in recently detoxified alcoholics (RDAs). However, the pattern of recovery among these patients is much less understood.
Participants and Methods: Fifteen RDAs were assessed two weeks and one year after abstinence and compared to 15 age- and education-matched controls on the Halstead Category Test (HCT), the Trail Making Test – Part B (TRAILS), and the Digit Span backward (DIGITS). A 2 (Time) X 2 (group) ANOVA was performed on each of the neuropsychological measures.
Results: For DIGITS, results showed a time by group interaction, $F(1, 28) = 6.186$, $p = 0.019$. This significant interaction was the result of an improvement in the average T-score of RDAs $t(14) = 1.947$, $p = 0.036$; but not controls, $t(14) = 1.612$, $p = 0.065$. At baseline, RDAs were significantly worse than controls on DIGITS, $t(28) = 2.482$, $p = .019$. They were not significantly different from each other at followup. In contrast, for the HCT, results revealed a significant effect of time; $F(1, 28) = 6.155$, $p = 0.019$. This result reflected the significant improvements in the HCT T-scores over time in controls, $t(14) = 2.035$, $p = 0.031$; but not in RDAs, $t(14) = 1.588$, $p = 0.071$. However, the two groups were statistically significantly different at both baseline, $t(14) = 2.084$, $p = 0.046$ and followup, $t(14) = 2.886$, $p = 0.007$. For TRAILS, results showed no statistically significant differences between the two groups.
Conclusions: The results suggest that on a test less susceptible to practice effects (DIGITS), controls remained stable over time while the RDAs improved; reflecting potential recovery in working memory. In contrast, on a test more susceptible to practice effects, controls benefited more from prior exposure to the HCT; which reflects potentially worse learning at baseline and/or poor retention over the interval period among RDAs. This highlights the potential role of learning and retention deficits in the detection of executive dysfunction recovery among RDAs.
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M. WEINBORN, J. MOYLE, R. BUCKS & S.P. WOODS. Time-based Prospective Memory and Risky Behavior amongst Substance Dependent Individuals in Treatment.
Objective: Deficits in prospective memory (PM; eg, enacting a previously learned action at the right time/place) and risky decision-making (eg, making choices that involve a high chance of undesirable/dangerous outcomes) are both common in persons with substance use disorders. Martin et al (2007) found a significant relationship between habitual time-based PM tasks (eg, making a verbal response

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every 7 mins) and risky sexual and injection practices in a HIV+ sample, and posited that PM function may influence whether an individual engages in risky behavior (eg, unprotected sex) or, conversely, is able to implement coping strategies at the right time to avoid further risk. The present study sought to extend this work by examining the unique contribution of both time-based (TB) and event-based (EB) non-habitual PM to risk behavior in a seronegative substance dependent sample.
Participants and Methods: A well-validated, comprehensive measure of ProM, the Memory for Intentions Screening Test, was administered to 45 polysubstance dependent individuals currently in treatment. HIV risk behaviors (eg, needle sharing, unprotected sex), and criminal activity (ie, history of offenses/convictions) were assessed with subscales of the Opiate Treatment Index.
Results: Regressions were conducted predicting risk behavior and criminality based on TB and EB PM controlling for 1) demographic variables (age, gender, premorbid IQ), 2) psychiatric variables (mood, lifetime substance use), and 3) performance on working memory, retrospective memory, and executive function measures. Results revealed that TB, but not EB, PM remained a significant unique predictor of risky behavior (R2 ch. from .14-.23, ps < .05) and criminality (Cox & Snell R2 ch. from .13-.17, ps < .05) in all analyses.
Conclusions: Findings support the relationship between impaired TB PM and higher levels of risky behavior amongst substance users in treatment. Targeted rehabilitation addressing PM deficits may be a useful added intervention in treatment to reduce risky behaviors.
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Emotional Processes

L.A. BAKKE, B. LAENG & T. ENDESTAD. Effective Connectivity Within Core Cortical Network of Face Perception: Influence of Unconscious affective stimuli.
Objective: Emotional face perception is a highly developed visual skill in humans that occurs along a distributed neural system, including visual, limbic, and prefrontal areas of the human brain. It has been proposed that the core regions of face perception include the inferior occipital gyrus (IOG), superior temporal sulcus (STS) and fusiform gyrus (FG). We examined the modulation of effective connectivity within core regions during affective stimuli viewing.
Participants and Methods: Thirty-three college students completed two separate event-related facial affect recognition, functional magnetic resonance imagining, experiments conducted in a single acquisition session in a randomized order. We used dynamic causal modeling to characterize effective connectivity within core regions of face perception.
Results: We replicated previous study that found explicit affective stimuli increase modulation in effective connectivity from IOG to FG. In addition, we found implicit processing of facial affect led to prominent modulation in the effective connectivity from IOG to STS.
Conclusions: Our results suggest that implicit affective stimuli are processed differently within core regions of face perception and imply implicit information is conveyed along alternative pathways.
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S.V. CASTRO, C. LIMA & C. GARRETT. Dissociating Emotions in Speech and Music: Evidence from Parkinson's Disease.
Objective: Do we recognize primary emotions such as happiness or fear by using shared mechanisms for speech and music, or is there domain specificity? We took a cross-domain comparative approach and examined whether Parkinson's disease (PD) affects emotion recognition in the two domains similarly or differently.
Participants and Methods: Twenty-four PD patients in the early stages of the disease (mean age 61.8 years, 7 women) and 25 matched healthy controls (mean age 59.2 years, 13 women) completed emotion recognition tasks for 40 spoken sentences and 40 instrumental music excerpts expressing two positive and two negative emotions: happiness and surprise (speech prosody) / peacefulness (music); sadness and fear. All participants were also tested on the recognition of facial expressions and a range of neuropsychological charactereristics, including executive function and low-level music perception abilities.
Results: Although performance in speech prosody correlated with performance in music, the profile of emotion-specific impairments differed across domains. Compared to controls, patients were impaired for positive emotions in music but not in speech, and for sadness in speech but not in music. The impairment in music was not associated with perceptual or cognitive dysfunctions, but the impairment in speech correlated with executive dysfunction. The patients did not differ from controls in the recognition of facial expressions.
Conclusions: We found evidence that emotion processing in speech prosody and in music is partly segregated in PD. This suggests that basal ganglia pathways play distinct functional roles for emotion processing in music and in speech prosody.
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A. HOMAYOUNI. Investigated Relationship Between Sport Competitive Anxiety And Eating Disorders in Adolescence Athlete Students.
Objective: Eating disorders is defined abnormal eating habits that may involve either insufficient or excessive food intake to the detriment of an individual's physical and mental health. The precise cause of eating disorders is not entirely understood, but there is evidence that it may be linked to combination of psychological, medical, social, cultural and environmental conditions. So for better understanding the disorder, the study investigated relationship between sport competitive anxiety and eating disorders in adolescence athlete students.
Participants and Methods: The population of 100 athlete students (50 males and 50 females) were selected and responded to Matner's sport competitive anxiety inventory and Garner & Garfinkel's eating attitudes test "EAT-26" (EAT-26 assesses: dieting, bulimia and food pre-occupation, oral control). Data were analyzed with Pearson correlation coefficient and "T" independent test.
Results: Findings showed that there is positive significant correlation between sport competitive anxiety and bulimia and food pre-occupation in eating disorder. More analysis showed significant difference in male and female athlete students. Female athlete students have more scores in bulimia and food pre-occupation and also sport competitive anxiety than male athlete students.
Conclusions: The findings indicated that eating disorders involves in several different factors. Eating disorders are serious problems and need to be diagnosed and treated like any medical and psychological disease, especially during adolescence period in order to preventing the behaviors that may lead to severe life-threatening medical and psychological complications.
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C. ITOI & A. MIDORIKAWA. Emotional perceptions and Personality traits.
Objective: When the dichotic listening test (DLT) includes emotional sounds rather than verbal stimuli, the results reflect great individual differences. Studies in the domain of developmental disorders, however, have reported relationships between emotional perception and traits associated with autistic spectrum disorders (ASD). Therefore, abilities related to emotional perception may be associated with personality traits. In this study, we explored the relationship between the DLT and personality inventories.
Participants and Methods: The participants were 61 right-handed Japanese university students (31 men, 30 women, aged 18–23, Mage = 20.35). Subjects completed the DLT and the Big Five Personality Test developed by Wada (1999). The DLT is composed of two-syllable words with emotional implications (angry, happy, sad, normal). Subjects were asked to identify the target words (word condition) or the target emotions (emotional condition).

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Results: Subjects were divided into four groups (verbally and emotionally superior group (V+E+), verbally superior and emotionally inferior group (V+E-), verbally inferior and emotionally superior group (V-E+), verbally and emotionally inferior group (V-E-)). The V+E- group consisted of eight persons (13%) who obtained significantly lower scores than did those in the other three groups on the "Extroversion" ($p < .001$) and "Agreeableness" ($p < .001$) subscales of the Big Five Personality Test.
Conclusions: These results imply that individuals who are unable to identify the emotional implications of emotional words are characterized by introversion and difficulties with cooperation.
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A.E. SØLSNES, J. SKRANES, A. BRUBAKK & G.C. C.LØHAUGEN. The ability to self-evaluate own executive-function with BRIEF-A in very low birth weight (VLBW) preterm born adults.
Objective: Preterm born very-low-birth-weight (VLBW: BW<1500g) children are more often reported to have problems with executive function and self-regulating than their term born peers by their parents and teachers. Neuropsychological assessment has revealed reduced IQ and executive function deficits in VLBW survivors. We wished to examine if VLBW young adults report more executive and self-regulating problems than their matched controls and to investigate if severity of subjective executive function problems is associated with general cognitive ability (IQ) in the VLBW group.
Participants and Methods: Forty-two VLBW (mean BW 1237g, sd 219g and gestational age 29.3 weeks, sd 2.4 weeks) and 62 term born controls at age 19 years completed a standardized self-report measure of executive functions and self-regulation in everyday life (The Behavior Rating Inventory of Executive Function-Adult Version - BRIEF-A). T-scores from the individual subscales, the indices and the sum score were compared between groups. T-scores from the BRIEF-A have a mean of 50 (sd 10), and scores ≥ 65 are considered clinically significant. The full Wechsler Adult Intelligence Scale III was applied to obtain IQ-scores. The VLBW participants were subclassified into those with low (IQ<89) or normal IQ (≥89) with cut-off value -1sd from control mean.
Results: There were no significant differences in mean subscales scores, index scores or sum score on the BRIEF-A between the VLBW and the control group. Mean IQ in the VLBW and the control group was 89 and 101, respectively. No differences in BRIEF-A scores were found between those with normal and low IQ in the VLBW group.
Conclusions: Preterm born VLBW young adults do not experience having more problems with executive function and self-regulation in their daily life than their term born peers regardless of IQ. We speculate that this may indicate under-reporting in the VLBW group, as shown by other studies (Hack et al. 2004).
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Genetics/Genetic Disorders

B. SEGURA, X. CALDÚ, R. SALA-LLONCH, P. VENDRELL, D. BARTRÉS-FAZ, I. CLEMENTE, N. BARGALLÓ, M.A. JURADO, J. SERRA-GRABULOSA & C. JUNQUÉ. Effects of COMT and DAT Genotypes on Brain Activation Related to Emotional Processing.
Objective: Two limiting factors of dopamine activity are the catechol-o-methyltransferase (COMT) and the dopamine transporter (DAT), which terminate dopamine activity by degradation and uptake, respectively. Genetic variants of COMT and DAT have been related to enzymatic activity and protein availability, respectively. The Met allele of the COMT Val108/158 Met polymorphism has been associated to lower enzymatic activity and the 9-repeat allele of the DAT 40 base-pair (bp) variable number of tandem repeat (VNTR) polymorphism has been related to lower protein availability. The aim of this study was to investigate the influence of COMT and DAT genotypes in emotional processing.
Participants and Methods: Genotypes for COMT and DAT were determined in a sample of 70 healthy young subjects, who underwent functional magnetic resonance imaging (fMRI) while performing a facial emotion recognition task (Ekman's faces). Independent Component analysis (ICA) of fMRI data was used to determine the main network of task-involved brain areas. BOLD Signal change was estimated between control and task conditions within main regions of interest and used to perform inter-subject statistical inference with genetic data.
Results: Analysis of fMRI data revealed a common network of task-related coactivation including bilateral amigdala, putamen, caudate, thalamus, insula, orbital frontal cortex (OFC), inferior frontal gyrus (IFG), middle frontal gyrus (MFG), paracingulate and precuneus. For the same level of performance in all subjects, the results showed the influence of COMT and DAT genotype in the functional signal change, gender was controlled in all the analysis. Homozygote subjects for the Val allele showed the highest activation in MFG, IFG and left caudate. Homozygote subjects for the 10-repeat allele of the DAT showed the highest activation in left putamen.
Conclusions: Our results support a role of COMT and DAT genotype in the regulation of emotional processing.
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J.I. EGGER, W. VERHOEVEN & J. HOOGEBOOM. Neuropsychology of four males from one kindred with Aarskog-Scott syndrome: Executive dysfunctions as part of the behavioural phenotype?
Objective: In the early 1970s, Dagfin Aarskog, a Norwegian pediatrician, and his colleague Scott described the Aarskog-Scott syndrome (AAS), also called faciodigitogenital syndrome, or faciogenital dysplasia. It is a genetically heterogeneous developmental disorder that is predominantly X-linked and phenotypically characterized by short stature, craniofacial dysmorphisms, brachydactyly as well as urogenital abnormalities. In about 20 percent of Aarskog families, a mutation in the FGD1 gene located in Xp11.21 can be identified.
As to the description of the behavioural phenotype, virtually no information is available except for the rather general finding that intelligence levels show great variability. The present study aims at the delineation of a potential behavioural phenotype of AAS.
Participants and Methods: Four affected males from the fourth generation of a previously published large Dutch family (Van de Vooren et al., 1983) are assessed in detail by means of an extensive neuropsychological battery and semi-structured psychiatric examination. In addition, mutation analysis was performed.
Results: As reported in other samples, in the current patients also, the level of intelligence varied between normal and severely disabled. Their behavioural profile showed, among others, impaired executive attentional processes, primarily reflected in distractible and irritable behaviours, which were interpreted as elements of attention deficit hyperactivity disorder. Finally, a novel FGD1 missense mutation (R402W) at position 1204 (1204C>T) was demonstrated.
Conclusions: Present findings suggest that dysfunctional executive processes can be considered as part of the behavioural phenotype of AAS. Since these processes may be sensitive to targeted cognitive training programs as well as to the structuring of daily life, a thus designed treatment strategy may therefore reduce the intensity of disinhibited behaviours that are found in AAS patients.
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M. GAROLERA, I. GARCÍA-GARCÍA, I. MARQUÉS-ITURRIA, M. ARIZA, I. HERNÁN, B. SEGURA, R. PUEYO, M.J. SENDER, M. VERNET, A. NARBERHAUS & M.A. JURADO. ANKK1 genotype of the DRD2 gene modulates the relation between obesity and cognitive flexibility.
Objective: Obesity is a multifactorial disease caused by the interaction between genotype and environment. It has been related to difficulties in executive functions. The A1 allele of the DRD2/ANKK1-TaqIA of the DRD2 genehas been associated with obesity and with performance in executive functions. The aim of this study was to investigate whether the ANKK1 allele modulates the relation between obesity and one process of executive function: cognitive flexibility.
Participants and Methods: Participants with obesity (n=42) and control participants (n=42) performed an extensive neuropsychological bat-

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tery that included the Wisconsin Card Sorting Test (WCST), Trail Making Test (TMT) and Block design subtest (WAIS-III). Perseverative errors of the WCST, B-A score of the TMT and raw scores of Block design, were entered in a factorial analysis. A 2x2 ANOVA (participants with obesity versus control participants x ANKK1 non-carriers versus ANKK1 carriers) was performed including the result of the factorial analysis as a dependent variable.
Results: There were no differences in age, education, gender and estimated intelligence between groups. Factorial analysis revealed one single factor. We will refer to this as 'cognitive flexibility'. The ANOVA test showed an effect of the ANKK1 genotype ($p<0.001$), with ANKK1 carriers performing worse in the cognitive flexibility component; and an interaction between group of obesity and genotype ($p=0.028$), with participants with obesity and ANKK1 carriers performing worse in cognitive flexibility.
Conclusions: Results suggest that being obese and a carrier of the ANKK1 allele could confer a weakness as regards the performance of cognitive flexibility.
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C. HELMSTAEDTER, Y. MIHOV, M.R. TOLIAT, H. THIELE, P. NÜRNBERG, S. SCHOCH, S. SCHOCH, R. SURGES, C. ELGER, W. KUNZ & R. HURLEMANN. DRD2/ANKK1 TAQ1A polymorphism predisposes to negative psychotropic side-effects of Levetiracetam.
Objective: Levetiracetam (LEV) is a highly effective anti-epileptic agent. In up to 30% of patients, however, LEV causes negative psychotropic side-effects that range from mild irritability and agitation to severe reactive-impulsive aggression and violence, perhaps reflecting an interaction of LEV with an underlying genetic vulnerability. Following recent evidence that the behavioral side effects of LEV might be predisposed, an association study with a priori focus on candidate genes heavily implicated in impulsivity and reactive-impulsive aggression was carried out.
Participants and Methods: We used a discovery/replication study design to identify genetic markers of increased susceptibility to negative psychotropic side-effects of LEV. Candidate single-nucleotide polymorphisms (SNPs) in 4 target genes regulating dopaminergic signaling were selected according to their known relevance for impulsivity and reactive-impulsive aggression. Specificity of results was controlled for by including 4 SNPs in genes regulating noradrenergic and serotonergic signaling.
Results: The discovery study (n = 288) revealed a higher load of negative psychotropic side effects for 3 variants in dopamine-related genes. Of these variants, the DRD2/ANKK1 TAQ1A (rs1800497) SNP, which is related to lower dopamine receptor D2 synaptic availability, was confirmed in an independent replication sample (n = 116).
Conclusions: The DRD2/ANKK1 TAQ1A polymorphism indicates an increased risk to the negative psychotropic side effects of LEV. The results encourage a pharmacogenetic approach to reveal patients at risk to experience idiosyncratic side effects of antiepileptic drug treatment.
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Stroke/Aneurysm

M.F. ANDÚJAR, R. DACOSTA-AGUAYO, I. CLEMENTE, M. GOMIS, E. LÓPEZ_CANCIO, M. MILLAN, N. PÉREZ DE LA OSSA, S. REVERTÉ, C. CÁCERES, N. BARGALLÓ, M. BARRIOS, A. DÁVALOS & M. MATARÓ. Thalamic Anisotropy Indices and Cognitive Function in Stroke Patients.
Objective: Focal cerebral stroke may be responsible for remote histological and functional changes that can also contribute to the cognitive patient's outcome. The aim of this study is to explore remote microstructural abnormalities in thalamus distant from ischemic area and its relationship with cognitive function three months after stroke.
Participants and Methods: The sample comprised 18 subjects, 9 patients with an stroke within the middle cerebral artery (MCA) territory and 9 paired control subjects. All patients had a neurological, neuropsychological and thalamic diffusion tensor image (DTI) examination three months after stroke. DTI analysis included fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (AD) and radial diffusivity (RD). Asymmetry indices (ipsilateral/contralateral to the ischemic lesion) were compared between control and patient groups by Students's t test. The relationship between neuropsychological scores and anisotropy indexs was carried out by Pearson coefficient.
Results: Patients showed higher significant asymmetry in RD ($t=-2.33$; $p=0.042$) which correlated with Stroop Color-Word Interference Test ($r=-0.894$; $p=0.003$) and percentage of verbal memory learning ($r=-0.748$; $p=0.021$).
Conclusions: We have reported microstructural remote thalamic abnormality in RD asymmetry which are related to cognitive dysfunction at three months after ischemic stroke.
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R. DACOSTA, M. FERNANDEZ, M. MILLÁN, S. REVERTÉ, M. GOMIS, E. LÓPEZ CANCIO, N. PÉREZ DE LA OSSA, C. CÁCERES, N. BARGALLÓ, M. BARRIOS, I. CLEMENTE, A. DÁVALOS & M. MATARÓ. Whole Brain Resting-State Analysis in Patients with First Ever Stroke: A Functional MRI Study with Independent Component Analysis (ICA).
Objective: Focal brain lesions may have important remote effects on the function of distant brain regions. The resulting network dysfunction may contribute significantly to behavioral deficits observed after stroke. The aim of this study is to investigate the different patterns of activation in resting state networks in stroke patients in relation to their different cognitive recovery at three months post-stroke.
Participants and Methods: 21 patients received neuropsychological assessment within the first 72 hours after ischemic stroke and at three months post-stroke. Functional MRI was performed at 3 months post stroke. Patients were classified into two groups according to their scoring in the Grooved Pegboard Test (normalized versus non-normalized scoring at three months). Independent Component Analysis (ICA) with dual regression and general linear model (permutations = 5000, threshold $p<0.05$; Threshold-Free Cluster Enhancement (TFCE) method to define the clusters) were performed to test for differences between brain networks among the two groups.
Results: The group with better improvement at three months post-stroke showed higher neural activity in the right Angular Gyrus, Middle temporal Gyrus, Supramarginal Gyrus and Lateral occipital cortex. However, when adjusting for age and premorbid intelligence, the group differences did not remain significant.
Conclusions: Application of fMRI technique has proved to be sensitive in detecting brain activity differences in spontaneous BOLD signal fluctuations in patients with a better cognitive recovery at three months post-stroke. The current data suggest that younger age and great intellectual enrichment could explain these differences helping patients to cope better with the neurocognitive challenges associated with stroke on cognition.
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N. DEMEYERE, W. BICKERTON, D. SAMSON, J. RIDDOCH & G.W. HUMPHREYS. A Multiplex Test of Attention: The Auditory Attention Test from BCoS.
Objective: We report data on cognitive and functional correlates of the Auditory Attention test from the BCoS battery, which attempts to provide measures of sustained attention, selective attention, inhibition and working memory.
Participants and Methods: We recruited 683 sub-acute hospital stroke patients who completed the Auditory Attention Test as part of the Birmingham University Cognitive Screen procedure using the BCoS battery. We assessed the incidence of impairments and the relations between the different aspects of this measure with the other cognitive measures provided by BCoS. Of this sample 331 patients were followed up after 9 months. We examined natural recovery for this measure as well as the relationship of the initial performance with daily living activities 9 months later.
Results: We found that, relative to controls, 51% of all patients were classed as impaired on the overall accuracy of the task, specific impairments in sustained attention were found in 37% of the sample, and

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25% of patients showed working memory deficits. The different measures of the Auditory Attention Task were found to correlate with each other and with different measures of cognition (including general orientation, language measures, executive functioning measures), though most notably we did not find correlations with spatial attention measures (neglect and extinction). We further found strong correlations between the initial and follow up scores, though 44% of impaired patients at the initial test (overall score) demonstrated recovery after 9 months. Impairments on the auditory attention task were reliably correlated with Barthel scores at the initial test and with NEADL scores at follow up, with patients with impairments in the sub-acute stage having poorer NEADL scores at 9 month follow up.
Conclusions: We conclude that the Auditory Attention Test provides a clinically applicable measure of working memory and sustained and selective attention. In addition it is a useful predictor of functional outcome.
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J.A. VORDENBERG, N.A. DONINGER & C.P. CONTARDO. Laterality Effects in Stroke Patients on the Brixton Spatial Anticipation Test.
Objective: The Brixton Spatial Anticipation Test (BSAT) is an executive based measure of rule attainment and set-shifting with demonstrated sensitivity to frontal lobe lesions; however, lateralization effects on performance remain mixed. Prior research demonstrating sensitivity to left-sided lesions was tested using a relatively newer and narrower patient population.
Participants and Methods: Demographic influences were examined from a convenience sample of inpatients on a rehabilitation unit. Lateralization effects were tested by comparing performance of inpatients diagnosed with cerebrovascular accident (CVA).
Results: Performance was negatively associated with age and unrelated to education. Consistent with prior research, women trended towards poorer performance relative to men. In addition, BSAT performance was significantly correlated with putative measures of set-shifting ability (i.e., Trail Making B). A laterality effect was not identified for the overall CVA sample (N=52); however, when examining patients who performed at the average level or better according to published age-related norms, patients with right hemisphere lesions (n=9) performed significantly worse than patients with left hemisphere lesions (n=10).
Conclusions: These findings are inconsistent with previous studies demonstrating sensitivity to left-sided lesions and suggest that the BSAT is more sensitive to laterality effects among patients with more subtle executive functioning deficits, including attending to and monitoring external events. Identifying subtle executive deficits associated with right hemisphere injuries may aid clinical decision making regarding therapeutic goals, rehabilitation course, and discharge planning (e.g. independent living, driving, and safety concerns). The BSAT involves brief administration time and modified use for nonverbal patients and patients with limited mobility, further supporting the use of the BSAT in rehabilitation settings with acutely hospitalized patients.
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G. ESCARTIN, C. JUNQUÉ, M. JUNCADELLA, A. GABARRÓS, M. DE MIQUEL, F. RUBIO & I. RICO. Decision-Making Impairment on the Iowa Gambling Task After Endovascular Coiling or Neurosurgical Clipping for Ruptured Anterior Communicating Artery Aneurysm.
Objective: To investigate decision-making deficits following anterior communicating artery aneurysm (ACoA) rupture and to compare the effects of two treatments.
Participants and Methods: The sample included 40 patients with subarachnoid haemorrhage (SAH) secondary to ruptured ACoA with a favourable neurological outcome and a control group of 31 subjects matched by age, gender and years of education. Twenty patients had surgical interventions (clipping) and 20 had received endovascular treatment. Decision-making was assessed by the Iowa Gambling Task (IGT). We used the Expectancy Valence model (EV) to examine the different components associated with the IGT.
Results: ACoA patients performed significantly worse on the IGT than controls, we observed poorly performance on IGT in 70% of the patients. Comparing the groups according to type of intervention, we found that clipped patients performed significantly worse than controls on the IGT, whereas coiled patients did not differ from controls or clipped patients; however, coiled patients performed worse than controls on the last block of the task. Patients with frontal lesions selected significantly more cards from the disadvantageous deck. IGT performance correlated with other tests of executive functions such as the perseverative errors and non perseverative errors of Wisconsin Card Sorting Tests (WCST), and verbal fluency test, but not with working memory tests. According to the EV model, patients with frontal lesions showed a greater tendency to focus on recent outcomes and ignore or rapidly discount past outcomes, and tended to have a more erratic response pattern.
Conclusions: Our results suggest that patients with SAH secondary to ruptured ACoA have deficits in decision-making under ambiguity. The main cause of this deficit is the presence of frontal lesions. Moreover, clipped patients, but not coiled patients, showed deficits in taking decisions in comparison with controls. Our results suggest that the IGT may help to identify neuropsychological sequelae in these patients.
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G. ESCARTIN, C. JUNQUÉ, M. JUNCADELLA, A. GABARRÓS, M. DE MIQUEL, F. RUBIO & I. RICO. Olfactory dysfunction after subarachnoid hemorrhage secondary to aneurysms of the anterior communicating artery.
Objective: Olfactory dysfunction has an important impact on quality of life. In patients with subarachnoid hemorrhage (SAH), anosmia has mainly been reported after surgery for aneurysm of the anterior communicating artery (ACoA). We studied if and how frequently patients with ACoA present smell identification deficits (SID) between two treatment groups: endovascular /surgical.
Participants and Methods: Prospective study of patients with SAH secondary to ruptured ACoA and who had a Glasgow Outcome Score = 1 or 2, comparing them with a control group matched by age and gender. Olfactory function was assessed using the University of Pennsylvania Smell Identification Test (UPSIT).
Results: A total of 39 patients were enrolled. A marked olfactory impairment was observed in AcoA patients compared to controls ($p<0.001$). Seventeen patients (44%) versus one (3%) control showed a SID according to UPSIT performance ($p<0.001$). Both groups presented olfactory impairment. 10 out of 17 (59%) clipping patients versus 6 out of 21 (28.5%) coiling patients scored below the 25th percentile, and surgical patients also performed worse than endovascular patients ($p=0.048$). We observed a worse performance on the olfactory test among patients subjected to endovascular coil embolization when cerebral vasospasm or frontal cerebral lesions were present ($p=0.037$ and $p= 0.009$, respectively). This difference was not observed in patients undergoing surgery.
Conclusions: Olfactory disorders after SAH secondary to rupture of the AcoA are very frequent and were present in both treatment groups. Cerebral vasospasm and frontal lobe lesions are related to worse performance in endovascular coil embolization patients.
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E. RUUSKANEN, L. NURMI, H. NUMMINEN, A. KOIVISTO & M. JEHKONEN. Spontaneous Recovery of Memory Functions in Stroke Patients.
Objective: Our aim was to assess the recovery of memory functions in stroke patients during a six-month follow-up and to compare recovery in left (LH; n=15) and right (RH; n=19) hemisphere infarct patients.
Participants and Methods: The study group consisted of 34 consecutive patients with first brain infarct. Neuropsychological and neurological examinations were performed twice: at the acute phase (within six days of onset) and at six months. Severity of stroke was evaluated by a neurologist using the National Institute of Health Stroke Scale. An

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MRI examination was carried out to verify the infarct. The cognitive variables examined were immediate and delayed visual and verbal memory, which were assessed with the Rey-Osterrieth Complex Figure test (ROCFT), the Logical Memory and the Word List (WL) subtests of the WMS-III, respectively.
Results: No differences were seen between the LH-group and the RH-group in memory functions either at the acute phase or at follow-up. During the follow-up the whole patient group showed statistically significant recovery in immediate (p=0.048) and delayed (p=0.021) verbal memory (WL), as well as in immediate (p=0.002) and delayed (p=0.001) visual memory (ROCFT). The LH-group showed statistically significant recovery in delayed verbal memory (WL; p=0.028) and in immediate (p=0.004) and delayed (p=0.011) visual memory (ROCFT). The RH-group showed no significant recovery of memory functions during the follow-up.
Conclusions: Interestingly, the memory functions of RH patients did not seem to recover significantly, even though there were no differences between the RH and LH groups in memory functions at the acute phase. The possible impact of executive dysfunction in complex visual memory in RH patients needs further research with larger patient groups.
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R. NIINIKURU & E. POUTIAINEN. The Relationship Between Mood and Memory Performance in Neuropsychological Rehabilitees After First-Ever Ischemic Stroke.
Objective: Memory, attention and executive function are among the most frequent cognitive domains to be impaired after stroke. The aim of this study was to examine if mood is associated with difficulties in memory, attention or executive function at the acute stage and 6 months after stroke in patients referred to neuropsychological rehabilitation after first-ever ischemic stroke.
Participants and Methods: Subjects were 199 consecutive working-aged patients with first-ever ischemic stroke. All subjects underwent neuropsychological examination at the acute stage and 6 months after stroke including measures of memory, attention and executive function (WMS/LM, Trail Making A and B). Mood was evaluated three months after stroke with a self-evaluation questionnaire (modified POMS, range 0-160). Altogether 48 patients were referred to neuropsychological rehabilitation. Self-evaluated mood did not differ between neuropsychological rehabilitees and subjects not in rehabilitation. Forty-six rehabilitees (two subjects were excluded because of missing data) were divided into two groups (according to self-evaluated mood) and differences in cognitive performance were examined.
Results: In ANOVA, the lower mood group had significantly worse memory performance both at the acute stage (p=0.01) and six months after stroke (p=0.001). However, no differences were found in attention or executive function. The mood groups did not differ regarding any background or clinical variables (age, sex, education, size and location of stroke, previous psychiatric diseases, alcohol use, NIHSS and Barthel Index).
Conclusions: Lower mood was associated with persistently poor memory function in cognitively impaired stroke patients referred to neuropsychological rehabilitation. Thus, it is essential to take mood factors into account during stroke recovery.
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D. SAMPANIS & G.W. HUMPHREYS. Mirror Therapy Enhances Hand Function And Improves Motor Extinction in Chronic Stroke Patients.
Objective: To evaluate the effects of Mirror Therapy on upper-extremity motor recovery and motor extinction of patients with chronic stroke.
Participants and Methods: 6 stroke patients (m.a. 62) recruited. The intervention consisted of 40min sessions on a weekly basis for 6 months. A mirror was used to facilitate visual feedback. Outcome Measures: (a) The number of taps made on simple counter device imitating unilateral and bilateral movements. (b) The Action Research Arm test.
Results: An ANOVA, included as factors the time, session, eyes, task (bimanual, unilateral) and hand, performed. All main effects were found to be significant: time of test ($F(3, 18) = 7.580$; p=0.002), session ($F(1, 6) = 13.045$; p=0.011), eyes ($F(1, 6) = 7.069$; p=0.038), task ($F(1, 6) = 29.304$; p=0.002) and hand ($F(1, 6) = 20.351$; p=0.004). The first significant interaction was between session and task ($F(1, 6) = 7.546$; p=0.033). Also, there was a significant interaction between time, session and hand ($F(3, 18) = 2.754$; p=0.039). All other interactions were not found to be significant (all p's > .05).
A second break down analysis for the interaction between time, session and task took place. For the contralesional hand the ANOVA returned $F(1, 6) = 21.180$; p=0.004 and for the ipsilesional upper limb $F(1, 6) = 120.5$; p<0.001. For the ipsilesional hand analysis returned pre and post unilateral value of $t(6) = -3.343$, p= 0.014 but no significant result for the bimanual task, $t(6) = -0.701$, p= 0.51. For the contralesional hand returned significant results of $t(6) = -4.274$, p=0.05 for the unilateral task and $t(6) = -3.341$, p=0.016.
A t-test analysis was made from the results of the action research arm test at the pre and post intervention period and returned significant improvement across the patients ($t(5) = -12.254$, p<0.01).
Conclusions: In our group of chronic stroke patient patients, hand functioning improved after mirror therapy after a six months period of intervention.
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T. SAVOLAINEN & E. POUTIAINEN. Symptom Awareness and Recovery of Memory Deficits After First-Ever Cerebral Infarction.
Objective: Unawareness of deficits is common after stroke. It has been studied mostly regarding neglect or motor deficits or general symptom awareness. The aim of this study was to examine the connection between symptom awareness at the acute state and recovery of memory deficits during 6 months period after first-ever cerebral infarction.
Participants and Methods: 230 consecutive patients (18 - 65 y) with a first-ever ischemic cerebral infarction were studied in two Finnish Central Hospitals. Neuropsychological examination (at the acute state and at 6 mo) included measures of immediate verbal memory (WMS/LM, list learning task), delayed verbal memory (delayed retention percents of the WMS/LM and list learning tasks), visual memory (BVRT immediate retrieval and delayed recognition tasks) and symptom awareness questionnaire (Anderson & Tranel, modified version). Deficits in memory were assumed when mean sum score of these 6 memory measures was below -1 SD of the demographic controls. At the acute state 37 patients had memory deficits and were included in the study group. Patients were divided into symptom aware and unaware –groups based on a difference score derived from patients' and researchers' evaluation of memory problems reported on the symptom awareness questionnaire.
Results: Immediate verbal memory improved more in symptom aware memory patients than in those with unawareness of the symptoms (repeated measures Anova, $p < 0.05$). No significant differences were found in delayed memory or visual memory. The two symptom awareness groups did not differ in background (age, gender, education) or the acute state clinical variables (NIHSS, Barthell Index).
Conclusions: Poor symptom awareness may impair the recovery of immediate verbal memory after first-ever ischemic cerebral infarction.
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J.J. SORIANO-RAYA, J. MIRALBELL, E. LÓPEZ-CANCIO, N. BARGALLÓ, J. ARENILLAS, M. BARRIOS, C. CÁCERES, P. TORAN, M. ALZAMORA, G. PERA, A. DÁVALOS & M. MATARÓ. Microstructural White Matter Changes Related to Moderate Deep White Matter Lesions Predict Cognitive Performance in a Young Elderly Community Sample.
Objective: Cerebral white matter lesions (WMLs) on conventional magnetic resonance imaging (MRI) only reflect extensive damage of macrostructural white matter (WM). The use of diffusion tensor imaging (DTI) allows us to assess the microstructural integrity of WM. Our objective is twofold: first, to investigate the association of periventricular (PVH) and deep white matter hyperintensities (DWMH) with fractional anisotropy (FA); and second, to evaluate the predictive value of FA related to moderate PVH and DWMH with cognitive function in healthy young elderly individuals.

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Participants and Methods: One hundred stroke- and dementia-free adults aged 50 to 65 years completed a comprehensive neuropsychological battery and brain MRI protocol. Participants were classified according to the PVH and DWMH scores (Fazekas scale). Tract-Based Spatial Statistics (TBSS) were applied to investigate whole brain voxelwise differences in FA associated separately to moderate PVH and DWMH. Standardized z-scores of the mean FA value for areas showing significant differences were entered into linear regression models to assess their predictive value of cognitive function, with separate analyses for PVH and DWMH.
Results: Subjects with moderate PVH and subjects with moderate DWMH showed a decreased FA in different areas of the inferior fronto-occipital fasciculus (IFOF), the anterior thalamic radiation (ATR) and the superior longitudinal fasciculus (SLF). The mean FA value related to moderate DWMH was associated with executive function and visuospatial/visuoconstructive skills. The mean FA value related to moderate PVH was not associated with cognitive function.
Conclusions: Our findings suggest the presence of microstructural WM changes related to moderate WMLs, besides the macrostructural damage shown by conventional MRI. Only the FA value in areas showing differences related to moderate DWMH is associated with cognitive functioning in executive and visuospatial/visuoconstructive domains.
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H.V. STRALEN, M. VAN ZANDVOORT, A. POSTMA, J. KAPPELLE & C. DIJKERMAN. Somatosensory impairments after stroke.
Objective: Somatosensory loss is common after stroke and is related to a longer length of stay in hospital and lower activity levels. Impairments in the somatosensory system may also lead to deficits in the cognitive processing of somatosensory information and can cause problems in building a representation about the external world or our own body. Although primary somatosensory input is regularly assessed by the neurologist, tests targeting the higher order, more cognitive somatosensory functioning is seldom a standard part of the neuropsychological test battery. This study provides an overview of neuropsychological tests that can be used by clinical neuropsychologists to detect deficits ranging from problems in processing somatosensory information about the external world (e.g. haptic object recognition) to the own body (e.g. body representation). In the second part of the study, frequency of deficits in in a group with stroke patients was assessed.
Participants and Methods: Fourty-five patients suffering from an ischemic stroke were assessed with an elaborate somatosensory testbattery.
Results: Preliminary results show that 51% of the patients report changes in somatosensory functioning. In this group, we found impairments in touch perception (49%), stereognosis (33.5%) proprioception (17.2%), fingeragnosia (29%) and extinction (17.6%).
Conclusions: Somatosensory impairments were dissociated from others suggesting that the underlying somatosensory modalities are different and should all be assessed. Further analysis will examine the relation with lesion as well as underlying mechanisms of these somatosensory deficits.
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K. TURUNEN, S. MUSTANOJA, T. TATLISUMAK & E. POUTIAINEN. Free and Cued Memory Recall in First-ever Ischemic Stroke Patients.
Objective: Memory recall is typically studied with free recall tasks only. Yet, in everyday life also cued recall plays an important role. We aimed to examine both free and cued recall in a stoke patient sample.
Participants and Methods: Subjects were consecutive working-aged inpatients in two Finnish Central Hospitals, with a first-ever ischemic stroke. At six months, after excluding patients with persistent severe aphasia, this subsample comprised 185 subjects. Demographically matched 50 controls served as reference. Neurological status was examined with NIH Stroke Scale (NIHSS) and Barthel Index (BI). We examined immediate and delayed memory with the WMS/Logical Memory stories. After normal free recall, for cued recall we asked fixed questions on the omitted items. Total cued recall was determined as the sum score of all correct answers given immediately and after a delay.
Results: NIHSS score was intact for 100 patients (54%), and mild to moderate for all the rest – only 8 patients had a score above two. BI score was intact for all but 5 patients. Patients and controls differed in immediate ($p=.024$) and delayed free recall ($p<.001$). A closer examination revealed that patients were inferior to controls only in the second story, both immediately ($p=.044$), and after a delay ($p=.001$). Further, total cued recall score differed ($p=.036$) as patients needed more cues than controls.
Conclusions: Well performing stroke patients with mild neurological symptoms remember less than healthy controls in high memory load tasks, suggesting the use of sufficiently demanding tasks in assessment. Further, questions should be asked to see, if patients' performance benefit from cues.
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M. VAN ZANDVOORT, I. HUENGES WAJER, P. GREEBE, G. RINKEL & A. VISSER-MEILY. Predictors for PTSD after SAH.
Objective: Cognitive sequels of a SAH have received growing interest. The long term outcome appears often more hampered than the physical condition would predict. Cognitive as well as psychological disturbances are considered as underlying this decrease in well-being. Recently PTSD is added to the list of potential consequences of an SAH. We have studied the frequency of PTSD at 3 years post-SAH and its relation to measures of cognition, mood and anxiety in the early phase.
Participants and Methods: 84 patients suffering from an SAH admitted to the university medical center utrecht (UMCU) were included at the multidisciplinary outpatient SAH service at 6 weeks after discharge. This involved a concise neuropsychological examination covering the main cognitive domains and questionnaires regarding cognitive complaints (CLCE-24), mood (Becks Depression Inventory), anxiety(STAI) and symptoms of PTSD (Impact of Event Scale). The cognitive and psychological measures together with the demographic characteristics and severity of the SAH were submitted to linear regression analyses to predict PTSD symptoms, in addition ROC-curves and AUC are calculated.
Results: In 1 out of every 4 patients symptoms of PTSD were found at 3 years after the SAH. Linear regression analyses demonstrated that cognitive disturbances, more specifically visuoconstruction and perception, are the strongest predictors for long term PTSD symptoms corrected for demographics, mood and anxiety in the early phase after the SAH (complete model $R=.46$; $p<0.01$; R-change for Visuoperception and construction $p<0.05$). This was confirmed by ROC curves and AUC.
Conclusions: PTSD symptoms are present in 1 out of every 4 SAH survivors in the long term. Cognitive measures, specifically visuoperception and construction are the strongest early predictor compared to cognitive complaints, mood or experienced anxiety. The influence of visuoperceptual disturbances on long term outcome appears consistent with findings in ischemic stroke patients.
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W.S. VEENSTRA, J.M. SPIKMAN, A. BUUNK & R.J. GROEN. Long-term Cognitive, Emotional and Behavioral Consequences of Subarachnoid Haemorrhage.
Objective: Aneurysmal subarachnoid haemorrhage (SAH) accounts for approximately 5% of all strokes. Occurring at a relatively young age, with a peak age incidence between 40 and 60 yrs. and less than 50% of patients that return to their previous occupations, SAH has an immense impact on real-world functioning. The aim of this study is to investigate long term cognitive, emotional and behavioral consequences of SAH in relationship to role resumption and return to work
Participants and Methods: 440 patients suffered from aneurysmal SAH and were admitted to the UMCG between 2002 and 2009. Of the 307 survivors 28 were excluded because of comorbidity; other neurological diseases, psychiatric disorders or other serious illnesses. Of the remaining group of 279 patients 175 were willing to participate (Mean age 59,7 yrs, 37% men, 63% women).
All patients received a semi-structured interview by telephone (role resumption list) and were asked to complete questionnaires on anxiety and depression (HADS), cognitive functioning (Head Injury Questionnaire-short version) and changes in executive, emotional and behavioral functioning (DEX).

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Results: SAH patients and their relatives frequently report problems concerning cognitive, emotional and behavioral functioning in daily life which play an important role in social relationships, role resumption and return to previous occupation and lifestyle. Differences within patient groups and between patients and their relatives are described in relation to severity, aneurysm localization and treatment.
Conclusions: SAH following ruptured aneurysm can lead to a variety of cognitive, emotional and behavioral disturbances which can have serious, adversive, consequences for patients who, after a period of initial recovery, try to return to work and social life according to patients and their relatives. In addition, severity, localization and treatment of the aneurysm play an important role in returning to previous lifestyle and employment 2 to 5 years after SAH.
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T. VIHAVAINEN & E. POUTIAINEN. Cognitive Performance and Health Related Quality of Life 6 Months After First-Ever Cerebral Infarction.
Objective: Health Related Quality of Life (HRQOL) comprises of the individual's physical, emotional, social and cognitive ability to function. Reduced HRQOL is a common consequence of stroke. The aim of this study was to examine overall cognitive performance as well as different cognitive domains in relation to HRQOL 6 months after first-ever ischaemic cerebral infarction.
Participants and Methods: Study group comprised of 174 (18-65 y) consecutive inpatients with first-ever cerebral infarction in two Finnish Central Hospitals. Exclusion criteria were previous CNS, psychiatric disease, or severe aphasia. Neuropsychological examination at 6 months included measures of Psychomotor Speed (TM A, Stroop-A/naming, WAIS-III/DSc), Executive Function (Stroop B-A, TM B-A, Phonemic fluency), Verbal Memory (WMS-R/LM I, and DSp, List learning delayed recall), Visual Memory (BVRT, delayed recall), Verbal Skills (WAIS-III/Sim, Semantic fluency), and Visuospatial Skills (Visual search task, WAIS-III/BD). HRQOL was assessed with the 15D questionnaire®. Based on the performance of demographic controls, sum z-scores were formed for overall cognitive performance and the different cognitive domains.
Results: In linear regression overall cognitive performance predicted HRQOL (β=-.47, t(164)=-5.21, p<.001), and explained 13,6% ($F_{0,164}$=4.02; p<.001; R^2=.136) of the variance in HRQOL. All separate cognitive domains were statistically significant in the model, of which Psychomotor Speed (14.8%), Visuospatial Skills (9%) and Verbal Memory (7.4%) had the strongest explanatory power.
Conclusions: Poor overall cognitive performance predicts lower HRQOL at 6 months after first-ever cerebral infarction. Psychomotor Speed, Visuospatial Skills, and Verbal Memory were the best individual cognitive domains predicting low HRQOL.
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FRIDAY AFTERNOON, JUNE 29, 2012

Invited Address: Plug It In and Turn It On: Connectivity and Activation after Pediatric Traumatic Brain Injury

Speaker: Christopher Giza

12:00–1:00 p.m.

C.C. GIZA, T. BABIKIAN, N.S. SANTA MARIA, A. PONNALURI, S. DEBOARD-MARION, M.L. PRINS, S. COPELAND, R.F. ASARNOW & D.A. HOVDA. Plug It In and Turn It On: Connectivity and Activation after Pediatric Traumatic Brain Injury.
It is well recognized that traumatic brain injury (TBI) early in life can result in significant and long-lasting impairments. It is also known that in most cases there is substantial recovery that occurs with time. Understanding the nature of post-TBI sequelae and the nature of recovery from TBI requires elucidation of the underlying neurobiological mechanisms. This lecture will review experimental and translational evidence for two major mechanisms of post-TBI dysfunction: 1) synaptic inactivation and 2) axonal-network disconnection. Following TBI, acute excessive glutamatergic stimulation gives way to a period of impaired neural activation that is correlated with behavioral deficits. Molecular pathways mediated by the N-methyl-D-aspartate receptor are involved in normal development and plasticity but demonstrate significant perturbations after TBI. These molecular and electrophysiological alterations have been increasingly described in animal models and are now also being detected after TBI in young persons, using noninvasive functional imaging. This understanding opens a window of opportunity for mechanism-based therapies to re-activate the injured brain. Furthermore, white matter injury also occurs following TBI, and the young, less myelinated brain may be relatively more vulnerable to this mechanism of damage. Axonal injury disrupts neural networks; this can occur after axonal transection or after transient axonal stretch injury. Reparative mechanisms related to remyelination of axons and strengthening of white matter pathways provide new mechanism-based opportunities for therapeutic intervention after pediatric TBI. Studies of behavioral recovery after pediatric TBI can be robustly linked to the neurobiological mechanisms of recovery through translational modalities of advanced neuroimaging and electrophysiology.
Learning Objectives:
1: To understand how principles of brain development and plasticity underlie recovery from Pediatric TBI
2: To review basic neurobiological mechanisms of recovery and rehabilitation in the immature brain.
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Paper Session: Dementia

12:00–1:30 p.m.

A. NORDLUND, M. GÖTHLIN, J. STÅLHAMMAR & A. WALLIN. Different Neuropsychological Profiles of Incipient AD and Vascular Cognitive Disorder.
Objective: To study which neuropsychological tests in an MCI population strongest predicted conversion to dementia in general, Alzheimer's disease, and mixed dementia/vascular dementia.
Participants and Methods: Two hundred and eighty MCI subjects were followed up after two years and 120 also after 4 years. The neuropsychological battery covered tests of speed and attention, learning and episodic memory, visuospatial, language and executive functions.
Results: The tests that best predicted dementia in general covered the cognitive domains speed/attention, memory and executive functions. Although there was some overlap, the profiles of incipient AD and MD/VaD differed quite distinctively. Memory, visuospatial and language symptoms preceded AD; speed/attention, memory and executive symptoms preceded MD/VaD.
Conclusions: The tests that predicted MD/VaD were almost identical to the tests that predicted dementia in general, which can be explained by the fact that a majority of the converting patients had vascular disease. The sensitivity and specificity figures were quite good for dementia in general but slightly poorer for the specific dementia diagnoses.
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H. JOKINEN, R. SCHMIDT, S. ROPELE, F. FAZEKAS, F. BARKHOF, P. SCHELTENS, S. MADUREIRA, A. VERDELHO, J.M. FERRO, A. WALLIN, L. PANTONI, D. INZITARI & T. ERKINJUNTTI. Microstructural abnormalities in normal-appearing brain tissue predict longitudinal cognitive decline. The LADIS study.

Objective: Cerebral white matter hyperintensities (WMH) are a frequent finding on brain MRI. They relate to aging and vascular risk factors and are one of the core features in the ischemic small-vessel disease. Growing evidence suggests that the progression of WMH is associated with cognitive decline, although the mechanism has remained obscure. Diffusion weighted imaging (DWI) provides quantitative data on the white matter microstructure and a more direct measurement of the brain tissue integrity than conventional MRI. The present study investigated whether DWI changes within normal-appearing brain tissue (NABT) or in WMH areas predict longitudinal cognitive decline in older individuals.

Participants and Methods: As part of the Leukoaraiosis and Disability study, 340 subjects with age-related WMH underwent DWI and clinical examinations at baseline. Detailed neuropsychological assessment was repeated yearly in 3-year follow-up. Baseline DWI predictors of cognitive change over time were analyzed with linear mixed models adjusting for demographic variables, WMH volume, and global brain atrophy.

Results: Within NABT, average apparent diffusion coefficient (ADC) as well as peak height and position of the ADC histogram significantly predicted steeper rate of decline in different cognitive composite scores including psychomotor speed, executive functions, and memory. Mean ADC within WMH areas only predicted change in psychomotor speed.

Conclusions: Microstructural changes as assessed by DWI particularly in NABT play a major role in determining future cognitive decline among older individuals. These abnormalities may represent subtle ischemic changes not yet visible on conventional MRI examination.

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T. SÄRKÄMÖ, S. LAITINEN, A. NUMMINEN, M. KURKI & M. TERVANIEMI. Therapeutic Use of Musical Leisure Activities in Mild-Moderate Dementia: Randomized Controlled Trial.

Objective: The capacity of music to engage emotions and cognitive functions is often well-preserved in dementia. Previously, music has primarily been used in therapist-lead interventions for persons with dementia (PWDs) living in long-term care institutions. Less is known about its use in everyday dementia care, especially in the early stage of dementia. The aim of the present single-blind, randomized and controlled trial was to determine the long-term effect of a novel music intervention based on coaching the caregivers of PWDs to use singing and listening of familiar songs in the everyday care of the PWD.

Participants and Methods: 89 dyads of PWDs with mild-moderate level dementia and their caregivers (family members or nurses) were randomly assigned to a singing group (n = 30), a music listening group (n = 29) or a control group (n = 30). In the singing and music listening groups, the PWD-caregiver dyads either sung or listened to familiar songs and were coached on how to incorporate regular musical activity into everyday life during a 10-week period. Outcome evaluation consisted of neuropsychological testing as well as questionnaires on mood, quality of life (QOL) and carer burden performed prior to coaching, immediately after it and 6 months later.

Results: The mood and orientation level of the PWDs improved significantly more in both the singing and music listening groups compared to the control group. In addition, music listening also had a long-term positive effect on the QOL of the PWDs whereas singing improved the verbal and episodic memory of the PWDs and reduced the psychological distress and burden of the family members.

Conclusions: Regular everyday musical activities, such as singing and music listening, provided by caregivers can have long-term beneficial effects on emotional, social and cognitive wellbeing in the early stage of dementia as well as on the psychological coping of the caregivers. Thus, music coaching seems to an effective and suitable method for dementia rehabilitation.

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L.A. MILLER, E. MIOSHI, S. SAVAGE, S. LAH, J. HODGES & O. PIGUET. Carer Burden in Dementia: Impact of Neuropsychological Impairments, Dementia Type and Demographic Factors.

Objective: Previous studies have indicated that Carer Burden (CB) in early dementia is linked with dementia type, carer gender, level of carer depression and dementia stage, but little is known about the impact of specific cognitive impairments. We investigated the contributions of (i) cognitive deficits (ii) diagnostic category and (iii) carer demographics (i.e., age, sex) to CB.

Participants and Methods: Thirty-nine Alzheimer's dementia [AD] and 63 frontotemporal dementia [FTD] patients undertook measures of anterograde memory (Rey Auditory Verbal Memory and "Doors" from Doors and People Memory Test), retrograde memory (Autobiographical Interview), impulse control (Hayling Test) and facial emotion recognition (Facial Emotion Selection Test) as well as a dementia screening tool (Addenbrooke's Cognitive Examination-Revised [ACE-R]). Patient's carers completed a measure of CB (Zarit Burden Interview). AD and FTD groups were well matched for ACE-R score, carer age and carer sex distribution.

Results: CB was negatively correlated with anterograde memory ($r = -.46$, $p = .001$), emotion recognition ($r = -.32$, $p = .003$) and carer age ($r = -.24$, $p = .018$). Female carers reported higher CB than male carers ($t(100) = -1.99$ and $p = 0.049$) and CB was higher for FTD than AD patients ($t(100) = -2.54$, $p = 0.013$). Surprisingly, we found no relationships between CB and autobiographical memory, verbal impulse control or ACE-R scores. Linear regression analysis including variables found to be correlated with CB revealed that while anterograde memory impairment ($\beta = -.234$, $p = .036$), emotional processing deficits ($\beta = -.223$, $p = .048$) and carer age ($\beta = -.222$, $p=.042$) made significant independent contributions to CB, dementia type and carer's sex did not.

Conclusions: CB is particularly high when patients have deficits in anterograde memory and emotion processing abilities and younger carers are especially at risk. These findings will be used to augment carer-support interventions by teaching ways to cope with changes in these domains.

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R. NÄÄTÄNEN. Cognitive decline in different neurological and neuropsychiatric disorders as indexed by the mismatch negativity (MMN).

Objective: This is a review showing that with the mismatch negativity (MMN), one can measure cognitive decline shared by different disorders irrespective of the etiology or symptomatology of the disorder

Participants and Methods: A review.

Results: A review

Conclusions: Cognition is usually affected in different major neuropsychiatric and neurological disorders such as schizophrenia, stroke, major depression, autism, dysphasia, epilepsy, Parkinson's disease, and Alzheimer's disease and related neurodegenerative diseases. Very importantly, the mismatch negativity, MMN, an automatic brain response to auditory change or, more generally, regularity violation, and its magnetoencephalographic (MEG) equivalent MMNm are affected in most of these cases. Furthermore, the MMN attenuation and/or peak-latency prolongation in these disorders seem to index cognitive decline associated with these disorders. This suggests that the MMN provides a unique window to the core element of neurocognitive diseases, viz., the cognitive impairment. In this talk, I will review MMN and MMNm studies in these neuropsychiatric and neurological disorders and show that the abnormalities of these responses are associated with the concurrent impairment of cognitive function. This appears to be due to the fact that MMN deficiency reflects deficiency of the NMDA-receptor function necessary for memory-trace formation, one central building block of cognitive function.

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Poster Session 6: Imaging, Memory Functions, Psychopathology/Neuropsychiatry

12:00–1:30 p.m.

Imaging (Functional)

E. GREEN, L. HAASE, A. JACOBSON, A. STICKEL & C. MURPHY. Energy Content Moderates the Relationship Between Adiposity and Hypothalamic Response to a Sweet Taste.

Objective: A high body mass index (BMI) is associated with increased risk for hypertension, hyperlipidemia, and type II diabetes and recent research suggests relationships between metabolic disease and cognitive impairment. Adiposity has been linked to decreased brain response in reward regions, suggesting that a blunted reward response may precede weight gain. The objective of this analysis was to investigate associations between BMI and fMRI activation during hedonic evaluation of caloric and noncaloric sweet tastes in 24 young adults.

Participants and Methods: After fasting for 12 hours, participants were given 0.3mL of a natural or artificial sweetener 16 times while completing a hedonic evaluation task in the scanner. A region of interest analysis was conducted and fit coefficients were correlated with BMI.

Results: Consistent with previous findings, significant negative relationships were observed between BMI and brain response to the caloric sucrose in several reward areas including the caudate ($r(22) = -.489$, $p = .015$), insula ($r(22) = -.448$, $p = .035$), nucleus accumbens ($r(22) = -.516$, $p = .014$), and hypothalamus ($r(22) = -.616$, $p = .001$). In contrast, BMI was positively associated with hypothalamic activation to the noncaloric saccharin ($r(22) = .456$, $p = .033$).

Conclusions: Results indicate that young adults with higher BMIs had larger hypothalamic responses to the artificial sweetener, but smaller responses to the natural sweetener than participants with lower BMIs. This suggests that overweight or obese individuals may have altered reward processing of both natural and artificial sweetener. Investigating differences in brain activity in regions involved in taste and reward processing may assist in further understanding the current obesity epidemic and energy intake in overweight or obese individuals who may be at increased risk for developing cognitive impairment.

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M. HENDRIKS, N. FRANKENMOLEN, R. KESSELS, H. BERGMANN, A. ALDENKAMP, P. HOFMAN & P. OSSENBLOK. Applicability of fMRI in the Assessment of Memory Functions for Epilepsy Surgery?

Objective: Epilepsy patients undergoing neurosurgery are at risk for postoperative language and memory deficits. To minimize this risk it is important to assess brain regions for language and memory preoperatively, using a non-invasive method such as fMRI. For language lateralization this has been successful. However, no sensitive fMRI memory task is currently available for this purpose. The objective of this study is to develop and examine an fMRI memory task (face-name-association memory) that provokes bilateral hippocampal activation in healthy volunteers.

Participants and Methods: Ten healthy adults, varying in age and education level, participated in the study (6 females, mean age 36.7, sd 18.2). The participants encoded the faces and names in the scanner, while functional images were obtained. Memory performance for the associations was measured with a recognition task afterwards. Results from the random effects analyses were first thresholded at $p< 0.001$ (uncorrected). Subsequently, an anatomical region of interest (ROI) was created that covered the hippocampus bilaterally and that was used to mask for small-volume corrections (tested at $pFDR < 0.05$).

Results: Results showed significant hippocampal activations in 9 out of 10 participants. The ROI analysis showed bilateral hippocampal activations in 8 participants and unilateral hippocampal activations in one participant. In two participants no task-specific hippocampal activation could be determined. The mean recognition score across all participants was 75% (M=36.3/48, sd=5.6).

Conclusions: The present study shows that this face-name-association task is a useful fMRI memory task that provokes hippocampal activations in individual participants. This may be a suitable task for clinical purposes. Further research will focus on validating this task in the preoperative memory assessment of epilepsy surgery candidates.

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B. OSNES, K. HUGDAHL, H. HJELMERVIK & K. SPECHT. Stimulus expectations modulate temporal and posterior frontal areas in auditory speech perception.

Objective: The involvement of inferior frontal gyrus and ventral premotor cortex has repeatedly been reported in speech perception studies but in particular the involvement of the premotor cortex is still controversially discussed. However, the complexity of the stimuli, tasks and instructions given to participants vary to a great extent between these studies.

Participants and Methods: Therefore, this fMRI study investigated whether already stimulus expectancy modulates temporal and posterior frontal area. Thus, the same stimuli were presented in three consecutive sessions, but with different instructions. The stimuli consisted of ambiguous sounds that were spectral mixes of phonetic (vowels) and non-phonetic sounds (music instrument sounds). In the first session the participants were unaware of any specific speech or music features in the sounds. Prior to the second and third session participants were informed about specific music features and speech features in some of the sounds, respectively.

Results: The results revealed activations in superior temporal sulcus and planum temporale in all sessions. In sessions two and three, additional activations were seen in Broca's area, primary motor cortex, premotor cortex, supplementary motor cortex, and inferior parietal lobule. Further, stimulus expectations modulated also the activation in superior temporal sulcus and planum temporale.

Conclusions: Thus, these results are highlighting the importance of contextual aspects such as information given to the participant when drawing conclusions about speech production networks in studies on speech perception.

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B.F. SIKVELAND, S. LEKNES, G. KIRKESOLA, ØYVIND. PEDERSEN, E. LÆRUM & T. ENDESTAD. Isolating the neuronal networks responsible for superficial muscle and support muscle control.

Objective: From previous research we know that the superficial neck muscles tend to be overactive and have reduced ability to relax in patients with chronic neck pain, whereas the inner muscles are not functioning optimally during muscle tasks (Falla et al. 2004 Spine). Previous research have only been using electromyography to study this phenomenon and a possible cortical explanation to this change in muscle activity has jet to be studied. In this rather explorative pilot study we use fMRI to investigate possible neurobiological mechanisms involved in successful treatment using Neurac* in treatment of chronic neck pain.

Participants and Methods: Using fMRI to map BOLD signals during muscle tasks (MT), before (T1) and after (T2) successful treatment, we hypothesize to find changes within each patient and between patients at T1 and healthy controls. We also compare patient data at T2 and control data, to study if in fact the treatment has normalized the muscle activation. MTs used: opening of the jaw (MT1) pressing the tongue to the right (MT2) and against the palate (MT3) and fingertaping as a control task (MTC). MT1-3 are designed to activate both inner and superficial neck muscles.

Results: Preliminary results shows that the controls have differentiated cortical and subcortical patterns, in the different conditions. In comparison to MTC, MT1 have lower brainstem activation, activating both Pons and the Midbrain, whereas MTC primarily activates Thalamus. MT1 also have cortical activation in precentral and postcentral gyrus in both hemispheres. MT3 gave activation in postcentral gyrus in both hemispheres, and MT1-3 and MTC all gave differentiated patterns of cerebellum activation.

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Conclusions: This leads to a discussion of whether brainstem and cerebellar activation reflects activity in inner neck muscles and cortical activation superficial muscles. Implications of these finding and results from the patient group will be discussed further on the poster.
*A treatment method developed by physiotherapists from Redcord.
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T. SINNES, A. MELINDER, D. SULHEIM, E. FAGERMOEN, A. WINGER, V.B. WYLLER & T. ENDESTAD. Emotional Stroop and CFS: An fMRI Study.
Objective: Chronic fatigue syndrome (CFS) is a highly debilitating disorder which, despite a wide amount of research effort, remains poorly understood. Earlier findings include a range of neuropsychological impairments of which the most prominent are related to processing speed, working memory and learning of information. Furthermore, the existence of disturbances in the motor planning system of CFS patients has indirectly been supported by brain imaging research. Taken together, these previous findings point towards a dysfunction in the frontal control system. In the current study we set out to more directly investigate this system in CFS.
Participants and Methods: A group of 14 adolescent patients diagnosed with CFS and 17 age-matched healthy controls underwent fMRI while doing an emotional Stroop task. The task, which is reported to be associated with frontal neural network activations, comprised a series of pictures of faces expressing either the emotion joy or fear with one of the corresponding words in the foreground, hence making each trial either congruent or incongruent.
Results: The fMRI data was analysed using an event-related design. For the controls, an expected frontal activation pattern was found. Further, a pattern of significantly lower activation in the upper brainstem and inferior frontal gyrus was found in the incongruent fear condition for patients compared to healthy controls. The same activation pattern also seemed to appear in the other conditions (however at a lower significance level), thus indicating a more general task effect, not confined to conflict resolution only. A tendency of lower activity in the patient group was also observed in the bilateral anterior insula in the fear condition, regardless of task congruence.
Conclusions: In general, the results point towards a frontal hypoactivation beeing part of a possible neural association with CFS. Further implications for our understanding of the syndrome will be discussed.
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J. STOJANOVIC-RADIC, G. WYLIE, G.T. VOELBEL, N. CHIARAVALLOTI & J. DELUCA. Functional Magnetic Resonance Imaging (fMRI) and Near Infrared Spectroscopy (NIRS): Extent of Agreement Between Two Imaging Methods When Studying Brain Activation.
Objective: To understand the extent to which two independent imaging methods – near-infrared spectroscopy (NIRS) and functional magnetic resonance imaging (fMRI) – agree when studying brain activation in a clinical population.
NIRS and fMRI have shown compatibility in the past, demonstrated by the correlation between the blood oxygenated level dependent (BOLD) signal detected via fMRI and oxygenated Hemoglobin (oxyHb) detected via NIRS. While fMRI has a better spatial resolution, NIRS has several important advantages: subjects are free to move, the system is portable and it is relatively inexpensive.
Participants and Methods: 10 MS participants who underwent NIRS recording (NIRS MS), were matched for age and gender with the 10 MS who underwent fMRI scanning (fMRI MS). All subjects performed a working memory (WM) task (the N-Back task). Data was collected from 30 NIRS source/detector optodes placed on participants' foreheads to capture changes in the (oxyHb) in the anterior prefrontal cortex. During the fMRI acquisition, the entire brain was imaged. On the N-Back test, the 0-back was used as the baseline condition, and the 1-back trial placed increased demands on WM systems.
Results: Comparison of NIRS MS and fMRI MS activations yielded matching neural activation patterns for the 0-back, 1-back, and [1-back minus 0-back] tasks as follows: significant activation decrease was found in Right Superior Frontal Gyrus (BA10) on 0-back; no significant activations were noted on 1-back on either measure; and significant activation was found on [1-back minus 0-back] contrast in Left Middle Frontal Gyrus (BA9).
Conclusions: This study shows compatibility between the two imaging methods, NIRS and fMRI in a clinical population (MS) during a cognitive task. The implications of these findings are that NIRS may be a reliable as well as more cost-effective and "subject-friendly" method of imaging for pre-defined regions of interest, even when studying cognition.
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M.J. TOBIA, C. ARFELLER & L. CATTANEO. Neural Representation of Mechanical Knowledge for Human Tool Use.
Objective: Mechanical knowledge is the set of facts and skills that allows one to manipulate the environment in a goal-directed manner by using a tool. Conceptual apraxia is a heterogeneous diagnosis involving the ablation of mechanical knowledge resulting in tool use deficits such as problem awareness, tool selection, and mechanical advantage impairments (Heilman, 2010). This fMRI experiment was designed to dissociate neural substrates representing aspects of mechanical knowledge that mediate tool selection.
Participants and Methods: BOLD fMRI data were recorded while participants (N=14) performed a picture matching task that presented a recipient and action goal, with four objects from which to select the one that would best allow goal accomplishment. Some trials allowed selection of the prototypical tool (proto), and some trials forced selection of either a substitutable (sub) or impossible (imp) tool. For other trials the specified action goal nullified accomplishment with a tool, in which case participants could indicate use of their dominant hand (hand).
Results: All trial types stimulated widespread brain activation spanning the visual cortex, posterior parietal cortex, lateral temporal cortex, and frontal cortex. Statistical comparisons (paired t-tests) revealed significantly different patterns of activation (FWE corrected ps < .001) between proto and sub, with the middle temporal gyrus (MTG) more strongly activated by proto, and inferior parietal lobule (IPL) and intraparietal sulcus (IPS) more strongly activated by substitution choices.
Conclusions: These findings suggest that activation of the MTG represents semantic knowledge of conventional tool usage, and that activation of the IPL/IPS supports object manipulation affordances and skilled movement representations. These findings are consistent with previous reports from neuropsychological studies of tool use and neuroimaging investigations of praxis.
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Imaging (Structural)

S.J. BANKS. Education protects against cognitive deficit in combat sports: the Professional Fighters Brain Health Study.
Objective: Boxing and mixed martial arts (MMA) are sports associated with repetitive head trauma. In some cases, fighters go on to develop chronic traumatic encephalopathy and other neurodegenerative conditions. While we know that higher levels of education protect cognition, but not the brain itself, in Alzheimer's disease, the relationship between educational level, brain trauma and cognition in combat sports is unknown.
Participants and Methods: A cohort of 73 fighters (26 boxers, 47 MMA) was separated into high school education or less or more than high school education. There was no difference in the distribution of type of fighter in each education group. Subjects underwent cognitive testing to assess psychomotor speed, processing speed, memory and ability to inhibit responses, along with brain MRI from which volumes of cortical and subcortical structures were calculated. Fighting history was obtained from self report and published records.
Results: While the two groups did not differ on exposure variables (number of fights or fights per year), cognitive test scores or volume of their

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brain structures, they did differ on the relationship between the degree of exposure and loss of cognition: The less educated group showed negative correlations between number of fights per year and bilateral hippocampal, amygdala, thalamus, caudate and left putamen volume, whereas the higher educated group only showed such a relationship with the caudate bilaterally; the less educated group had a negative relationship between number of fights and memory, processing speed and psychomotor speed, whereas no such relationship existed in the higher education level group.

Conclusions: In summary, in this cross-sectional study of fighters we found education to be protective not only to the brain itself but also to the effects of repeated fighting on cognition. The longitudinal data being collected in this ongoing study may reveal more about the apparent neuroprotective effect of education in this cognitively vulnerable population.

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A. BJØRNEBEKK, L.T. WESTLYE, K.B. WALHOVD, H. GRYDELAND, S. TORGERSEN & A.M. FJELL. Characteristics of the neurotic brain: investigating the big five with structural neuroimaging parameters in a large healthy sample.

Objective: Advances in neuroimaging techniques provides new insight about the neurobiology of complex traits of human personality. However the field has been hampered with studies with small sample sizes and a risk of letting coincidental findings characterize the field.

The current study provides a comprehensive investigation of brain structure-personality relations using several imaging parameters in a large sample

Participants and Methods: 265 healthy adults completed the revised NEO Personality Inventory (NEO-PI-R), and underwent MRI scanning with structural MPRAGE's and diffusion tensor imaging sequences. Cerebral characteristics were investigated with measures of thickness and surface area across the cortical mantle as well as volumetry of selected subcortical ROIs and brain volume measures. Tract based spatial statistics (TBSS) were used to examine associations between big5 and diffusivity indexes of white matter (WM) microstructure across the brain.

Results: Neuroticism was negatively associated with brain volume, WM microstructure in widespread anatomical regions, and reduced cortical surface in temporal and frontal areas. In particular the anxiety and vulnerability to stress facets of neuroticism were related to these cerebral characteristics. Minor personality-brain associations were found for extraversion, conscientiousness and agreeableness.

Conclusions: Of the five traits neuroticism is the one most strongly related to structural brain measures. These cerebral characteristics constituting reduced brain volume, surface area and integrity of WM fiber tracts affects anxiety-related aspects of personality, and represents promising biomarkers for increased susceptibility to psychiatric disease.

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M. CHECHLACZ, P. ROTSHTEIN, K.L. ROBERTS, W. BICKERTON, J. LAU & G.W. HUMPHREYS. Acute versus Chronic Prognosis of Allocentric versus Egocentric Neglect Symptoms Based on Clinical Scans.

Objective: The present study examined neuroanatomy of acute versus chronic neglect and whether persistent neglect symptoms could be predicted based on clinical scans.

Participants and Methods: We contrasted the neuronal substrates of subacute and chronic deficits associated with neglect using computed tomography scans acquired as a part of routine clinical diagnosis. Voxel-wise statistical analyses were conducted on a group of 160 stroke patients scanned at a subacute stage. Lesion-deficit relationships were examined across the whole brain, separately for grey and white matter. We assessed lesions that were associated with behavioural performances at subacute stage within 3 months and chronic stage - 9 months post stroke.

Results: Allocentric and egocentric neglect at subacute stage was associated with lesions to dissociated regions within the frontal lobe, amongst other regions. However, the frontal lesions were not associated with chronic neglect. Lesions in the angular gyrus were associated with persistent allocentric neglect, while lesions within the superior temporal gyrus extending into the supramarginal gyrus, as well as lesions within the basal ganglia and insula, were associated with persistent egocentric neglect. Damage within the temporo-parietal junction was associated with both types of neglect at 9 months. Finally, we demonstrated that white matter disconnections resulting from damage within the superior longitudinal fasciculus were associated with both types of neglect and critically related to both subacute and chronic deficits.

Conclusions: In summary, we provide evidence that although wide spread lesions are associated with subcute symptoms, only some of these are critical for predicting whether neglect will become a chronic disorder. The presented findings strongly advocate the potential of using CT data to predict functional recovery and we conclude that the use of this imaging modality to develop novel tools for making clinically meaningful predictions of stroke outcome presents a feasible possibility.

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N. DEMEYERE, W. BICKERTON, P. ROTSHTEIN, J. RIDDOCH & G. HUMPHREYS. A Lesion-Symptom Analysis of Multiple Components of Attention: A Voxel-Based Analysis of the Auditory Attention Test from BCoS.

Objective: We report data on neural correlates of the Auditory Attention Test from the BCoS battery, which provides measures of sustained attention, selective attention, inhibition and working memory.

Participants and Methods: The study used an automated voxel-based correlational method to relate behavioural scores of sub-acute stroke patients (N=444) on the Auditory Attention Test to changes in grey and white matter as detected on clinical admission CT scans.

Results: Impairments in sustained attention (decay in performance over time, when tapping to auditory targets) were found to be reliably related to bilateral cerebellar lesions, in line with the cerebellum playing a necessary role in attentional control. Impairments in inhibition (where patients have high false positive scores) were found to be associated with damage to Right caudate and Right superior medial frontal areas. In contrast working memory impairments (remembering the 3 target words) were found to be correlated with grey matter changes in the right superior frontal gyrus, the left postcentral gyrus and the right cerebellum.

Conclusions: The data indicate that components of the Auditory Attention task map onto distinct underlying brain structures and can be associated with focal brain lesions.

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I. MARQUÉS-ITURRIA, I. GARCÍA-GARCÍA, B. SEGURA, R. PUEYO, M. GAROLERA, M. VERNET, M. SENDER, M. ARIZA, A. NARBERHAUS & M.A. JURADO. Cortical Thickness Decreases in Healthy Participants with Obesity at Relatively Young Ages.

Objective: There is growing evidence about the effect of obesity on brain structure and function. In line with studies that highlight similarities between obesity and addiction, obesity could be considered a disturbance of the eating behavior control in which cerebral structures related to inhibitory and motivation processes would be implicated, mainly prefrontal brain areas. The aim of this study was to investigate the cortical thickness of the prefrontal cortex in obesity.

Participants and Methods: Participants' health condition was assessed by specific medical and psychological tests that excluded the most important variables that could possibly interact with obesity, such as metabolic syndrome. 3T Magnetic Resonance Imaging and FreeSurfer software were used to assess cortical thickness of 20 obese participants with ages between 19 and 39 (mean 33.00, standard deviation (SD) 6.45) and 16 controls with ages between 19 and 40 (mean 30.50, SD 6.41).

Results: Compared to control group, obese group showed reduced cortical thickness in a variety of prefrontal areas: left and right superior frontal ($p=0.008$, $p=0.013$), left and right caudal middle frontal ($p=0.015$, $p=0.032$) and right medial orbitofrontal ($p=0.018$) areas.

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Conclusions: These results show that a reduction of cortical thickness is evident on obesity, even at young ages. We suggest that these decreases in prefrontal cortical thickness may account for the lack of control and altered motivation processes in the eating behaviour in obese people.
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Memory Functions

I. CHEN, M. HUA, C. CHEN, Y. WU & T. CHENG. False Memory in Patients with Huntington's Disease.
Objective: The issue regarding elevated false alarm memory recognition errors in patients with Huntington's disease (HD) has been widely reported. However, little has approached the false recognition pattern in the patients for further understanding their constructive processes of memory. Using the Deese-Roediger-McDermott (DRM) false memory paradigm, the present study was to explore gist memory, verbatim memory, and monitoring functioning in patients with HD.
Participants and Methods: Twenty-five HD patients and thirty healthy normal controls participated in the study. The patients were further partitioned into mild and moderate to severe groups based on their general cognitive and living functioning. All subjects were given a battery of neuropsychological tests and the DRM paradigm tasks.
Results: On the related false recognition indices of the DRM paradigm tasks, only moderate to severe HD patients exhibited significantly poorer scores than their normal counterparts. On the unrelated false recognition indices, mild HD patients showed more errors than their normal counterparts on the verbal DRM task while moderate to severe patients exhibited more errors than their normal mates on both of verbal and pictorial DRM tasks. On the verbatim memory indices, all patient groups showed significantly poorer performances than their normal counterparts on the pictorial task, and performance of the moderate to severe patient group was remarkably poorer than that of the mild patient one.
Conclusions: Based on the results, it appears that defective verbatim memory and monitoring functioning are early signs in HD patients and these may deteriorate along the disease course. Nevertheless, gist memory is relatively robust with a partial decline at the advanced stage of the disease. Our findings suggest that the mesial temporal lobe functioning is relatively preserved compared with frontal-related structures in early HD patients, and a gist-oriented memory rehabilitation program might be beneficial to the patients.
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Y. HIGUERAS, F. GARCÍA-VAZ, M. TOUMAIAN, P. HORWITZ & S.G. BOEHM. False Memories: Do You Want More?
Objective: Previous studies on false memories have often used the Deese-Roediger-McDermott (DRM) paradigm, where a lure item not present in a learning verbal test is usually recalled by the participants as an old item. They use to have only a single lure item per list and the number of lists is small (~20).This approach results in a considerable small number of trials with false memories per participant, making difficult to investigate the neural basis of false memories with brain imaging techniques like event-related potentials. We propose a new task that reliably induces false memories on a large number of trials suitable to be used with brain imaging techniques.
Participants and Methods: We designed a visual false memory task divided into three blocks. Each block included several study/test phases with relax periods between blocks. At study phase, a string of three visual scenes to be learned are shown. At test phase we present a list of visual single items and participants are asked to press yes or no buttons whether they remember those items being present in any of the previous scenes displayed at study phase. We will test 15 items per each scene (5 old, 5 lure items with a semantic relationship with the scene but not present on it and 5 new unstudied items). This task is designed with 30 scenes to be studied and 150 possible lure items to be tested. Twenty healthy adults (45% male; 85% right handed and 5% bimanual) with a mean age of 29 (SD 7.18) participated.
Results: The hit rate for old items was 77.9% and the false alarm rate for new items was 7.5%. On average, 50.4% of the critical lure items were endorsed as old as an indication of false memory.
Conclusions: Our false memory test based on visual scenes reliably induces false memories for critical lure items fitting the topic of studied scenes but not present in the scene itself. The present approach offers sufficient power for investigating the neural basis of false memories with brain-imaging techniques.
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J. LI & P. WANG. More Familiarity-based Responses in Mild Cognitive Impairment Patients Makes the Absence of Emotional Enhancement in Recognition Memory.
Objective: This study separated the two processes in recognition test, recollection and familiarity, to investigate whether emotional memory advantage is preserved in recollection process for patients with amnesic mild cognitive impairment (aMCI) who are at higher risk for later Alzheimer's disease (AD), and whether aMCI relies more on familiarity compared to healthy elderly in recognition task.
Participants and Methods: Positive, neutral and negative faces were used as memory stimuli. Thirty-one aMCI patients and 30 healthy older adults (NC group) participated in a recognition test followed by a Remember/Know judgment.
Results: For overall recognition performances, emotional memory enhancement was found only in NC group which leading to NC performed better than aMCI group with both negative and positive stimuli but not with neutral ones. However, when Remember and Know responses were separately analyzed, we found equivalent emotional memory enhancement in both groups for R response. But the pattern for Know responses were dramatically different in that only in aMCI group which contributed a significant proportion to recognition performance, and furthermore were not affected by the emotional nature of the stimuli.
Conclusions: The present study provided evidence that emotional memory enhancement was present in aMCI patients. The observed absence of emotional memory advantage in previous and current recognition tests resulted from the fact that aMCI patients relied more on familiarity-based "know" responses for correct recognition which diluted the emotional memory enhancement in recollection-based Remember response. The results provided implications for early detection of aMCI in that using emotional stimuli in recognition memory test may be more sensitive relative to neutral stimuli for identifying aMCI from normal elders.
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A. MARYNIAK, A. ONDRUCH & E. JURKIEWICZ. Lost Attachment. Teenage Girl with Post-Traumatic Loss of Autobiographical Memory.
Objective: We describe the case of teenage girl who showed a selective loss of autobiographical memory.
Participants and Methods: As a result of road accident, a fourteen-year-girl suffered contusions in the right hemisphere of the gyri: rectus, orbital, inferior frontal, inferior, middle and superior temporal.
Results: The patient experienced complete loss of retrograde autobiographical memory in all its aspects (semantic - knowledge about the history of her life, family members, friends; episodic – memories; emotional - loss of bond). Other cognitive functions, including the learned knowledge, remained intact.
During three years of observation the patient reconstructed semantic autobiographical memory - getting to know the story of her life, reconnecting to her family and social contacts. However, she had major difficulties in establishing emotional relationships.
Conclusions: The presented case raises questions about the relationship between declarative autobiographical memory, memories, and bond with other people. What is happening to the attachment created from the first moments of the child's life, if it has forgotten its parents and other close persons? Does forgetting past life also mean losing emotional experiences gained in it? Is it possible to rebuild them?
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S.E. MCKNIGHT, K.J. FINLEY & A.Y. STRINGER. The Impact of Anxiety on Recognition Memory: A Potential Confound in Effort Testing?

Objective: Effort measures often identify exaggerated neuropsychological impairment by contrasting recognition and recall memory. While recognition is usually less affected by brain trauma, anterior parahippocampal lesions that spare the hippocampus may lower recognition compared to recall. While such focal lesions are rare, more common anxiety disorders have been linked to both structural and functional abnormalities in the parahippocampal cortex and may therefore be a confound when interpreting recognition-based effort tests. We investigate the impact of anxiety on recognition memory in a neurological case series in which recall is typically worse than recognition.

Participants and Methods: We report a series of patients (1 male, 2 female; average age=43.6, years of education=15.3) diagnosed with anxiety disorder in addition to neurological conditions [brain injury (n=2) and oligodendroglioma (n=1)] that typically cause decline in recall more than recognition. Patients underwent brain imaging in addition to neuropsychological assessment.

Results: Neuroimaging and neuropsychological testing confirmed brain damage in each patient, in addition to anxiety disorder, though no patient had hippocampal involvement. Contrary to expectations based on their neurological disorders, all patients performed 1-3 standard deviations lower on recognition memory relative to recall, including recognition-based effort measures. Diminished motivation could not account for the pattern of performance across patients.

Conclusions: Whereas the standard interpretation of recognition-based effort tests implicates suboptimal motivation as the basis for poor performance, our data suggest that anxiety may differentially impact recognition memory, perhaps by interfering with the ability to detect familiarity vs. novelty. Findings have implications for forensic practice, and should be subjected to further empirical investigation.

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T. METITIERI, C. BARBA, S. PELLACANI, F. GIORDANO & R. GUERRINI. Making Memories: The Development of Long-term Visual Knowledge in Children with Visual Agnosia.

Objective: There are few reports in the literature of the effects of perinatal acquired brain lesions on the development of visual perception. These studies reported unexpected visual abilities following bilateral early damage to primary visual cortex. However, longitudinal data from agnosic patients analyzing the effects of impaired perceptions on long-term visual knowledge are limited to lesions having occurred in adulthood. These data demonstrate the interaction between perceptual and memorial processes. The study of children with focal lesions of visual pathways provides a unique opportunity to assess the development of long-term visual memories in a condition in which perceptual input is degraded.

Participants and Methods: We report performance of three boys with lesions occurring early in infancy (GD: left occipital; LG: bilateral parieto-occipital; RB: left temporo-occipital; mean age=12 years) on visual and mnesic tasks.

Results: All patients exhibited visual agnosia. We attempted to classify their visual recognition deficit according to the types of agnosia found in adults. All patients also exhibited impaired visual memory (immediate and delayed) and drawing from memory joint with the evidence that some intact visual knowledge might be built-up relying on the semantic memory system.

Conclusions: On the basis of these results, we conclude that processing of impoverished perceptions from birth gives rise to degraded long-term memories. Then, the integrity of the visual system is a necessary condition for making intact visual memories. However, semantic knowledge may interact to some degree with degraded visual memories, thus resulting in less severe impairment.

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J. SHIN, S. PARK, M. KIM & Y. LEE. Strengthening memory formation by non-conscious encoding process.

Objective: The purpose of this study was to examine the effects of non-conscious encoding or retrieval processes in memory formation. Based on the scientific researches that memory formation and retention often occur without conscious intent, we hypothesized that memory can be strengthened by non-conscious encoding, subliminal repetition of information, or non-conscious retrieval, subliminal repetition of partial information of associations.

Participants and Methods: Participants of this study were 93 college students (average age=22.7). There were three groups in this experiment: the non-conscious encoding, the non-conscious retrieval, and the control. First, all the participants were asked to memorize twenty pairs of faces with written professions. And then, participants were exposed to subliminal stimuli. The non-conscious encoding group was subliminally exposed to the ten faces with written professions which were selected from the initial encoding session. The non-conscious retrieval group was subliminally exposed to the ten faces only which were same as the non-conscious encoding group. The control group was subliminally exposed to a new face which was not included in the initial encoding session. Finally, participants took a true or false test after 15 minutes.

Results: The score difference of true or false test between non-consciously repeated faces and non-repeated faces were analyzed with a paired t-test. The result showed that participants in the non-conscious encoding group had higher percentages of correct answers in the ten subliminally presented faces than the other ten faces. The non-conscious retrieval and control group showed no differences.

Conclusions: This result means that a non-conscious encoding process has an influence on short-term memory formation. It replicates previous study which showed memory can be changed without intention. It also reveals that memory can be strengthened through a non-conscious encoding procedure. The different results between encoding and retrieval group are discussed.

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A. DUMBRAVA, C. BALUT, M.N. TOBA & M. TATU. Prospective memory deficits in portable telephone users.

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

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

Results: A significant reduction in all (and especially in the time-related) prospective memory performances in heavy users as compared with never users of the portable phone has been noticed. A follow-up after a couple of years of 23 of the subjects in the originally never users group who inevitably changed sides showed a tendency toward the deficit initially noticed in the contrasting group of heavy users of the portable telephone. The influence of some possible independent variables (such as the level of professional and familial duties or the extension of the social network) which might be different in the two groups (which can, however, be also uncertainly interpreted) has not been ruled out and could be targeted in future studies.

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

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A. DUMBRAVA, C. BALUT, M.N. TOBA & M. TATU. Rumination in early versus late onset post-stroke depression.

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

Participants and Methods: Alongside a qualitative analysis of their content, we used different adapted measures of rumination (the Response Style Questionnaire [Nolen-Hoeksema, Morrow, 1991], the Rumination on Sadness Scale [Conway et al., 2000]) and worry (Penn

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State Worry Questionnaire [Meyer et al., 1990], Tallis, Eysenck, Mathews, 1992) to equivalent (in respect to most relevant psycho-demographic and clinical parameters) groups of non-aphasic post stroke subjects: non-depressives (n=83), early onset (during the first three months after the stroke) (n=42) and late onset (beyond the sixth month post-stroke) (n=31) depressives [all diagnosis being based on adapted DSMIV criteria].
Results: The level of ruminative thinking proved to be high at the early post-stroke evaluation in all groups of subjects but decreased significantly only in non-depressives and early onset depressives at subsequent every six months follow-ups. A similar but variably statistically significant evolution has been noticed for the level of worry. The qualitative analysis showed that both rumination and worry were concerned with the present and future, making them more difficult to differentiate in this population based on this temporal orientation aspect.
Conclusions: Such data support the distinction between the early and late onset post-stroke depression, suggesting a less reactive causality of the former.
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I. QUINTERO, H. SERGIO, E. VERCHE & M. ALONSO. Figural Memory Performance in Children with Low Birth Weight.
Objective: To assess figural memory in low birth weight children (LBW).
Participants and Methods: 34 children LBW born before 37 weeks of gestational age and 11 born at term and normal weight children (NBW) were assessment with a modified version of Visual Learning and Memory Test for Neuropsychological Assessment (DCS). LBW group was divided in three groups by weight (<1000g ELWB: Extremely Low Birth Weight; 1000-1499g VLBW: Very Low Birth Weight; and 1500-2499g MLBW: Moderate Low Birth Weight). Children aged 9-10 years with normal Visual Discrimination (VD).
Results: ELBW was significantly different with NBW in all trials, total figures remembered on the curve and long-term recall. VLBW had differences in Trail 2, 4 and 6, total figure remembered and long-term recall. We founded no differences between NBW and MLBW, within 3 groups of preterm, in recognition task and VD.
Conclusions: There is a progressive improvement according to weight at birth: ELBW had the lowest performance, VLBW had a low and intermediate performance and MLBW group showed lower average than NBW, but they showed no significant differences. Data confirms: The inverse relationship between weight and performance; Low birth weight does not necessarily represent deficits in visual memory; and a weight less than 1500g increases the difficulty in visual memory. These results indicate the possible influence of development of frontal lobe in storage and retrieval strategies of information.
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E. GARCIA MARCO, S. HERNÁNDEZ & E. VERCHE. Neuropsychological Assessment of Visual and Verbal Learning and Memory in Adolescents with Obsessive Compulsive Disorder.
Objective: Obsessive Compulsive Disorder (OCD) has been traditionally associated with neurological impairment, and neuropsychological deficits. In memory, it has been described important deficits associated to fronto-subcortical and fronto-temporal dysfunction. Nowadays, the memory profile in people with OCD is quite controversial.
Participants and Methods: Participants were 6 adolescents with OCD (mean age=17,52 SD=4,31 years) and 8 control subjects (mean age=17,82 SD=2,84 years). They were all Spanish, right-handed, matched in age, and IQ. We assessed the following cognitive domains: verbal span (Digits from WISC-IV), visual span (Spatial Span Processing from CANTAB), verbal learning (TAVEC-TAVECI), logical memory (Memory for Stories from TOMAL), visual-spatial learning (Visual Learning and Memory Test for Neuropsychological Assessment (DCS), and complex visual-spatial learning (Rey Complex Figure).
Results: No significant differences were found in verbal learning. No differences were found either in logical memory. In visual learning, differences were found in visual span, trials 1 and 4 and also OCD group had more errors in reproduction than control group. In complex visual learning we found differences in short and long term memory, but not in copy.
Conclusions: Results suggest deficits in visual learning and memory process in patients with OCD. However, verbal memory processes are conserved. This profile could be associated to dysfunction in right fronto-temporal cortex. A larger sample is needed in order to study these memory problems in more depth in adolescents with OCD.
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Psychopathology/Neuropsychiatry (Other)

M. BEDARD, C. JOYAL, S. CHANTAL & K. OLIVIER. Neuropsychological and psychiatric effects of capsulotomy in patients with severe obsessive-compulsive disorder: A repeated-measure study.
Objective: Capsulotomy is a possible treatment for persons with severe refractory obsessive-compulsive disorder (OCD) because it is associated with significant symptom reduction. However, the surgery is relatively rare and data concerning its effects on cognitive and psychiatric symptoms are still scarce.
Participants and Methods: The main goal of the present study was to assess the effect of capsulotomy on cognitive functions and psychiatric symptoms of persons with OCD using 3 repeated comprehensive neuropsychological (complete cognitive profile) and psychological evaluations (OCD symptom severity, anxiety levels, depression) pre- and post-operatively (3 and 6 months after the surgery) with 8 patients. The cognitive domains assessed included: psychomotor speed, attention, visuospatial analyses, verbal memory (encoding, retrieval and storage ability), visual memory (encoding and retrieval), language and executive functions (inhibition/switching, problem solving, working memory, flexibility and planification). The psychiatric measures included the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS), the Beck Anxiety Inventory (BAI) and the Beck Depression Inventory (BDI-II).
Results: Results indicate that the capsulotomy had a positive effect in reducing psychiatric symptoms but, importantly, to different degrees across participants. For the cognitive functions, results showed that most of the deficit observed 3 months after the surgery were temporary and disappeared after 6 months. Nevertheless, some deficits still remained for a few patients. The deficits concerned more particularly attention and executive functions. Specific results will be presented along with pre- and post-operative group comparisons.
Conclusions: It is concluded that capsulotomy seems effective to reduce psychiatric symptoms although a substantial risk of adverse effects remains for certain cognitive functions. Longer follow-up is needed to determine whether restoration takes place over time.
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M.A. DWAIRY & M.A. DWAIRY. A Two-layers Bio-psycho-social Model of Medicine and Psychotherapy.
Objective: The bio-psycho-social model relates to a person as one system, with biological, psychological and social components in constant interaction. The model so far tends to objectivize the human experience of life and ignores a central component, existing exclusively in humankind, the subjective component of meanings, narratives, images, and dreams that are central in psychotherapy. This presentation proposes a two-layer bio-psycho-social model: an objective-rational layer and a metaphorical-spiritual layer.
Participants and Methods: Some illustrative cases with physical or psychological symptoms will be presented.
Results: This model explains how physical state of the body corresponds with subjective-metaphoric state represented in imaginations, metaphors,

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and dreams, and how, on the other direction, metaphor therapy corresponds to physical health of people. The model is based on the assumption that people process and experience their stresses in two ways: an objective-rational way, typical of the left hemisphere of the brain, and a metaphorical-spiritual way, typical of the right hemisphere.
Conclusions: Every medical, psychological, or social intervention, whether tending to use objective or metaphorical devices, will eventually activate both layers of the system.
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A. LIM & J. HONG. Relationship between Fatigue Severity and Psychopathological Symptoms in Patients with Major Depressive Disorder.
Objective: Fatigue is one of the most common problems in patients with depression. The aim of this study is to evaluate psychological distress and quality of life in patients with depression according to fatigue severity.
Participants and Methods: Subjects included were 101 patients with depressive disorder, diagnosed with the DSM-IV based MINI. Symptom Checklist Questionnaire (SCL-90-R) was administered to assess various aspects of psychopathological symptoms. Quality of Life was assessed on the Medical Outcome Study Short Form 36 (MOS) SF-36. Participants were divided into three groups according to total scores of the Fatigue Severity Scale (FSS) (High: FSS sum >54 N=34, Mid: 53≥ FSS sum ≥43, N=35, Low: FSS sum <43 N=31). Correlation analysis was conducted to investigate relationship between variables. ANCOVA was conducted to compare the difference in the means of three groups while controlling gender and age.
Results: FSS scores was positively related to SCL-90-R total score ($r = .496$, $p<.001$) and all sub scores such as Anxiety ($r = .493$, $p<.001$), Depression ($r = .456$, $p<.001$), Hostility ($r = .270$, $p<.01$), Interpersonal Sensitivity ($r = .334$, $p<.01$), Somatization ($r = .499$, $p<.001$), and obsessive-compulsive ($r = .419$, $p<.001$), etc, FSS scores was negatively related to SF-36 sum score ($r = -.696$) and all sub items such as Physical Functioning ($r = -.445$, $p<.001$), Vitality ($r = -.562$, $p<.001$), Emotional Well-being ($r = -.570$, $p<.001$), Social Functioning ($r = -.507$, $p<.001$), Bodily Pain ($r = -.402$, $p<.001$), and General Health ($r = -.471$, $p<.001$), etc. There were significant group differences in SCL-90-R scores ($F=18.44$, $P <.001$) and SF-36 scores ($F=24.10$, $P <.001$) among three groups.
Conclusions: These data suggest careful management of fatigue in depressive patients could help to alleviate their psychological distress and improve their quality of life.
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B. MATHIASSEN, P.H. BRØNDBO, K. WATERLOO, M. MARTINUSSEN, M. ERIKSEN, K. HANSSEN-BAUER & S. KVERNMO. IQ as a Moderator of Outcome in Severity of Children's Mental Health Status.
Objective: Psychotherapy is an effective treatment for mental health disorders, but even with the most efficacious treatment, many patients do not experience improvement. Moderator analysis can identify the conditions under which treatment is effective or whether there are factors that can attenuate the effects of treatment. In this study, linear mixed model analysis was used to examine whether IQ moderated outcomes in general functioning and symptom load.
Participants and Methods: A total of 132 patients treated at three outpatient child and adolescent mental health services (CAMHS) were assessed at three different time points. The Children's Global Assessment Scale (CGAS) and the Health of the Nation Outcome Scales for Children and Adolescents (HoNOSCA) were used to measure the severity of impairments in general functioning and symptom load. IQ was assessed at the start of treatment. Patients with IQs > 85 and IQs ≤ 85 were compared.
Results: Moderator analysis revealed that the IQ * time interaction predicted changes in CGAS scores ($p = .04$), whereas the same interaction did not predict alterations in HoNOSCA scores ($p > .05$). These results indicate that the rate of improvement, as measured by the CGAS, was steeper for patients with IQs > 85 than for patients with IQs ≤ 85, whereas the rates of improvement, as measured by HoNOSCA scores, were equal for both groups.
Conclusions: These findings indicate that patients with IQs > 85 have a greater capacity to benefit from treatment at the CAMHS than those with IQs ≤ 85.
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E.D. MEIRELLES, A. NUNCIATO & P.F. GARDINO. The Changing Inside the Brain: The Glial Hypothesis for the Cognitive (Dys)Functions.
Objective: The established neurobiological substrate for cognitive disabilities is the morphofunctional changes in CNS areas responsible for behavior, emotion and cognition. However, these alterations are not only result of changes in neurons, but also in the glial cells. This work aimed to present the glial hypothesis for the cognitive (dys)functioning, based on recent researches in Neurobiology.
Participants and Methods: The present study performed a literature search regarding the participation of glial cells in the cognitive processing. The PubMed database were searched. Glia, astrocyte, oligodendrocyte, cognition, and cognitive function, were used as keywords, with permutations. The inclusion criteria employed were: in vitro or in vivo studies; studies addressing the participation of glial cells in the cognition. Only papers published after 2006 were considered.
Results: Twenty four papers were selected, of which 18 were analyzed further. These analyses indicated an association between the glial function and modulation of the cognitive processing. An increasing number of experiments in vitro and in vivo support the concept that glial cells are excitable and play an important role in information processing, and modulation of neuronal activity. Therefore, this examination indicated a main paper of the astrocytes, among the other glial cells, for cognition. Astrocytes appear to be involved in the etiology of various neurological disorders such as seasonal epilepsy, Alzheimer's disease, schizophrenia, mood disorders, among other disorders, and the astrocyte's functioning, related to cognitive impairment associated to them.
Conclusions: Glial cells, specifically astrocytes, seem to be underling some phenomena of the neurological and cognitive disorders. Clarifying the complete neurobiological substrate for cognition can contribute to the knowledge about the etiology of cognitive disorders and to develop new intervention strategies. The authors thank CAPES, CNPq, and FAPERJ for the financial support for this work.
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A. PANTZAR, E. LAUKKA, S. KARLSSON, A. ATTI, C. GRAFF, F. LAURA & L. BÄCKMAN. The APOE e4 Allele Does Not Further Exacerbate Cognitive Deficits in Depression.
Objective: The cognitive deficits in depression (processing speed, executive functioning and episodic memory) are also prevalent in MCI and dementia. The e4 allele of the APOE gene is a known risk factor for dementia. However there are conflicting results regarding the association between APOE and depression. We examined a dementia-free sample comparing depressed and nondepressed persons. Of particular interest was whether presence of the e4 allele exacerbated the cognitive deficits associated with depression.
Participants and Methods: Genotyping from peripheral blood samples and testing of processing speed (number cancellation, figure comparison), executive functioning (Trail Making Test-B, Verbal Fluency), and episodic memory (free recall, recognition) were performed in the population-based SNAC-K study. All participants without dementia (n=2284, DSM-IV criteria), were categorized according to depression status (nondepressed/depressed, ICD-10 criteria), free of antidepressant medication and scoring ≥24 on the MMSE. APOE genotypes were dichotomized (e4-carrier/non e4-carrier), resulting in four groups: nondepressed non e4-carriers (n=1468), nondepressed e4-carriers (n=593), depressed non e4-carriers (n=45) and depressed e4-carriers (n=23).
Results: A 2x2 MANCOVA with age and education as covariates revealed a main effect of depression on cognition. Neither a main effect of APOE, nor an interaction effect of APOE status and depression was observed. Post-hoc tests for depression further revealed that nondepressed outperformed depressed in processing speed, executive functioning, and episodic free recall.

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Conclusions: Depression had an expected negative effect on cognitive performance. APOE had no effect on cognition in this sample, neither was an interaction effect between depression and APOE observed. These results indicate that being depressed and carrying a e4 allele does not further exacerbate the depression-related cognitive deficits.
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S. PARK & H. YOO. Depression, suicidal ideation, and Internet addiction in Korean adolescents.
Objective: The aim of this study was to examine the relationship between Internet addiction and depression and suicidal ideation in a community sample of Korean adolescents.
Participants and Methods: In total, 974 middle and high school students (695 girls; mean age, 13.66+1.48 years) were recruited. The presence or severity of Internet addiction was assessed by the Internet Addiction Proneness Scale for Youth-Short Form (KS-scale). Participants were assessed for depression using the Beck Depression Inventory (BDI) and for suicidal ideation using the Reynolds Suicidal Ideation Questionnaire (SIQ). Presence of depression was defined by scores of 16 and above on the BDI, and presence of suicidal ideation was defined by scores of 62 and above on the SIQ. The frequencies of depression and suicidal ideation were analyzed between adolescents with and without Internet addiction.
Results: Eighty four adolescents (8.6%) met the criteria for Internet addiction. Presence of Internet addiction was significantly associated with the presence of suicidal ideation (OR=4.51, 95% CI=2.49-8.15; $p < 0.001$) as well as the presence of depression (OR=5.11, 95% CI=3.06-8.54; $p < 0.001$). Association between the presence of Internet addiction and the presence of suicidal ideation persisted even after adjustment for the presence of depression, although the significance was decreased (OR=2.21, 95% CI=1.06-4.6, p=0.035).
Conclusions: Internet addiction is highly associated with depression and suicidal ideation, suggesting that clinician should closely evaluate and treat those psychiatric conditions among adolescents with Internet addiction.
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M.R. TIMPANO SPORTIELLO, D.M. CAMMISULI, E. COLOMBINI, D. FABIANI & A. GAROFALO. Executive functioning impairment in euthymic bipolar patients.
Objective: Previous investigations showed that euthymic patients with Bipolar I disorder (BP-I) perform poorly on episodic memory, divided attention and verbal fluency tests. Such a kind of cognitive impairment seems to characterize both acute episodes and euthymic phases. More recently, several studies have pointed out that these patients present selective deficits also in executive functioning. The present study aims at analytically describing the neuropsychological profile of a group of bipolar patients in the euthymic phase.
Participants and Methods: 16 euthymic BP-I outpatients (M:F=70:30%, age 31±7, education 14±2) were assessed by a wide neuropsychological battery, including: a global cognitive evaluation (Brief Neuropsychological Exam); a specific assessment of memory system (Digit Span, Corsi Span, Story Recall, Pairs Associates Learning, Corsi Learning Supra-Span), attention system (Visual Search Test), and executive functioning (Go-No-Go Frontal Assessment Battery subtest, Stroop Color Word Interference Test, Brixton Test, Picture Identification Test, Tower of London). The raw scores were transformed into the equivalent scores to compare performances on cognitive tests.
Results: BD-I patients presented a clear deficit of divided attention. The memory system was invalidated even though incostantly. In fact, declarative memory resulted to be the most fragile subdomain: episodic memory was globally impaired, both verbal and visual-space one. Within working memory, phonological loop was more frequently deteriorated than visuo-spatial scratchpad. Among frontal domains, planning, logical reasoning and mental flexibility were more damaged than sensivity to interference and inhibitory control.
Conclusions: Executive dysfunction does not seem related to the intensity of the psychiatric disorder. Future research should clarify the congruence of the selective deficits of executive functioning with psychopathological symptoms to better understand their mutual relationship.
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S. WEIDER & K. HESTAD. Cognitive Profiles in Patients with Anorexia Nervosa and Bulimia Nervosa.
Objective: It has been hypothesized that patients with anorexia nervosa (AN), have a higher intelligence quotient (IQ) than normative data, and that they have a higher verbal intelligence (VIQ) than performance intelligence (PIQ). IQ in bulimia nervosa (BN), has been less studied, but it has been suggested that this group show average IQ with better PIQ than VIQ. The purpose of the present study was to explore the role of AN and BN in relation to performance on VIQ and PIQ and on the four indexes of the WAIS-III; Verbal comprehension (VCI), perceptual organization (POI), working memory (WMI) and processing speed (PSI).
Participants and Methods: The sample consisted of 27 women with AN and 26 women with BN. All subjects completed the WAIS-III as part of a larger study on cognitive functioning.
Results: The analysis show that both groups (AN and BN) had an average total IQ (103.3 and 106.5 respectively). The groups did not differ in VIQ, but there was a significant difference on PIQ between the AN group (M=103.8, SD=18.17) and the BN group, M=113.1, SD=11.17; $t(44) = -2.245$, p=.030. For patients with BN there were a significant difference between VIQ (101.5, SD=13.74) and PIQ, M=113.1, SD=11.17; $t(25) = -4.687$, p=<.001. This was not seen for the AN group. At the index level, there were no significant differences between the groups on VCI, WMI or PSI. On the POI, the BN group (M=118.9, SD=13.33) performed significantly better than the AN group, M=107.9, SD=20.62; $t(45) = -2.298$, p=.026.
Conclusions: Findings suggest that both groups have at least average total IQ. There were, however, significant differences in the cognitive profiles between the groups, with the BN patients scoring better on PIQ and especially on the POI than AN. The fact that the BN group show significantly elevated perceptual skills, might have contributed to these patients` overconcern with body shape and size. On the other hand, these skills should be taken advantage of in the treatment process, for instance by incorporating practical/ nonverbal techniques
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Psychopathology/Neuropsychiatry (Schizophrenia)

S. FERNANDEZ-GONZALO, M. TURON, E. POUSA, R. DUÑÓ, D. PALAO & M. JODAR. Influence of the Neuropsychological Functions in Theory of Mind in Schizophrenia: The False-Belief/Deception Paradigm.
Objective: In the last decades, different authors have studied the neuropsychological deficits and the social cognition alterations in schizophrenia, although the relation between these aspects remains unclear. The purpose of this study is to investigate the influence of neurocognition in a false-belief/deception theory of mind (ToM) task in a sample of remitted schizophrenic patients.
Participants and Methods: In a cross-sectional study of 43 remitted patients we analyzed the relation of neurocognition in first and second order ToM stories, controlling for clinical symptoms and duration of the illness.
Results: None of the cognitive factors were associated with first order ToM stories. Neuropsychological variables did not explain the performance in one of the second order ToM stories (the Ice-cream van story) but the influence of neuropsychological functions was observed in the second order ToM story of The Burglar. A logistic regression model with high specificity (96,3%) and sensitivity (75%) was obtained in the Burglar second order ToM story, being the Information WAIS-III subtest (OR=0,783, CI95%=0,62 - 0,99; p=0.04) and the Block design WAIS-III subtest (OR=0,89, CI95%=0,79 - 1, p=0.056) the best predictive factors.

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Conclusions: Neurocognition was not related neither to the first order nor the second order ToM false belief performance of the schizophrenic patients. However, an influence of neuropsychological variables in the second order ToM deception was observed. The influence of neurocognition in different aspects of ToM will be discussed. Neuroanatomical correlation of false-belief and deception as well as the clinical implications in the assessment of ToM in schizophrenic patients will also be commented.

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A. NIETO, B. FERRERA, D. FERREIRA, O. DELGADO, S. HESS & J. BARROSO. A qualitative analysis of verbal fluency impairment in schizophrenia.

Objective: Previous research has shown that schizophrenic patients might have word generation impairment in verbal fluency tasks. However, the interpretation of this alteration is still controversial. A qualitative performance analysis can provide information about the affectation of the different processes involved in these multifactorial tasks

Participants and Methods: 26 patients diagnosed with schizophrenia (CIE-10/OMS) and 23 matched controls participated in this study. They were given a Phonemic Fluency task and a Semantic Fluency task. We used Troyer`s (2000) method to define cluster (two or more consecutive words belonging to the same category) and switches (number of transitions between cluster, including single words). In addition, we used the number of clusters as a complementary measure of cognitive flexibility. MMSE was used to examine general cognitive state

Results: Schizophrenic patients performed significantly below normal subjects on Phonemic and Semantic tasks (correct responses). Fluency tasks scores were not related with MMSE score. We found significant differences between schizophrenic patients and controls in number of switches and number of cluster. However, there were no significant differences in the cluster mean size. Performance was positively correlated with switches and with number of clusters in patients and controls. Cluster mean size was related to performance only in semantic fluency of the control group

Conclusions: As expected, schizophrenic patients show a decreased performance in verbal fluency. Qualitative analyses of strategies reveal a lesser use of "switching" strategies (number of switches and clusters). Considering "switching" strategies as a component of cognitive flexibility associated to frontal lobe functions, these results indicate that impaired performance on verbal fluency in schizophrenia is mainly related to a frontal dysfunction. In addition, results suggest that patients with schizophrenia do not use the same strategies as healthy subjects to perform semantic fluency tasks

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S. HELLE, E. JOHNSEN, R. GJESTAD, R.A. KROKEN, H.A. JØRGENSEN & E.M. LØBERG. Neuropsychological functions recover from acute phase to three months-follow up in patients with non-affective psychotic disorders.

Objective: Neuropsychological functioning in patients with schizophrenia and non-affective psychosis has previously been shown to be relatively stable. Less is known about the stability of these functions in the acute phases of psychosis. The aim of this study was to examine the change of neuropsychological functioning at admission to a psychiatric emergency ward, after 4-6 weeks and 3 months.

Participants and Methods: 42 patients acutely admitted to an emergency ward for non-affective psychosis were included. Active psychosis was defined as a score of ≥ 4 on one or more psychosis items from the Positive and Negative Syndrome Scale (PANSS) Positive subscale. They were tested with a screening test with alternative forms (Repeatable Battery for the Assessment of Neuropsychological Status; RBANS) at baseline and after 4-6 weeks, and with a comprehensive neuropsychological test battery after 3 months with tests comparable to the screening test. Patients were split into groups based on the presence of psychosis at 3 months; n = 15 and n = 27 for the psychotic and non-psychotic group, respectively.

Results: The sample had a global neuropsychological t-score at baseline about 1.5 SD below that of the general population. A repeated measures analysis of variance was performed; Group (Psychotic, Non-psychotic) x Time (Baseline, 4-6 weeks, 3 months). A main effect of Time emerged for verbal abilities, learning, attention and total scores. This was seen for all combinations of Time as tested by post-hoc Unequal N HSD tests. For visuospatial abilities and memory no effects of Time was seen. No effects of Group emerged for any of the five cognitive domains or the total scores.

Conclusions: All patients showed a recovery of their neuropsychological functioning from admission to a psychiatric emergency ward and up to three months follow-up. This was seen for global neuropsychological functioning, verbal abilities, learning and attention and independent of the resolution of positive symptoms.

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R. JOHANSEN, V.C. IVERSEN & K. HESTAD. General Intelligence and Clinical Symptoms in Early Schizophrenia Spectrum Disorders – Association with Service Engagement.

Objective: The early years of psychotic disorders are critical and when treatment has its most important impact. It is also when young patients is most prone to drop out of treatment. Identifying factors that influence engagement in early phases is cruicial. Neurocognition predicts aspects of social and daily-life functioning. Active engagement in treatment requires ability to administer appointments, psychosocial skills to form and maintain a therapeutic relationship, social cognitive skills to benefit from interventions and social problem-solving skills to negotiate relational challenges. We wanted to examine gender differences, and if service engagement was associated with aspects of general intelligence and psychotic symptoms.

Participants and Methods: Forty patients with early-phase schizophrenia spectrum disorders and available data on general intelligence (WAIS-III), psychotic symptoms (PANSS), and service engagement (SES) from a sub-project of the Thematically Organized Psychosis Research study were included.

Results: There were no gender differences or statistically significant associations between cognitive-, psychotic symptom- and service engagement scores. Mean scores (sd) men/women; estimated WAIS-III total IQ: 103 (13.4)/99 (10.3). Estimated WAIS-III verbal IQ: 99 (14.6)/95 (8.4). Estimated WAIS-III performance IQ: 107 (15.3)/104 (14.7). PANSS positive: 18 (5.5)/17 (4.8). PANSS negative: 17 (4.5)/15 (6.8). PANSS general: 36 (8.4)/34 (19.3). SES availability: 0.35 (0.8)/0.29 (0.8). SES cooperation: 2.4 (2.0)/2.9 (1.9). SES help seeking: 4.7 (3.0)/3.8 (3.0).

Conclusions: The relationship between impaired neurocognition, clinical factors and service engagement in early-phase schizophrenia spectrum disorders is not clear-cut, and needs further exploration. The difference in the current results compared to our previous findings might be due to differences in sample size and characteristics, measurements, or reflect unobserved disparities in the treatments provided.

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M. KIM, H. LEE & J. LEE. Neuropsychological correlates of P300 abnormalities in college students with schizotypal traits.

Objective: We investigated whether nonclinical individuals with schizotypal traits have P300 abnormalities, and these abnormalities are associated with neuropsychological functions.

Participants and Methods: Based on the scores of Schizotypal Personality Questionnaire (SPQ), schizotypal-trait (n=18) (highest 5% of scores on SPQ) and control (n=19) (average ± 1SD on SPQ) groups were determined.

In auditory oddball task, of a total of 200 stimuli, 20% were target tones (1500 Hz) and 80 % were standard tones (1000 Hz). Participants were required to respond to target tones by pressing a button.

A comprehensive neuropsychological tests evaluating memory, attention, executive function were administered.

EEG activities were recorded using a 64-channel Geodesic Sensor Net system. EEG epochs (-100~900ms) were averaged for two types of stimuli. P300 was defined as the largest positive peak at 300-400 ms post-stimulus. P300 amplitude and latency were analyzed by ANOVA, repeated measure, mixed design.

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Results: The two groups did not differ in terms of accuracy (F1,35=.67, ns).
In terms of P300 amplitude main effects of channel (F10,350=87.35, p<.0001) and group (F1,35=28.68, p<.001) were observed. The largest amplitude was observed at Pz (11.44 μV) and the smallest one at Fz (-1.23 μV).
The schizotypal-trait group showed smaller P300 amplitude than control group (3.54 vs. 6.78 μV).
No significant effects of channel and group were observed in term of P300 latency.
A significant correlation between short-term recall of list A (California Verbal Learning Test; CVLT) and P300 amplitude at Pz was observed (r=.35, p<.05). And significant correlations between P300 amplitude at Cz and short-term recall of list A (r=.38, p<.05) and recognition of CVLT (r=.39, p<.05) were observed in schizotypal-trait group.
Conclusions: Present results indicate that P300 abnormalities associated with temporal dysfunction are present in schizophrenia high-risk group, and reduced P300 amplitude could be served as a biological marker for schizophrenia.
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S. TSOTSI, M.H. KOSMIDIS, K. FOKAS, G. GARYFALLOS & V.P. BOZIKAS. Attention processes related to facial emotion recognition in schizophrenia.
Objective: Previous investigations have shown that emotion perception involves attention processes, yet, the extent to which it is moderated by attention remains unclear. In schizophrenia, the relationship between emotion perception and attention may be complicated by the existence of deficits in both cognitive functions. Our goal in conducting the present study was to explore whether attention performance is related to recognition of facial emotions in patients with schizophrenia.
Participants and Methods: The sample comprised 20 schizophrenia outpatients (DSM-IV-based diagnosis; 9 men) in remission under medical treatment. All patient symptoms were assessed using the Positive and Negative Symptom Scale. We administered three tests of attention: the Trail Making Test-Part A (TMT-A) for visual attention-scanning, the Rapid Visual Processing (RVP) subtest of the Cambridge Neuropsychological Test Automated Battery for attention inhibition, and the Attention to Faces (AF) test, a new task assessing the detection of details in facial features and matching based on identity. Facial emotion perception was measured via another new recognition task.
Results: Our findings showed that only the TMT-A could predict emotion recognition. The RVP and AF neither predicted emotion recognition ability nor correlated with it. Thus, visual attention-scanning was the only factor that predicted emotion recognition ability in patients with schizophrenia.
Conclusions: This finding is consistent with previous results suggesting relatively intact sustained attention in schizophrenia. In contrast, neither attention inhibition nor detection of facial features were associated with facial emotion recognition, perhaps due to the reliance of the latter on executive processes related to attention, which are often impaired in schizophrenia. Our study offers some preliminary insight into the involvement of attention processes in emotion recognition in schizophrenia.
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M. TURON, J. VICENS-VILANOVA, S. FERNANDEZ-GONZALO, S. SUBIRA & M. JODAR. Cognitive biases, Theory of Mind and neuropsychological measures related to positive symptoms in schizophrenia: a multivariate approach.
Objective: In recent years, measures of reasoning and social cognition have been applied to the study of schizophrenia, using univariate approaches. In this study we have used a multivariate methodology to develop a comprehensive framework of associations and dissociations between different cognitive and neuropsychological measures, which go much further in the current knowledge about the nature of different neurocognitive processes involved in positive and negative symptoms disease.
Participants and Methods: A total of 40 patients were evaluated by a comprehensive battery of social cognition, reasoning and neuropsychological measures. Factorial analysis was performed to determine the pattern of relationships among cognitive biases (JTC and BADE), social cognition measures (Theory of Mind) and neuropsychological measures (abstraction, phonetic fluency, sustained attention and memory), followed by a correlation of the factors that emerged in the analysis of components, with the main positive and negative symptoms of schizophrenia.
Results: Factor analysis showed the extraction of three components interpreted as Executive, Memory and Reasoning. The Executive component correlated with symptoms of conceptual disorganization, social withdrawal and depression. The Memory component correlated with the symptoms of poverty of contact, abstract thinking, and presence of hallucinations. The Reasoning component, which brought loads of JTC and BADE, did not correlate with any symptoms of the disease.
Conclusions: Multivariate analysis demonstrated the independence of cognitive biases compared to other neuropsychological functions. These results suggest that cognitive biases have a neuroanatomical substrate, which is independent of other neurocognitive functions, but yet not fully explain the delusional experience. Future research should be more focused on the role of emotion as a precursor of delusional ideation.
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Invited Address: Developmental Social Neurosciences: Contributions to Clinical Practice

Speaker: Vicki Anderson

1:15–2:30 p.m.

V. ANDERSON. Developmental Social Neurosciences: Contributions to Clinical Practice.
Social skills and interactions form the foundation of human consciousness. They emerge gradually through childhood and adolescence, through a dynamic interplay between the individual and his or her environment. They are central to the child's capacity to develop and sustain lasting relationships and participate and function within the community. With the recent burgeoning of the social neurosciences there is emerging evidence that a number of social domains are affected by brain disruptions and can impact more broadly on the child's capacity to adapt to their environment, establish rewarding friendships and relationships, and perform in school settings. The psychological and biological bases, and developmental pathways of social skills remain poorly defined. The impact of disruption, as a result of brain insult or environmental influences, is even less well understood, but is likely to have dramatic effects as these skills are developing and emerging during childhood and adolescence, resulting in psychological distress, social isolation, and reduced self-esteem.
This presentation will i) propose a model of social function which incorporates biological, psychological and environmental parameters; ii) discuss its relevance to research data from our longitudinal research programs investigating the impact of early childhood brain insult; iii) describe cognitive abilities underpinning social skills; and (iv) consider options for intervention.
Learning Objectives:
1. Describe a model of social function which incorporates biological, psychological and environmental parameters;
2. Identify the relevance of this model to research data from our longitudinal research program investigating the impact of early childhood brain insult
3. Describe cognitive abilities underpinning social skills
4. Identify intervention options.
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Symposium: Cognitive Behavioral Therapy for Depression Following Traumatic Brain Injury: A Randomized Controlled Trial

Chair: Theodore Tsaousides

1:45–3:15 p.m.

T. TSAOUSIDES, T. ASHMAN & E. D'ANTONIO. Cognitive Behavioral Therapy for Depression Following Traumatic Brain Injury: A Randomized Controlled Trial.

Symposium Description: The first part of the symposium includes a description of the state of the evidence regarding prevalence, assessment, and interventions for depression following traumatic brain injury (TBI). The literature on the treatment of post-TBI depression is scarce. Published intervention studies to date either lack methodological rigor (i.e., case reports, case series, uncontrolled single-case design studies) or refer to interventions for which the primary treatment target was not depression. Issues of instrumentation will be covered, and comparisons of outcomes based on instrument selection will be presented. The benefits of using a cognitive-behavior therapy (CBT) approach to treating mood disorders in individuals with TBI will be discussed.

The second part of the symposium includes a description of a randomized controlled trial (RCT) on the efficacy of CBT for post-TBI depression. This is the first RCT to date to target post-TBI depression directly using individual psychotherapy. Participants included individuals with TBI who met DSM-IV-TR criteria for a depressive disorder. They were randomly assigned to receive 16 individual psychotherapy sessions of either CBT or supportive psychotherapy (SPT). Rate of remission did not differ significantly between the two groups, but within-group comparisons suggested that both groups appeared to benefit from the intervention.

The third part of the symposium will include an analysis of session-by-session data obtained during the course of treatment. Evidence for improvement derived from mood assessments (e.g., depression and anxiety) conducted at the beginning and end of each session, using visual analog scales VAS, will be presented.

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T. TSAOUSIDES & T. ASHMAN. Treatment for Depression Following Traumatic Brain Injury.

Objective: Reported rates of depression following traumatic brain injury (TBI) range from 14% to 77%. Even by conservative estimates, post-TBI depression and suicidal ideation rates are higher than population base rates. The high prevalence and negative impact necessitate developing interventions to reduce depression. The literature on interventions for post-TBI depression is limited, leaving clinicians with restricted options. The purpose of this presentation is to review the state of the science regarding treatments for depression for individuals with TBI and to describe the rationale and development of two theory-based types of psychotherapy for post-TBI depression.

Participants and Methods: A review of the existing literature on interventions for post-TBI depression was conducted. Rationale for the development of a cognitive-behavioral therapy (CBT) protocol was sought in the literature. A CBT manual was developed based on existing manuals and guidelines. A supportive psychotherapy (SPT) manual was developed by combining common factors from different models of psychotherapy as a comparison treatment. Both manuals were adapted for use with individuals with TBI and included interventions and compensatory strategies to maximize benefits in individuals with TBI-related cognitive impairments.

Results: A range of pharmacological, other biomedical, and behavioral intervention (including individual psychotherapy) studies exist that have addressed post-TBI depressive symptoms directly or indirectly. Studies vary considerably in terms of inclusion criteria, sampling, and outcome measurement. Although widely recommended and applied, limited empirical evidence exists for the effectiveness of individual psychotherapy for post-TBI depression. The development and application of the psychotherapy interventions (CBT and SPT) is described.

Conclusions: Challenges unique to this population in terms of implementing a manualized psychotherapy intervention are discussed and case studies are presented.

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T. ASHMAN & T. TSAOUSIDES. Cognitive Behavioral Therapy for Depression Following Traumatic Brain Injury: Findings of a Randomized Controlled Trial.

Objective: Few published studies exist evaluating the effectiveness of psychotherapy for post-traumatic brain injury (TBI) depression and findings have been mixed. Given the high prevalence and negative impact of post-TBI depression, developing appropriate behavioral interventions is imperative. Cognitive-behavioral therapy (CBT) is a well-established treatment for depression in the general population. The structure and frame of CBT render it a suitable treatment for individuals with TBI-related cognitive challenges. However, the efficacy of CBT in post-TBI depression has not been investigated. The purpose of Part 2 of this two-part presentation is to describe the outcomes of a recently completed randomized controlled trial of the efficacy of psychotherapy for post-TBI depression.

Participants and Methods: A study was designed to compare the efficacy of CBT and supportive psychotherapy (SPT) in treating depression following TBI. Participants included individuals with TBI who met DSM-IV-TR criteria for depressive disorder. They were randomly assigned to either CBT or SPT and received 16 psychotherapy sessions. Participants' mood (diagnosis and symptom severity) and psychosocial functioning were assessed at four time points (pre-treatment, post-session 9, post-treatment, 6-month follow-up).

Results: Forty-one participants completed treatment and follow-up assessments (CBT=21, SPT=20). Approximately 57% of the CBT and 35% of the SPT group no longer had a DSM-IV-TR depressive disorder diagnosis, representing significant change for both groups ($p = .00004$ and $p = .003$, respectively). Rate of remission did not differ significantly between groups ($p = .134$).

Conclusions: The study provides evidence that individual psychotherapy is an effective treatment for post-TBI depression. The structure and techniques provided by CBT render it a preferred treatment when working with individuals with cognitive impairments. Implications of these findings for practice and research are discussed.

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E. D'ANTONIO, T. TSAOUSIDES & T. ASHMAN. A comparison of treatment responses to two psychotherapeutic treatment modalities targeting depression following traumatic brain injury.

Objective: To examine the differential treatment effects of cognitive behavioral therapy (CBT) and supportive psychotherapy (SPT) in individuals with TBI who sought treatment for depressive disorder and to provide symptom-by-symptom and session-by-session analysis.

Participants and Methods: Forty-four individuals with TBI and depression who received CBT or SPT (mean age 48.8 yrs; 57.1% female; 57.5% Caucasian, 20% Hispanic, 15% African-American). Outcome measures included the BDI-II and mood assessments for depression and anxiety conducted at the beginning and end of each session, using visual analog scales (VAS).

Results: Mean total BDI-II scores did not differ significantly between treatment groups at either baseline ($t(42)=.98$,ns) or end of treatment ($t(42)=.09$, ns). 50% of CBT and 31.9% of SPT participants improved by at least 2 points on two or more BDI items, while 33.3% of CBT participants improved on 3 or more items. CBT participants reported significant improvement in sadness ($t(21)=2.34$, $p=.03$), loss of interest ($t(21)=2.94$, $p=.01$), and loss of interest in sex ($t(21)=2.34$, $p=.03$). SPT participants reported significant improvement in agitation ($t(21)=2.65$, $p=.02$), and irritability ($t(21)=4.17$, $p<.001$). There was no overlap in individual symptom improvement between groups. Analyses of the depression VAS showed a within session treatment effect (pre-session vs. post-session VAS) for sessions 1 and 16 for the CBT group

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(t1 = 5.36, p<.001, t16 = 2.4, p<.05); and for session 1 but not session 16 for the SPT group, (t1 = 2.27, p<.05; t16 = 1.1, ns). In addition, the CBT group demonstrated a difference between sessions 1 and 16 pre-session VAS (t = 3.11, p<.01) but no difference between sessions 1 and 16 post-session VAS.
Conclusions: CBT demonstrated a broader treatment effect, decreasing more symptoms in more participants. SPT may target symptoms of behavioral disinhibition, while CBT may target mood symptoms. Participants overall reported better mood at the end of each session.
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Poster Session 7: Cognitive Intervention/Rehabilitation, TBI, Epilepsy/Seizures, Forensic Neuropsychology

2:00–3:30 p.m.

Cognitive Intervention/Rehabilitation

J. HEUTINK, G. DE HAAN, B. MELIS-DANKERS, O. TUCHA & W.H. BROUWER. Spontaneous Recovery and Treatment Effects in Patients with Homonymous Visual Field Defects: A Meta-Analysis of Existing Literature in Terms of the ICF framework.
Objective: Homonymous visual field defects (HVFDs) are a common consequence of brain injury. Most patients do not recover spontaneously, and treatment is needed. To determine whether a certain intervention may help an individual patient, it is necessary to predict future functioning of the patient and the effect of a specific training. Therefore, we classified existing literature on HVFD according to the International Classification of Functioning, Disability and Health (ICF) as developed by the WHO.
The aim of our review was 1) to increase awareness of the focus of previous research on HVFDs and 2) to give an overview of the variables predicting functioning of HVFD patients or the effect of treatment.
Participants and Methods: In total, 222 publications were classified into three categories: 1) studies on the functioning of people with HVFD regardless of treatment, 2) studies on the effect of restoration training aimed at partial recovery of the lost visual field, 3) studies on compensatory eye movements or the use of prisms. For every publication, all variables that were mentioned were categorized into the different ICF levels and analysed systematically.
Results: Functioning of people with HVFD regardless of any intervention was addressed in 180 articles; 32 described the effect of restoration training; 29 described the effect of compensation. All studies included variables at the level of Body Functions and Structures, fewer considered Activities, while very few studies mentioned measures at the Participation level.
Conclusions: Additional research is necessary to identify those factors that predict both functioning in HVFD patients and the effects of training. The ICF helps to clarify the scope of the existing literature and it is recommended to take notice of this framework when designing future studies. Future studies should include more outcome measures related to Activities and Participation.
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E. KALLIO, A.M. SALO, H. JOKINEN, A. KUHA, E. HVONEN & M. HIETANEN. Neuropsychological Interventions after Stroke - Timing Is Essential.
Objective: Key points in improving the outcome of stroke are early diagnosis of stroke symptoms, access to thrombolytic therapy, and acute care in a stroke unit, where assessment and rehabilitation are carried out by a multidisciplinary rehabilitation team. Cognitive deficits are among the most far-reaching and incapacitating consequences of stroke. They often remain undiagnosed due to tiredness, hemiplegia or aphasia of a patient. Therefore, the early time window for intensive cognitive rehabilitation and individualized psychoeducation is lost.
Participants and Methods: We present a model of systematic neuropsychological interventions for working-aged patients (< 65 years) supporting recovery after stroke at the Department of Neurology, Helsinki University Central Hospital (HUCH), Finland. 1. An orienting neuropsychological assessment is performed at 1-3 weeks after stroke. A screening battery has been composed to be completed in a relatively short assessment session (1 hour). Information on cognitive functions at this early stage influences rehabilitation strategy and clarifies patients' possibilities to benefit from subsequent interventions. 2. A comprehensive neuropsychological assessment is carried out at a more stabilized stage post-stroke, usually 2-3 months after the stroke. 3. Outpatient neuropsychological rehabilitation begins 1-3 months after stroke.
Results: During 2011, at HUCH, out of 1121 stroke patients 280 were working-aged, of which 213 were referred to an orienting neuropsychological assessment. A comprehensive neuropsychological assessment was carried out for 128 patients. A total of 59 working-aged stroke patients attended outpatient neuropsychological rehabilitation.
Conclusions: The current model of neuropsychological interventions ensures systematic help for working-aged stroke patients with either mild or more severe cognitive dysfunction. Early neuropsychological assessment must be seen as an elementary component of the acute care and subsequent neurological rehabilitation to support best recovery.
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K. KØHN, J.E. NORDVIK, M. LØVSTAD & A. SCHANKE. Improved Psychological Functioning Following Group-based Rehabilitation in a Sample of Chronic Acquired Brain Injury Patients.
Objective: Group-based rehabilitation is routinely delivered to patients with chronic acquired brain injuries (ABI) aiming at increased awareness of deficit and adjustment to new life circumstances. The aim of this study was to explore indications of positive changes in self-reported psychological functioning.
Participants and Methods: 24 ABI patients (18 male; mean age=44; TBI: 14; CVI: 7; Other: 3) in the chronic phase were admitted to Sunnaas Rehabilitation Hospital, Norway, for treatment in small groups. The treatment consisted of psychoeducation, learning of coping strategies and staff supported exchange of experiences. Treatment was provided during a 6 week in-patient program, and a 1 week follow-up 9 months later. Participants completed the following questionnaires at the start of the treatment and at the follow-up: Life Satisfaction Scale (LiSat), Rosenberg Self Esteem Scale (RSES), Symptom Checklist 90 – Revised (SCL-90), SF-36 and Coping Resources Questionnaire.
Results: Paired samples t-tests were conducted, with a Bonferroni correction of 5 for multiple testing. The results indicated reduced psychological distress, increased self-esteem and possibly life satisfaction, as there was a significant decrease (from M=60.2 (T-value) to M=56.0, p<.05, r=.47) in the Global Severity Index (GSI) of SCL-90, a significant increase (from M=40.9 (T-value) to M=46.2, p<.05, r=.60) in self-esteem as measured by the RSES, and a near significant increase (from M=4.0 (raw score) to M=4.3, p<.09, r=.42) in LiSat.
Conclusions: Due to the lack of control group, caution must be exerted in the interpretation. However, an explorative evaluation of changes in psychological functioning in the chronic phase of ABI shows significant reduction in symptoms of psychological distress, improvement in self-esteem and near significant improvement in life satisfaction. The findings give preliminary support to the effectiveness of group based interventions aiming at enhancing psychological well-being, and that such effects may occur years after injury.
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M. LESNIAK, K. POLANOWSKA & J. SENIÓW. Anodal Transcranial Direct Current Stimulation Does Not Improve Cognitive Functions in TBI Patients After Three-Week Therapy.
Objective: Anodal transcranial direct current stimulation (A-tDCS) – a non-invasive neuromodulation technique has been shown to improve

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language and cognitive performance both in healthy subjects and patients with brain damage. In this project we aimed to investigate the cumulative effects of A-tDCS applied to the left dorso-lateral prefrontal cortex (DLPFC) combined with cognitive training, on memory and attention in patients recovering from moderate to severe TBI.
Participants and Methods: Eighteen patients with TBI (5-92 months post injury) and subsequent cognitive deficits were randomly allocated to two groups. The experimental group received 15 (5 times/week for 3 weeks) 10-min. A-tDCS (anode over DLPFC; cathode above the contralateral orbit; stimulation parameters: 1 mA, current density= 0.028mA/cm2) sessions followed by cognitive training (including attention and memory exercises). The control group received the same amount of cognitive rehabilitation, but the A-tDCS was applied only during the first 10 sec. (sham condition). The effects of A-tDCS were measured using a battery of tests of memory and attention assessed both in visual and auditory modality. Participants were tested twice before the start of the rehabilitation program (to control for spontaneous recovery) and once after its completion.
Results: There were no differences in baseline characteristics (sex, age, education, time since TBI), and tests scores between the two groups before treatment. Similarly, no statistically significant differences in test performance were observed after the therapy in any measure of memory or attention.
Conclusions: In contrast to previous studies on efficacy of A-tDCS in improving memory and learning skills, our study does not confirm this technique an effective supplementary method of treatment of TBI patients even if repeated daily during the 3-week cognitive rehabilitation program.
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A. MATHIEU & A. BERARDI. Stimulation Seeking according to Personality Traits in Video Games.
Objective: The aim of this study was to determine the relationship between personality traits and video game preferences.
Participants and Methods: Three groups of participants were studied: 18 Adventure Gamers (AV; age: 21.28 ± 1.6; education: 13.83 ± 1.76; 8 M, 10 F), 12 First Person Shooter Gamers (FPS; age: 21.67 ± 2.19; education: 14.33 ± 1.16; 8 M, 4 F) and 18 Non-Gamers, who didn't like and didn't play any video games (NG; age: 21.89 ± 2.22; education: 14.44 ± 1.29; 5 M, 13 F). All groups were matched on age (p = .66), education (p=.43) and sex (p=.11). Participants were administered a personality inventory (NEO-PI-R; Mc Rae & Costa, 1992; French translation: Rolland & Petot, 1994), a self-esteem inventory (SEI; Coopersmith, 1981; French translation: ECPA, 1984), and a sensation seeking scale (SSS-V; Zuckerman, 1978; French translation: Carton & al., 1990). Tests were administered in counterbalanced order. Results were analyzed with one-way ANOVAs with one between-group factor (AV vs. FPS vs. NG), and one within-group factor (the score on each test). Bonferroni post-hoc T-tests were used to determine specific between-group differences.
Results: Results showed that AV had higher scores on neuroticism (p=0.04) and were marginally more depressed than FPS (p=0.07). FPS were less anxious than both AV (p=0.02) and NG (p=0.01). FPS also had higher scores on thrill and adventure seeking than both AV (p=0.01) and NG (p=0.000). NG had higher scores on professional self-esteem than both AV (p=0.04) and FPS (p=0.01). NG also had higher scores on experience seeking relative to FPS (p=0.04).
Conclusions: In conclusion, this research demonstrates a relationship between specific personality traits and video game preferences. The seeking of specific stimulations may motivate the exposure to particular video games. These results could be taken into account to create higher motivational cognitive and/or psychotherapeutic interventions.
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P.T. MAURER-KARATTUP. The Changing Brain - Neuropsychological Long-Term Outcome In Patients With Disorders Of Consciousness (DOCs).
Objective: Severe brain injury can lead to long-lasting DOCs, which presents a major burden for patients and families. Not much is known about their long-term recovery of cognitive functions. The purpose of this study was to show the extent of improvement of consciousness and neuropsychological functions one year after discharge from rehabilitation.
Participants and Methods: A questionnaire for relatives of patients with severe brain injury was developed. The items cover important aspects of medical, neuropsychological and functional recovery and display the defining aspects of consciousness disorders as well as the description of broad neuropsychological problems. Data regarding the cognitive aspects of recovery, as described by the patients' relatives, were extracted from the data base and analyzed. They were compared between different groups of DOCs at admission and discharge from the clinic, based on the Disability Rating Scale (DRS) and the Koma-Remissionsskala (KRS) in a large patient sample (n=264).
Results: From all patients with DOCs at admission, most had recovered consciousness by the time of discharge, with 12 patients remaining in Vegetative State (VS) and 15 in Minimally Conscious State (MCS). One year later, 25% of those VS-patients had recovered to MCS, none had become conscious, whereas 21% of MCS-patients were rated as conscious. Only 9 patients could not communicate at all one year after discharge. Return to work was possible in 1% of primary VS-patients and 10 % of MCS-patients. Most patients maintained major neuropsychological problems like attention, memory and behavior problems.
Conclusions: Even in severe brain injury recovery of consciousness is possible over months post injury, in most cases associated with severe neuropsychological problems. Implications for long-term therapy are being discussed.
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S. PALSSON, S. VIDAR, H.R. GUDMUNDSDOTTIR, K.G. REYNISDOTTIR & O.H. BJARNADOTTIR. Effects of Six-Weeks Computerized Cognitive Training in People with Multiple Sclerosis.
Objective: It is estimated that 43-65% of people with multiple sclerosis (MS) experience some form of cognitive impairment. Those impairments are linked to reduced quality of life. Cognitive rehabilitation for people with MS is in its early stages but several studies show promising results. The aim of the study was to evaluate the efficacy of a six-week computer based cognitive training for people with MS.
Participants and Methods: Participants were 33 outpatients with confirmed multiple sclerosis (MS).The cognitive training was home-based and conducted over the internet using selected training programs with the main focus on attention, working memory and mental speed. The training programs were all developed by Lumosity ®, a website that specializes in brain training games. Participants trained approximately 30 minutes each day, five days a week for six weeks. They were tested before and after the training with eight computerized tests from Lumosity ® and the paper/pencil test of D2 Test of Attention. Participants in the study underwent EEG before and after the training as well but data have not yet been analyzed.
Results: The training did not result in significant improvement on the computerized tests after the training period but significant improvement were found on the attention test of D2.
Conclusions: Attention was significant better on the paper/pencil attention test after training but not in the computer tests. Perhaps the discrepancy in the results is due to the computerized cognitive tests, used in the study, not being sensitive enough. They might be too short to assess improvements in attention compared to the paper and pencil test. The six-weeks of training might also not be enough training time to improve cognition in people with MS. This result is encouraging but further studies are needed on the subject.
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K. POLANOWSKA, M. LESNIAK, J. SENIÓW & A. CZLONKOWSKA. Anodal transcranial Direct Current Stimulation Can Enhance Verbal Repetition in Aphasic Patients with Subacute Stroke.
Objective: Recent studies have suggested that non-invasive cortical stimulation can improve some aspects of cognition, including language, memory and thinking skills in both healthy and brain-damaged individuals.

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It is assumed that the best outcome may be obtained after combining brain stimulation with behavioral training. The aim of our study was to investigate whether excitability-enhancing anodal transcranial direct current stimulation (A-tDCS) applied to the left hemisphere can increase the effect of language training in patients with poststroke aphasia.
Participants and Methods: Thirty three right-handed patients (13 female, 20 male) with subacute stroke and subsequent aphasia participated in double-blind sham-controlled study. All participants received a total of 15 (5 times a week for 3 weeks) 45-min. sessions of individual speech and language training preceded by 10-min A-tDCS (anode over the Broca's area; cathode above the right supraorbital area). Depending on group assignment, A-tDCS was either real (1 mA for 10 min.; current density= 0,028mA/cm2) or sham (1 mA for 10 sec.). Behavioral consequences of both stimulation conditions were estimated using Boston Diagnostic Aphasia Examination (auditory comprehension, naming, and repetition), performed before and after the therapy.
Results: No differences in baseline characteristics (sex, age, education, time from stroke, infarct volume), and test scores were found between the two groups. After three-weeks rehabilitation, both groups significantly improved in all tested language skills. However, the positive impact of real A-tDCS was detected only in verbal repetition (F= 11,083; p= 0,002).
Conclusions: The combination of A-tDCS of Broca's area and language training may enhance the recovery of verbal skills. Better repetition after excitatory stimulation of intact or perilesional left frontal cortex suggests that tDCS-induced neuromodulation may help in functional language reorganization during early poststroke recovery.
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A. GARCÍA-MOLINA, R. SÁNCHEZ-CARRIÓN, A. ENSEÑAT, J. SOLANA, E. GÓMEZ, J. TORMOS & T. ROIG-ROVIRA. Same Cognitive Impairment, Similar Rehabilitation Program, Different Outcomes.
Objective: Identify markers of response to cognitive rehabilitation in a sample of patients with moderate or severe traumatic brain injury (TBI).
Participants and Methods: Sixty patients with moderate or severe TBI; the mean Glasgow Coma Scale score was 7.02 (SD= 3.2); mean age: 32.5 years (SD= 13.4); time since injury: 4.2 months (SD= 2.3 months). Patients received computer-assisted cognitive rehabilitation using Guttmann NeuroPersonalTrainer, 5 sessions per a week, 45 minutes per session, over a 12-week period. Differences between baseline and post-treatment neuropsychological test scores were used to measure patients' improvements in the domains of attention, memory and executive functions. Patient's everyday competence after treatment was examined with the Patient Competency Rating Scale (PCRS).
Results: Thirty-four patients presented satisfactory everyday competence after treatment; the rest (n=26) an unsatisfactory everyday competence. Both groups had similar cognitive impairment at baseline and showed statistically significant improvement in neuropsychological tests scores after the application of the computer-assisted cognitive rehabilitation. There were no significant differences between them in demographic and injury characteristics (age, sex, severity of injury, PTA duration, and time since injury; p>0.05). Nevertheless, education level was significantly different among both groups (p=0.003): group with satisfactory everyday competence had higher educational attainment than the other group.
Conclusions: Computer-assisted cognitive rehabilitation for people with moderate or severe TBI is effective in improving cognitive impairment; however this improvement aren't transferred to the patient daily life in all cases. The findings suggest that education may act as an outcome marker: higher educational attainment is associated with better recovery.
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A.M. SALO, E. KALLIO, K. RELANDER-SYRJÄNEN & M. HIETANEN. Neuropsychological interventions support successful vocational reintegration.
Objective: After an acquired brain damage even mild cognitive deficits may complicate return to work (RTW). The Department of Neurological Rehabilitation, Helsinki University Central Hospital (HUCH), Finland, is mainly focused on multidisciplinary outpatient rehabilitation of working-aged patients including neuropsychological rehabilitation (NPR). We report the outcome of NPR during 2009-2010 in relation to RTW.
Participants and Methods: A total of 197 patients (52 % male, mean age 45.1 years, SD 11.7) attended NPR at the Department of Neurological Rehabilitation. The majority of the patients had stroke (n=123). The indication for NPR was most often memory deficits (59 % of the patients), executive (51 %) or attentional (47 %) dysfunctions. The methods used in NPR were individual sessions (tailored to the needs of a patient), brief psychoeducative period (1-5 appointments for 1-3 months) and/or group counseling (a structured program of 6 sessions), all of which include alternating components of cognitive training, reinforcing compensatory strategies, psychoeducation, psychotherapeutic elements and follow-up.
Results: The number of NPR sessions varied between 1-35 (mean 9.7 ± 8.3), and duration between 1-19 (mean 4 ± 3.3) months. Altogether 127 patients attended individual NPR period, 60 patients received neuropsychological psychoeducation, and 12 patients participated group counseling. The majority (55 %) of the 197 patients received only NPR, while 21 % needed multidisciplinary rehabilitation. More than half (55 %) of the patients returned either to their former work, modified or part-time work, or work trial. Disability pension was allowed to 32 % of the patients.
Conclusions: RTW is one indicator of successful NPR with working-aged patients. When NPR was tailored to take into account mild cognitive deficits and the individual situations, more than half of the patients was able to return to their former work or otherwise reach vocational reintegration. Even short neuropsychological interventions can help patients to RTW.
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B.K. SAUNES, A.K. AARLIEN & J. EGELAND. Does computerized working memory training for children with ADHD work?
Objective: Computerized working memory training has become increasingly popular for different clinical populations. Effect studies on working memory (WM) training of children with ADHD, are reviewed.
Participants and Methods: The table sums up ten studies which have applied Cogmeds Robomemo method and also presents results from our own project: Effect study of WM training in children with ADHD 10-12 years. Based on Baddeley's WM model we consider possible training effects on auditory and visual storage capacity and central executive. Transfer effects are evaluated, and whether they persist over time.
Results: We found that increased visual capacity is generally supported. Training effects related to auditory storage and the central executive are smaller and less consistently found. Regarding transfer effects two studies report decline in parent rated attention deficit symptoms. Our study shows improved visual storage capacity, enhanced attention control and improved skills in reading and mathematics. Effects evident after completed training persist after 8 months. No studies have so far found teacher reported improvements in ADHD symptoms after training.
Discussion: All published studies have reported positive findings, but there is limited support for transfer effects that affect everyday life functioning of children with ADHD. Earlier studies may be criticized for small samples, lack of control data and imprecise operationalization of outcome. For valid conclusion about improvement after training multiple measures of the same function should be included. The method is also criticized not to treat the core difficulties in WM in children with ADHD, by focusing on storage capacity, but not the manipulation element that is most impaired in ADHD and most clearly related to inattention.
Conclusions: Computerized working memory training is a promising therapeutic strategy for children with ADHD, but it requires further development of the software.
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S. VON TETZCHNER, H. SCHIØRBECK & S. KRABBE. The Effect of Intervention Based on Doman Programs and on Ordinary Habilitation.
Objective: Today, many of intervention programs are lacking a clear evidence base. High-intensive treatment based on the ideas of Glen Do-

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man has a long history in the intervention for children with severe disabilities. The Institutes for the Achievement of Human Potential (IAHP) and Family Hope Center (FHC) claim that children who have received this form of treatment have show much more progress than children following ordinary programs. However, the research investigating the effects of Doman-based treatment is inclusive, having mainly included low-intensity intervention. The present study investigates the claims of IAHP and FHC that children following their programs will show more progress than children following ordinary programs.
Participants and Methods: Participants are 18 children whose families who have chosen the programs of IAHP and FHC for their child, and 17 matched with families who have chosen the ordinary program. There is no random allocation as choice of program is an important decision for the family. This also ensures loyalty to the program. Cognition and language are assessed at project start and after 6, 12 and 24 months. The parents are interviewed about the child's development at project start and each follow-up.
Results: The two groups are compared on cognitive skills and language skills at project start and after 6, 12 and 24 months, using standard statistics for comparing means, and supplemented with individual trajectories.
Conclusions: The results and their implications for interventions provided to disabled children are discussed.
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S.M. SKEIDE. Meditation and Neuroplasticity.
Objective: Recent studies find evidence of functional and structural changes in the brain following meditation practice, indicating that meditation harnesses the brain's inherent ability to change in response to experience. An open question exists, however, whether meditation enhances neuroplasticity. The objective of this study, is this to examine whether, and how, this might be the case.
Participants and Methods: The poster is based on a main thesis submitted for the Professional Program in Psychology. The method is a comprehensive literature review of current research.
Results: It is found that meditation might enhance neuroplasticity specifically through the mechanisms of relaxation (as it is shown that stress impairs neuroplasticity and learning) and the training of attention skills.
Conclusions: These findings have potential practical applications in areas such as therapy, rehablitation, education, and age-related cognitive decline.
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A. STIGSDOTTER NEELY & P. SANDBERG. Long-Term Effects after Working Memory Training in Young Adults.
Objective: Working memory training has attracted a lot of attention in recent years. However few studies have examined long-term effects following training. Since the stability of training gains is both of theoretical and practical relevance this is an unfortunate omission. The present work aims at examining the long-term effects of immediate gains after working memory training.
Participants and Methods: In a previous study we examined the effects of a training program focusing on the central executive of the working memory system by providing training in updating, shifting and inhibition. The training comprised 15 sessions á 45 min/session given over a five-week period.
Results: The results yielded substantial improvements in the trained tasks compared to a no-contact control group. Also near transfer effects were seen to untrained tasks measuring updating and inhibition as well as to a complex working memory span task. These results may suggest that the training have affected working memory in a more general sense.
Conclusions: We are currently collecting the data to the follow-up assessment where 30 young adults were invited back 18 months after completion of training and were administered a battery of criterion, near and far transfer test. These data will be discussed and hopefully bring light on the stability of task-specific and transfer effects in young adults.
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J. UIMONEN & E. POUTIAINEN. Referral to Neuropsychological Rehabilitation – A Follow-up Study of Working Aged Stroke Patients.
Objective: Over 60 % of ischemic stroke patients suffer from cognitive symptoms but the resources of neuropsychological rehabilitation are usually limited. The aim of this study was to examine if patients' background or clinical factors have an effect on the referral to neuropsychological rehabilitation.
Participants and Methods: Subjects were 179 working aged consecutive inpatients in Helsinki University Central Hospital with first-ever ischemic stroke. Neuropsychological functioning and depressive symptoms were assessed at the acute stage. Out of the neuropsychological measures we created four cognitive main domains; memory, executive functions and speed, visual functions, and language functions. Deficit in the domain was determined when the particular domain scored below 1.5 SD of the demographic controls (n=50). Study group consisted in 96 (54 %) patients which had a deficit at least in one of the four cognitive domains at the acute stage. Rehabilitation data was collected from medical records.
Results: 36 % of the total study group of 96 patients was impaired in one cognitive domain, and almost 80 % of the patients had decreased executive functions and speed. 38 % of the 96 cognitively impaired patients were referred to neuropsychological rehabilitation, almost 50 % of them had deficits at least in three of the four main cognitive domains. They were also significantly younger ($p<.01$), more likely still working than retired ($p<.01$), more educated ($p<.05$), and stayed at inpatient ward longer ($p<.01$) compared with those who were not referred to neuropsychological rehabilitation. Patients' other demographic and clinical variables were not associated with referral to neuropsychological rehabilitation.
Conclusions: Patients who were referred to neuropsychological rehabilitation were mostly young and employed subjects with moderate to severe cognitive dysfunction. The limited availability of neuropsychological rehabilitation may explain this selectivity.
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D. VOITA, A. KAULINA & E. VALEVICA. Biofeedback method for possible correction of learning and reading disorders for children with decreased stress tolerance.
Objective: Learning disabilities often connected with reading disorders. Decreased stress tolerance (ST) and dysfunction of autonomic nervous system (ANS) may be one of the factors that has an impact on learning disabilities. The importance of the Biofeedback (BFB) method is increasing. The objective of the study was to determine the efficiency of BFB on children with learning disorders, including reading disorder with dysfunction of ANS and decreased ST.
Participants and Methods: Theoretical methods: analysis of medical, psychological literature; empirical methods: Task Force® Monitor device (CNSystemsMedizintechnik AG), Determination test (Vienna test system), Analogue Visual Scale, Biofeedback X-pert 2000, parametric statistic analyses, a complex evaluation of cognitive abilities. 72 persons with learning disabilities were tested for evaluation of the autonomic nervous system activity (ANS) and ST. Twelve boys (age 10 ± 0.5), with decreased ST and increased sympathetic nervous system acitvity were selected for BFB trainings.
Results: The children took part in 14 BFB temperature sessions, resulting in a significant trend for increasing of ST and normalizing of ANS function. Two participants stopped use of tranquilizers that could be explained with a positive BFB effect on the ANS. All participants showed a better academic performance and a trend of improved reading fluency.
Conclusions: The acquired data show that the usage of BFB has a potential in treatment of children, it increases the quality of life and reduces learning and reading disorders. An increase in efficiency is possible with the inclusion of relaxation training. To reduce reading and language disorders, a complex system of methods, including BFB, relaxation and cognitive training sessions should be developed.
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S. WATANABE & K. AMIMOTO. Playing Catch Rehabilitates Constructional Apraxia.

Objective: Constructional apraxia has been defined as a disability in organizing the spatial structure of a design in the absence of an impairment of individual movements (Kleist, 1914/1918). In previous studies some interventions for this disability have been proposed but any methods have not been established. Playing catch is simple task for therapeutic exercise and seems to be a useful method for training the spatial cognitions. This study examined whether playing catch tasks aimed at reeducation of the spatial cognition affect to improve constructional apraxia.

Participants and Methods: Four patients with constructional apraxia after stroke who suffered more than 30 days from onset (Mean Age; 69, three for right hemisphere dameged and one for left) were participating in our study. The playing catch tasks were conducted in one session first. Cube Copy Drawing was assessed at baseline, post, 24-hour, and 48-hour after this session. Following these assessment, five days sessions of playing catch tasks in 15-minute per day were conducted and post reassessment of copy drawing was completed. At baseline, all subjects were submitted to a neuropsychological evaluation including Mini-Mental State Examination (MMSE), Behavioural Inattention Test (BIT), a short screening test for apraxia. Furthermore, Functional Independence Measure was administered to assess the relation with everyday functioning.

Results: Results showed the improvement of constructional apraxia in three patients and no change in one patient. At 48-hour after one session, performances in these three benefit patients returned toward baseline. After five days sessions, all patients improved their performance and maintained at 48-hour after the end of all sessions. In contrast, playing catch tasks did not affect to the performance of MMSE, BIT, apraxia, and FIM.

Conclusions: These findings suggest that playing catch provide at least immediate improvement of constructional apraxia. This effect might be brought through reeducation of spatial cognition.

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D. WILKINSON, D. LANGSTON, O. ZUBKO & M. SAKEL. Can Repeated Sessions of Galvanic Vestibular Stimulation Induce Lasting Recovery From Hemi-spatial Neglect?

Objective: Hemi-spatial neglect is a debilitating, attentional disorder that is difficult to treat. Sufferers behave as if one side of their visual world (usually the left) is missing, often colliding with obstacles and failing to acknowledge people on their affected side. The condition significantly lengthens hospital stay and is the strongest predictor of general functional recovery from stroke. Previous study has indicated that a single session of galvanic vestibular stimulation (GVS), a non-invasive means of increasing blood flow to temporal-parietal cortex, can induce spontaneous relief from the condition. A key problem, however, is that symptoms resurface minutes after stimulation is stopped. The aim of the present pilot study was to determine whether repeated sessions can induce longer-lasting carry-over that may hold relevance to rehabilitative practice.

Participants and Methods: Two participants with hemi-spatial neglect (as diagnosed via the Behavioural Inattention Test), one 6 weeks post-stroke and the other 38 months post-stroke, received 30mins of sub-sensory GVS for 5 consecutive days, plus a follow-up session 3 days later to test whether any carry-over had occurred. Two different spatial exploration tasks (star cancellation and letter cancellation) were administered before and after the stimulation period, along with a questionnaire to assess safety.

Results: Repeated measures ANOVA indicated that participants produced significantly fewer errors in the letter (36% more accurate) and star (50% more accurate) cancellation tasks on the final day of stimulation compared to the pre-stimulation baseline. More so, this improvement was still present at the 3 day follow-up session. Neither patient reported ill-effect from the treatment.

Conclusions: We have shown in two neglect patients that the short-lived recovery induced by a single session of GVS can be prolonged by four additional sessions. A larger, controlled study is now underway to more fully explore the relationship between session frequency and recovery.

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TBI (Adult)

J. DOUGLAS, C. BRACY & P. SNOW. Social Communication Outcome Following Severe Traumatic Brain Injury: Comparing the Perspectives of Injured Adults and their Relatives at Different Stages of Recovery.

Objective: To investigate social communication outcome as perceived by adults with severe traumatic brain injury (TBI) and their relatives at 3 time postinjury (TPI) intervals (early < 2 years, middle 2-4 years, late > 4 years).

Participants and Methods: A total of 64 adults with severe TBI and 64 relatives in early (n = 21), middle (n=22) and late (n=21) stages post injury participated in the study. The 3 groups were matched on injury severity, age and education at the time of injury. The La Trobe Communication Questionnaire (LCQ), a 30-item questionnaire that measures social communication ability from multiple perspectives was used to measure communication outcome. Formal translations of the LCQ are available in Norwegian, Spanish, French, Danish, and Swedish.

Results: Mixed 2x3 ANOVA (within factor: source of perception - self versus relative; between factor: TPI group - early, middle, late) revealed a significant interaction ($p = .04$). Post hoc planned comparisons revealed: early stage TBI participants reported themselves to have significantly fewer social communication problems than did their relatives ($p = .002$) and significantly fewer problems than middle ($p = .009$) or late ($p = .035$) stage TBI participants. Perceptions of middle and late stage TBI participants and their relatives were similar.

Conclusions: Results highlight the enduring nature of social communication deficits following TBI and reflect the presence of impaired self-awareness of communication deficits early postinjury group, but not in the middle and late stages post-injury.

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T.L. EDGINTON, C. LOVEDAY, J. IDDON, N. BORG & P. HUTCHINSON. Assessing and responding to the cognitive and psychosocial sequelae of Traumatic Brain Injury in a multidisciplinary neurotrauma out-patient clinic.

Objective: To explore generic and specific patterns of cognitive impairment and establish how they relate to clinical, neurological and psychosocial factors using a specially designed neuropsychological triage assessment.

Participants and Methods: 200 TBI patients who report cognitive difficulties post TBI were recruited from our multidisciplinary neurotrauma outpatient clinic that is offered as part of their follow up care.

Our short neuropsychological triage battery and the SF36 quality of life questionnaire was administered. Factor analysis was used to identify cognitive constructs that underpin the key cognitive deficits observed in TBI patients in relation to the nature of their brain injury obtained from imaging data. Frequency and correlation analyses were used to identify the relationship between these factors with their SF36 and Marshall scores.

Results: Factor analysis revealed that memory and executive components form two independent factors. On the most sensitive executive measure 65% showed impairment with 28% in the most significantly impaired range. In contrast on the key measure of memory functioning 75% showed impairment with 36% in the most significantly impaired range. Furthermore, the executive component was strongly correlated with physical functioning on the SF36; $r=0.625$, contrasting with memory deficits that did not correlate with any SF36 measures.

Conclusions: Our short neuropsychological assessment can be used successfully to detect cognitive impairments and differentiate between two distinct cognitive factors that have independent relationships with SF36 measures and Marshall scores. We discuss these findings in relation to the nature of their brain injury, quality of life, targeted rehabilitation and implications for future development of the service.

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A.A. FEDIO, J. SEXTON, T. THOMAS, R. BURGESS, A. LOGEMANN & P. FEDIO. Self-concept as a Motivator for Seeking Treatment following Traumatic Brain Injury: Patient and Family Contributions.
Objective: Self-concept theoretically includes abstract and concrete impressions of self. The present study investigates the relationships among traumatic brain injury (TBI) patients' self-concept, self and families' perceptions of recovery, and the desire to seek treatment.
Participants and Methods: Fourteen moderate-severe TBI patients (8M, 6F; age 36 yrs, 4 yrs post injury) completed the Tennessee Self-Concept Scale-2 (TSCS-2), rating physical, moral, personal, family, and social self-worth, as well as their identity, behavior, and self-satisfaction. Each patient and family also completed the Neurobehavioral Functioning Inventory (NFI), rating somatization, motor skills, attention/memory, communication, depression, and aggression. Patients also completed the Motivation for TBI Rehabilitation Questionnaire (MOT-Q).
Results: Patients' ratings on the TSCS-2 were within average range, although their perceived value as a family member fell below expectations ($t(13)=-3.67$, $p<.005$). Patients' and families' ratings on the NFI were in close agreement and within the average range. The dyads' endorsement of patients' depression and motor problems inversely related to most measures of self-worth. Time since injury was inversely related to patients' self-worth ($r=-.52$), and directly related to depression ($r=.76$), somatic ($r=.65$), and motor skill ($r=.86$) concerns, as well as reliance on professional help ($r=.71$). Patients' negative self-worth predicted their reliance on professional help ($r=.54$) and motivation for treatment ($r= .57$).
Conclusions: TBI patients' as well as their families' perceptions of the patients' depression and motor problems impact the self-concept of patients even years after injury. Low self-worth serves as a motivator for seeking treatment. Finally, patients' feelings of inadequacy as a family member underscore the need for family therapy to bolster family relations and support to enhance recovery.
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T. FINNANGER, T. SKANDSEN, A. STEIN, S. LYDERSEN, A. VIK & M.S. INDREDAVIK. Association Between Global Outcome, Measures of Injury Severity and Concurrent Neuropsychological Function 12 Months After Traumatic Brain Injury.
Objective: To explore whether performance on neuropsychological tests 12 months after traumatic brain injury (TBI) are associated with concurrent measures of global function when adjusted for injury severity.
Participants and Methods: Patients aged 15-65 participated in a prospective cohort study of patients admitted to a level I trauma centre. Fifty patients with moderate and severe TBI (Glasgow Coma Scale (GCS) score 3 - 13) were assessed with a comprehensive neuropsychological test battery twelve months post-injury. Mean T-scores (composite scores) were calculated for the following domains: motor function, psychomotor speed, attention, working memory, executive function, verbal and visual memory. Concurrent global function was assessed according to the Global Outcome Scale Extended (GOS-E). Associations between neuropsychological function and concurrent functional outcome was analyzed with ordinal logistic regression. Covariates were included separately and then adjusted for injury characteristics as GCS score and length of post traumatic amnesia (PTA).
Results: Among the patients 38 % reports GOS-E score below 7, while 24 % and 38 % reported a GOS-E score at 7 and 8 respectively. PTA-duration less than one week predicted higher GOS-E score (odds ratio (OR): 7.49, $p = 0.001$), but GCS-score at injury did not (OR: 1.12, $p = 0.195$). Better concurrent information processing speed (OR: 2.18, $p = 0.003$), attention (OR: 2.88, $p = 0.042$), verbal memory (OR: 1.71, $p = 0.024$), visual memory (OR: 1.97, $p = 0.008$), and executive function (OR: 5.17, $p = 0.001$), were associated with higher GOS-E. When adjusted for duration of PTA and GCS-score only measures of executive function predicted functional outcome (adjusted OR: 3.26, $p = 0.024$).
Conclusions: Length of PTA and neuropsychological functions as information processing speed, attention, verbal memory, visual memory and executive function were associated with concurrent global function. However, when adjusted for injury severity only executive function predicted global outcome.
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B. JOHANSSON, H. BJUHR & L. RÖNNBÄCK. Mindfulness-Based Stress Reduction (MBSR) and an Advanced Program - a Promising Treatment for Long-Term Mental Fatigue After Traumatic Brain Injury or Stroke.
Objective: Mental fatigue is for many a very distressing and long-term problem after a traumatic brain injury (TBI) or stroke. It will make it more difficult for the person to return to work and participate in social activities, and it can take several years to find the right balance between rest and activity in daily life, find strategies and to accept the new situation. Since no effective therapy exists today, the aim with the present study was to implement mindfulness-based stress reduction (MBSR) aimed at improving the condition of these patients.
Participants and Methods: MBSR is a structured public health intervention to cultivate mindfulness and consists of eight weekly 2.5h long group sessions, one day long silent retreat and home practice every day. The results of the program were evaluated using the mental fatigue scale (MFS) and tests measuring information processing speed, attention and working memory. 32 patients were included, 18 stroke, 11 TBI and 3 with other brain diseases. All were well rehabilitated physically other than mental fatigue. Sixteen participants were randomized for inclusion in the MBSR program. The other 16 served as controls and received no active treatment during the first period but were offered MBSR during the next 8 weeks. In total, 25 completed the MBSR program. After that, we offered an advanced program and 17 participated during 8 months.
Results: Statistically significant improvements were achieved in the MFS, and in information processing speed after 8 weeks. These positive results remained at follow-up after the advanced program.
Conclusions: The results from the present study show that MBSR may be a promising non-pharmacological treatment for mental fatigue after a stroke or TBI.
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B. JOHANSSON, A. CARLSSON, M.L. CARLSSON, M. KARLSSON, M.K. NILSSON, E. NORDQUIST-BRANDT & L. RÖNNBÄCK. The Monoaminergic Stabilizer OSU6162 Alleviates Long-Term Mental Fatigue and Associated Symptoms After Traumatic Brain Injury or Stroke.
Objective: Mental fatigue is a common long-lasting symptom following Traumatic Brain Injury (TBI) or stroke, resulting in difficulty returning to work and pursuing social activities. Mental fatigue is characterized by pronounced fatigability even after moderate mental activity. Focused attention and concentration are maintained for only short periods of time. A typical feature of this type of fatigue is a prolonged, profound recovery period needed to restore mental energy. Affected persons often experience associated symptoms, the most common of these being stress sensitivity, irritability, tearfulness, sound- and light sensitivity and headache.
There is currently no specific targeted pharmacotherapy that will ameliorate mental fatigue. The aim with the present study was to implement a novel pharmacological strategy for these patients, using the monoamine stabilizer OSU6162.
Participants and Methods: OSU6162 was compared with placebo using a double blind, randomized cross-over design. Patients included were well rehabilitated physically with no gross impairment in cognitive functions other than those related to the mental fatigue. OSU6162 was given for four weeks, with a slow and careful dose increase. Twelve patients suffering from mental fatigue, following upon stroke (N=6) or TBI (N=6) were included in this pilot study.
Results: OSU6162 caused a significant improvement in mental energy, as evaluated by the mental fatigue scale (MFS). Positive responses were seen already during the first few days of active drug treatment in nearly all the MFS items. Increasing dosage resulted in no further improvement. Side-effects were mild and could largely be avoided by dose adjustment.
Conclusions: Our preliminary results are most promising. 60 % of the patients in our pilot study responded promptly with respect to mental fatigue. Further studies on the effectiveness of OSU6162 are ongoing.

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J.L. MATHIAS & P.K. ALVARO. Prevalence of Sleep Disturbances, Disorders and Problems in Adults after a Traumatic Brain Injury, Compared to the General Population: A Meta-analysis.

Objective: Sleep is often disrupted following a traumatic brain injury (TBI), which may compromise recovery and quality of life. Prevalence rates vary widely (30%-84%), reflecting differences in the criteria and measures that are used to assess sleep, as well as sampling differences. This meta-analysis examined the prevalence of general and specific, formally and informally diagnosed, sleep disturbances following TBI in order to establish the nature and extent of these sequelae and their potential impact on recovery.

Participants and Methods: Data from 21 studies, which assessed (1) sleep disturbances, regardless of type or severity, (2) diagnosed sleep disorders, and (3) specific sleep problems following TBI, were analysed and compared to data for the general population.

Results: Overall, 50% of people suffered from some form of sleep disturbance after a TBI and 25% to 29% had a diagnosed sleep disorder (e.g. insomnia, hypersomnia, apnoea). They were also two to four times more likely to experience problems with sleep maintenance and efficiency, nightmares, excessive sleepiness, early awakenings and sleep walking. These rates are significantly higher than those seen in the general population.

Conclusions: Sleep disturbances are very common after TBI and have the potential to seriously undermine patient rehabilitation, recovery and outcomes; making it important to routinely screen for such problems in order to assess both treatment needs and their potential impact on recovery and outcome.

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C. PADGETT, C. SKILBECK, M. SUMMERS & J. VICKERS. The Role of APOE Genotype in Recovery Following TBI: Is the e4 Allele Associated with Poorer Outcome?

Objective: The APOE gene synthesises ApolipoproteinE (ApoE) is the predominant apolipoprotein in the CNS, and is integral to repair following injury. There are three alleles of the APOE gene; e2, e3 and e4. The e4 allele has been linked to poorer neuropsychological outcome following TBI, however results have been mixed. A limitation of previous studies has been that measures insensitive to neuropsychological impairment have been used. The present study aims to investigate the relationship between APOE genotype and performance on tasks sensitive to neuropsychological impairment following TBI.

Participants and Methods: A total of 174 participants provided buccal samples to determine APOE genotype, and were tested on tasks of executive function (Trails B and Controlled Oral Word Association Task), short term memroy (Digit Span, Letter Number Sequencing and Visual Patterns Test) and information processing speed, at 0, 3, 6, 12, and 24 months post injury. Forty- two individuals (m=21, f=21) were identified as having at least one copy of the e4 allele. As current evidence indicates estradiol levels mediate APOE expression, e4 carriers were matched to non e4 carriers on sex and age, as well as estimated premorbid IQ (n=42).

Results: Repeated measures ANOVAs and discrete ANOVAs at each time-point found no significant differences between the e4 and non e4 groups. However the e4 group performed worse that the non-e4 group on 38 of the 48 analyses and subsequent chi-square analysis found this discrepancy to be significant; $\chi 2$ (1) = 15.18, p <.01. This trend was consistent in all measures except for the COWAT.

Conclusions: It is proposed that lack of power may have resulted in non-significant parametric results, and that non-parametric findings support the proposition that the e4 allele may confer poorer outcome following TBI. Advantages of the current study over the majority of previous research include the use of matching, and use of neuropsychological measures known to be sensitive to impairment following TBI.

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G. SPITZ, D. RUDZKI, S. MCGUIGAN, J. MALLER & J.L. PONSFORD. The Association Between Cognitive Performance and Functional Outcome Following Traumatic Brain Injury: A Longitudinal Multilevel Examination.

Objective: Cognitive impairments following traumatic brain injury make it difficult for individuals to successfully reintegrate into the community. The current study investigated whether the initial status and trajectory of functional outcome was associated with individuals' cognitive abilities over the initial year following TBI.

Participants and Methods: Ninety TBI participants with a mean age of 33 years (SD=14.1) and 55 healthy controls with a mean age of 29 years (SD=11) were followed-up at three, six and 12-months post-injury and administered a battery of cognitive tests—assessing information processing, memory, and executive functions—as well as the Mayo-Portland Adaptability Inventory (MPAI) to assess functional outcome. Multilevel modelling was used to model the trajectory of MPAI score over the initial year—both in terms of initial status and slope trajectory.

Results: TBI participants reported significantly greater functional difficulties on the MPAI, and displayed poorer cognitive performance compared to controls. In addition, greater time post-injury ($t(54)=-3.4, p<.01$), younger age ($t(22)=2.50, p<.05$), and fewer days of post-traumatic amnesia (PTA) ($t(22)=3.7, p<.01$) were associated with better functional outcomes. However, the addition of measures of information processing ($\chi 2(3)=152.1$, $p<.001$) and executive functions ($\chi 2(3)=107.1$, $p<.001$) resulted in better models, compared to the initial model that included only age and PTA, with individuals performing poorly in these cognitive domains likely to experience poorer functional outcomes.

Conclusions: Functional outcomes improved over the initial year following TBI, being influenced both by demographic and cognitive factors. Individuals with better information processing and executive functions reported fewer functional difficulties over the initial year post-injury. These results suggest that cognitive impairment continues to be a source of difficulty for individuals following TBI, a factor that should be detected and dealt with in the acute stage.

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C. VALLS, G. CUBEROS-URBANO, R. CARACUEL & A. VERDEJO-GARCÍA. Life-log technology increases effectiveness of executive training after brain injury.

Objective: To compare the relative efficacy of traditional Goal Management Training –GMT–(Levine et al., 2000) vs. GMT + life-log technology on recovery of executive dysfunction in patients with acquired brain injury. The GMT + life-log technology incorporates SenseCam and ActiHeart to provide real-life behavioral and physiological recordings that are later used for feedback-based therapeutic change.

Participants and Methods: Sixteen patients with acquired brain injury (minimum of 6 months after injury) were randomized into the two intervention groups (GMT vs. GMT + Lifelog). Both interventions were implemented for 8 weeks, 2 sessions of 2 hours each week. Behavioral changes related to executive dysfunction were assessed pre- and post-intervention with the family version of the Dysexecutive Syndrome Questionnaire –DEX–(Pedrero Pérez et al.,2011).

Results: Repeated-measures ANOVAs showed that the GMT traditional intervention produced significant changes in Positive Emotionality and Global DEX scores, whereas GMT+Lifelog produced, on top of these changes, additional improvement of the Intentionality and Cognitive DEX scores.

Conclusions: Life-log technology can extend the beneficial effects of GMT on executive dysfunction, by positively impacting cognitive and intentionality executive components.

Levine, B., Robertson, I. H., Clare, L., Carter, G., Hong, J., Wilson, B. A., Duncan, J., et al. (2000). Rehabilitation of executive functioning: an experimental-clinical validation of goal management training. JINS, 6(3), 299–312.

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Pedrero-Pérez, E.J., Ruiz-Sánchez, J.M., Lozoya-Delgado, P., Llanero-Luque, M., Rojo-Mota, G., Puerta-García, C. (2011). Prefrontal symptoms assessment: psychometric properties and normative data of the Dysexecutive Questionnaire (DEX) in a sample from the Spanish population. Rev Neurol. 2011 Apr 1;52(7):394-404.
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M. YANG, M. HUA, C. YANG & S. HUANG. Effect of Theory of Mind on Social Interaction in Patients with Traumatic Brain Injury.

Objective: A poor outcome of social function is prevalent in patients with traumatic brain injury (TBI), even years after the injury. Recent studies revealed that the patients also evidenced an impairment of theory of mind. However, little has examined the effect of theory of mind on social function in these patients. In light of theory of mind is one of the essential components of social cognition, the present study was thus to make an attempt to explore the issue.

Participants and Methods: Thirty mild, moderate and severe TBI patients as well as twenty nine normal controls participated in the present study. The patient's brain lesion was confirmed by the structural brain imaging study, either CT or MRI. Each participant received a battery of neuropsychological tests and the measure of theory of mind, the faux pas task. TBI patients and their families also completed a social interaction outcome questionnaire.

Results: TBI patients evidenced significantly poorer performances on the social interaction outcome questionnaire and the faux pas task than their normal counterparts. Meanwhile, their current outcome score was significantly lower than the pre-morbid one. Performance scores of the faux pas task and the verbal comprehension intelligence test were significantly contributory to the patients' ratings of the current and the premorbid-morbid discrepancy scores of the social interaction outcome questionnaire. However, only the verbal comprehension intelligence score significantly contributed to the family ratings of the current and the discrepancy scores of the questionnaire.

Conclusions: Based on the results, the impairment of theory of mind other than verbal comprehension intelligence did remarkably affect the frequency of social interaction in patients with TBI regardless of severity. We thus suggest that an inclusion of the checkup of theory of mind in the regular neuropsychological assessment of this patient population is necessary.

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TBI (Child)

L. CROWE, C. CATROPPA, F. BABL & V. ANDERSON. Comparing 3-year and 5-year IQ Outcomes After Early Traumatic Brain Injury.

Objective: Traumatic brain injury (TBI) occurs often in young children. Despite this there is little research into the outcomes of this group. Theories around recovery from TBI in young children highlight an early vulnerability and suggest children with TBI will continually fall behind their peers as they develop.

Participants and Methods: The sample consists of 55 children, 35 children with a TBI before 3 years (mild and moderate/severe group) and 20 typically developing children matched for age, gender, and socioeconomic status making up the a control group. Assessments of cognitive function were administered at 3 years and 5 years post-injury.

Results: Verbal IQ, Performance IQ, and Full-Scale IQ scores where compared over time. There was little change in ability in children with moderate-severe TBI. Children with mild TBI continued to perform in the average range, though slightly below controls.

Conclusions: There was no evidence of a decrease or a catch-up in performance over time for children with moderate-severe TBI, rather children in all groups performed similarly over time. Results challenge the suggestion that children 'grow into deficits.'

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J. SERRA-GRABULOSA, X. CALDÚ, M. ARIZA, P. SALGADO-PINEDA, K. VERGER, J. MERCADER & C. JUNQUÉ. Long-term White and Gray Matter Damage in Early Traumatic Brain Injury.

Objective: Previous studies showed that traumatic brain injury causes specific and unspecific brain damage. In this study, we applied voxel-based morphometry method to investigate residual gray and white matter damage in children and adolescents with antecedents of traumatic brain injury (TBI).

Participants and Methods: Eighteen patients with diffuse TBI were studied at least 6 years after injury, and compared to a matched control group. Since TBI can affect diverse brain regions, we used voxel-based morphometry (VBM) to evaluate differences between controls and TBI subjects in gray and white matter brain density.

Results: VBM results showed that TBI subjects had temporal and frontal white matter hypodensities and multiple gray matter anomalies. We found gray matter bilateral abnormalities in hippocampus and the parahippocampal region, thalamus and basal ganglia. White matter analysis showed anomalies in certain regions of the frontal and temporal lobes, and in the corpus callosum.

Conclusions: Voxel-based morphometry analysis showed that TBI in childhood without focal lesions causes residual diffuse brain damage, reflected in white (WM) and gray matter (GM) hypodensities affecting numerous structures. These results agree with previous findings, emphasizing the utility of the VBM analysis applied to TBI subjects, to detect brain damage by using a whole brain analysis.

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Epilepsy/Seizures

H.P. MAHER, N. PENDER, N. DELANTY, C.P. DOHERTY & T. BURKE. Cognitive Functioning in Individuals with Mesial Temporal Lobe Epilepsy with Hippocampal Sclerosis (MTLE+HS) Relative to Unaffected Same-Sex Siblings.

Objective: To examine cognitive function in pre-operative patients with MTLE+HS. Specific goals were to determine the array and severity of deficits and to determine whether high and lower functioning patient subgroups performed differently relative to matched unaffected siblings.

Participants and Methods: We evaluated cognitive function (across an extensive battery) in a carefully selected group (n=34) with unilateral MTLE+HS. We also evaluated age and gender matched unaffected siblings (n=34).

Results: As a group, patients performed more poorly, across many tests, than did their siblings. Within the patient group, clear evidence of variability was observed, with 50% showing relatively normal profiles (average/above average performance levels) whilst others showed compromise in specific domains. Both patient clusters, however, performed more poorly than their siblings. Notably, we found that although matched on predicted IQ, siblings of 'intact' patients performed marginally better on some tests than did siblings of 'impaired' patients. Although neither group was 'impaired', the results suggest that at least some aspect of poorer performance in the 'impaired' patient cluster might reflect factors other than direct and indirect effects of epilepsy and its treatment.

Conclusions: We provide further evidence of deficits linked to MTLE+HS that extend beyond the memory domain. We also provide evidence of distinct subgroups within the MTLE+HS sample. Most importantly, our results suggest that there is a subsample of patients whose current levels of cognition reflect not just the impact of epilepsy and its management but also reflect, to some extent, what might be a family vulnerability to greater cognitive compromise. Our results also raise questions about whether it is appropriate to consider high functioning individuals with MTLE as 'spared'. We argue that subtle cognitive problems in these individuals might well be overlooked unless performance levels are appropriately benchmarked.

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K. RANTANEN, K. ERIKSSON & P. NIEMINEN. Neurocognitive Functions of Children with Early-onset Epilepsy – a Five-year Follow-up Study.

Objective: Studies have shown that children with early onset epilepsy are at risk for neurocognitive impairments. However, there are only few prospective follow-up studies focusing on young children with epilepsy. The aim of the present study was to assess neurocognitive functions of children with early onset epilepsy at school-age.

Participants and Methods: Participants were 28 children aged 9-13 (mean 10.9 years) children from a population-based cohort (N=64) from the Pediatric Neurology Unit at Tampere University Hospital. Medical data were reviewed retrospectively from children's medical records. Total of 17 children had uncomplicated epilepsy and 11 complicated epilepsy. Mean age at the onset of epilepsy was 2.5 years. Neuropsychological assessment was conducted twice: at preschool age with WPPSI-R and NEPSY, and at follow-up with WISC-III and NEPSY-II.

Results: Preliminary results show that after follow-up intellectual function was at a lower end of normal distribution (mean 81.9) in children with uncomplicated epilepsy, and severly impaired (mean 50.0) in children with complicated epilepsy. At follow-up, a statistically significant decline (8–13 IQ scores) was evident in Verbal and Full Scale IQ for both groups. Diffuse impairments in all neurocognitive domains assessed were demonstrated in children with complicated epilepsy. Specific impairments in attention, verbal fluency and narrative memory were found in children with uncomplicated epilepsy. Neurocognitive impairments were associated with epilepsy-related variables, e.g. abnormal MRI, seizure control and the number of antiepileptic drugs at preschool age.

Conclusions: Neurocognitive impairments reported at preschool age were persistent at follow-up, especially in children with complicated epilepsy. Despite a more favorable neurocognitive outcome, a cognitive decline was demonstrated also in children with uncomplicated epilepsy.

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M. TAVAKOLI & M. BAREKATAIN. Neuropsychological assessment in patients with intractable temporal lobe epilepsy.

Objective: Cognitive impairment associated with Temporal Lobe Epilepsy (TLE) have been recognized in multiple studies. We designed this study to find a specific cognitive profile in patients with TLE who were candidates for epilepsy surgery. We also sought to find if neuropsychological assessment could differentiate left TLE, right TLE, and normal subjects.

Participants and Methods: The sample of this study consisted of 29 patients with right TLE, 31 with left TLE, and 32 subjects without history of seizure as controls. For all recruited patients and controls demographic questionnaire, Wechsler Memory Scale-III (WMS-III), Color trail making test (CTT) and Wechsler Adult Intelligence Scale-R (WAIS-R) were administered. Multivariate analysis of variance was carried out to reveal differences on memory, attention and intelligence performance between the 3 groups.

Results: All of the mean scores of the WMS-III indexes and CTT subscales were significantly higher in the control group in comparison with the right or the left TLE groups ($p<0.001$). The WAIS-R also revealed significantly better mean scores of Full Scale Intelligence Quito (FSIQ) and Performance Intelligence Quito (PIQ) in the control groups than the right TLE and left TLE patients ($p<0.001$).

Conclusions: These findings indicated that WMS-III, CTT and WAIS-R can differentiate patients with refractory temporal lobe epilepsy from normal subjects.

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E. VERCHE, M. CAIRÓS, R. MARRERO-ABRANTE & S. HERNÁNDEZ. Is there a Behavioral Profile in Children and Adolescents with Frontal Lobe Epilepsy? Evidences of Variability Assessing Behavior Problems.

Objective: In Frontal Lobe Epilepsy (FLE) it has been described a pattern of frontal dysfunctions in cognition and behavior. In pediatric population it is associated with deficits in attention, response inhibition, psychomotor speed, motor programming, and planning. Behavioral assessments revealed hyperactivity, obsession, and addictive behaviors in adult population. Studies assessing behavior problems in children with FLE are scarce and they usually use parents or teachers rating scales but not self-report.

The objective is to study behavioral aspects in a sample of children and adolescents with FLE

Participants and Methods: Nine children with FLE (aged 10-19 years) and nine healthy control subjects (aged 10-18 years) participated. They all completed the scale Self-Report of Personality from the Spanish version of the Behavior Assessment System for Children (Reynolds & Kamphaus, 2004). It assesses anxiety, attitude to school, attitude to teachers, atypicality, depression, interpersonal relations, locus of control, relations with parents, self-esteem, self-reliance, sense of inadequacy and social stress. There are three global scales: personal adjustment, clinical adjustment and school adjustment. Mann-Whitney U test was used to analyze the differences between groups.

Results: Children with FLE showed significant more social stress than healthy controls. However, no other differences between groups were found. There was a large within group variability in FLE.

Conclusions: Contrary to our expectations, we did not found more behavioral problems in FLE group, except social stress than control group. The big within group variability in FLE could explain these results according to the different functions associated with the frontal lobes. The risk of developing school problems highlights the importance of assessing behaviour adjustment. Bigger samples are needed in order to consider further differences regarding the site of the epileptic foci in the frontal lobes.

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M. CAIRÓS, E. VERCHE, J. FLORES-GALDO, R. MARRERO-ABRANTE & S. HERNÁNDEZ. Assessment Of Executive Functions In Adults With Temporal Lobe Epilepsy Through Use Of CANTAB.

Objective: Computerized batteries in Neuropsychology facilitate the scoring, interpretation, and administration of a variety of tests. The Cambridge Neuropsychological Testing Automated Battery (CANTAB) is sensitive to the presence of brain dysfunction, its validity has been supported by numerous studies, and patients see it as an interesting and motivating format. Memory disabilities have been widely proved in Temporal Lobe Epilepsy (TLE). Some authors suggest a pattern of relatively generalized cognitive impairment. Attention disorders are often presented in patients with mesial TLE as well as deficits in working memory, inhibitory control, verbal fluency, and cognitive flexibility.

Participants and Methods: 12 TLE subjects (mean age=32,84 years; SD=7,23 years), 6 women and 6 men, completed four tests from the CANTAB: Rapid Visual Information Processing (RVP), Stockings of Cambridge, Intra-Extra Dimensional Set Shift, and Spatial Span. These tests measure sustained attention, planning, set shifting, spatial working memory, and cognitive flexibility. All of them were on medication.

Results: TLE patients shown deficits in cognitive flexibility and set shifting, and they needed more attempts and made more mistakes. Adults with TLE showd problems in attention and had more difficulties to inhibit the wrong sequence and to detect the correct one. There was a large variability in planning. Their performance in spatial working memory was normal.

Conclusions: Our TLE group has shown heterogeneous results. As some studies have found, executive deficits in chronic TLE may be individually variable and their assessment needs to include different tests. We expected a better performance in adults with TLE, so their deficits may be due to a global neuropsychological impairment, not only in memory. The CANTAB is a good instrument to assess executive functions in TLE. It is simple, computerised, non-linguistic and culturally blind. A bigger simple is needed in order to study differences regarding the left or right temporal lobe.

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Invited Address: Fatigue and Sleep Disturbance following Traumatic Brain Injury- Creating an Evidence Base for the Development of Efficacious Treatments

Speaker: Jennie Ponsford

2:30–3:30 p.m.

J. PONSFORD. Fatigue and Sleep Disturbance following Traumatic Brain Injury- Creating an Evidence Base for the Development of Efficacious Treatments.

Despite the fact that fatigue and/or sleep disturbance are reported by up to 70 percent of individuals with moderate to severe traumatic brain injury (TBI), there has been relatively little research investigating the specific nature and causes of these changes. In this paper, the results of a series of studies of fatigue and sleep disturbance following TBI will be reported, with the aim of shedding light on these issues. The first study has examined the relationships between self-reported fatigue, demographic factors, injury-related factors, mood, attention and vigilance in a group of 120 TBI participants and 90 controls. The second study describes self-reported sleep changes following TBI and the relationship of these subjective complaints with demographic and injury-related factors, fatigue, anxiety and depression in TBI participants and matched controls. In a third set of studies focused on a subset of these participants, we have considered the effect of TBI on mechanisms controlling sleep as measured objectively, examining sleep timing mechanisms and circadian control of sleep by measuring melatonin production during the evening and by examining overnight polysomnography. These studies have provided evidence of differences in melatonin production and in sleep architecture between the two groups. The implications of all these findings for management of fatigue and sleep disturbance following TBI will be discussed.

Learning Objectives:

1. Summarise the factors contributing to fatigue and sleep disturbances following traumatic brain injury
2. Apply a systematic assessment of factors underpinning fatigue and sleep disturbance to the management of individuals with TBI who experience these problems.

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Invited Address: Cognitive Enhancing Drugs: Prospects and Problems

Speaker: Trevor Robbins

4:00–5:00 p.m.

T.W. ROBBINS. Cognitive Enhancing Drugs: Prospects and Problems.

Objective: To review effective pharmaceutical treatments for human neurological and neuropsychiatric disorders ranging from Alzheimer's disease to schizophrenia, and attention deficit/hyperactivity disorder to Parkinson's disease.

Participants and Methods: I review cognitive enhancing effects of candidate cognitive enhancers acting via diverse conventional and novel mechanisms, both in patients and human volunteers, as well as in experimental animals, using translational methodology in defined neuropsychological tests. I will consider effects of the anti-narcoleptic agent modafinil, the stimulant methyphenidate, the noradrenergic reuptake blocker atomoxetine, as well as the new generation AMPA-kines and glutamatergic receptor agents. I will also consider individual variation in drug responsiveness as well as relevant genetic polymorphisms and the use of functional brain imaging to define brain mechanisms of action.

Results: I will report data on cognitive enhancing effects of modafinil in healthy volunteers and schizophrenia, as well as back-translational data in experimental animals; recent findings on attentional boosting effects of methylphenidate in ADHD and its central action on striatal dopamine function; effects of L-Dopa on cognitive deficits in Parkinson's disease; consistent enhancing actions of atomoxetine and other agents on tests of impulsivity in humans and experimental animals. Finally, I will report selective effects of a novel mGluR5 receptor positive allostearic modulator in an animal model of cognitive deficits in schizophrenia

Conclusions: There has been some success in attempts boosting cognitive functioning in patients (and volunteers) with cognitive enhancing drugs. Such effects however may depend on the precise aspects of cognition under test, and may even show deficits in other domains. There are some encouraging examples of 'back-translation' via animal models of cognitive enhancing drug effects. Future prospects will also depend on translation of such effects in the laboratory to the real world.

Learning Objectives:

1. Describe the nature and limitations of cognitive enhancement produced by several drugs having diverse mechanisms of action
2. Understand the concepts of translation and back-translation from animal models to clinical as well as non-clinical applications in humans, in the special context of cognitive enhancement.

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SATURDAY MORNING, JUNE 30, 2012

Symposium: Mechanisms of Psychological Adjustment to Acquired Brain Injury

Chair: Jennie Ponsford

Discussant: James F. Malec

9:30–11:00 a.m.

J. PONSFORD, J.F. MALEC, R. COETZER, A. KÜNEMUND, M. SCHÖNBERGER, C.E. LONGWORTH & F. GRACEY. Mechanisms of Psychological Adjustment to Acquired Brain Injury.

Symposium Description: Emotional difficulties are common following acquired brain injury (ABI), anxiety and depression being most common, with both prevalence and lifetime incidence at about 30%. Psychological and social factors are thought to be most important to emotional outcomes and specific neurocognitive factors may also contribute to vulnerability. It has been suggested that psychological adjustment of one's self-concept after ABI is related to low levels of depression and anxiety. Furthermore, personal growth after brain injury has been documented in a few studies and found to be associated with low levels of anxiety and depression. However, there is a paucity of research on this topic as well as a lack of conceptual models integrating these findings in such a way as to inform brain injury rehabilitation.

In the symposium, five papers will be presented, all concerned with mechanisms of emotional and psychological adjustment after ABI. In the first talk, Rudi Coetzer will present data illustrating the importance to emotional well-being of psychological adjustment to personal loss following Traumatic Brain Injury (TBI). In the second talk, Anna Künemund will demonstrate the role of personal growth for the development of positive affect after ABI. Michael Schönberger will then present longitudinal data on the development, as well as psychological predictors, of psychological adjustment and emotional distress after TBI. In the

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fourth talk, Catherine Longworth will present correlational data suggestive of a specific contribution of the executive problem of 'goal neglect' to depression after ABI, in addition to fatigue and coping style. In the final presentation, Fergus Gracey will present a model of social-cognitive determinants of emotional outcome following brain injury based on a review and synthesis of the literature. All five papers will then be discussed by James Malec.

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M. SCHÖNBERGER, J. PONSFORD, D. WONG, A. MCKAY, H. HARRINGTON & M. MEALINGS. Development and Correlates of Psychological Adjustment and Emotional Distress Following Traumatic Brain Injury.

Objective: Little is known about the time course of positive psychological adjustment and emotional distress after traumatic brain injury (TBI). This study aimed at describing the development and predictors of psychological adjustment and emotional distress after TBI.

Participants and Methods: N=42 individuals (age md=29 years, PTA md=13 days, 81% male) who participated in community-based rehabilitation following TBI entered the study. A questionnaire package was administered to the participants every third month throughout the course of rehabilitation, including: Reactions to Impairment and Disability Inventory (RIDI; Adjustment Subscale); Hospital Anxiety and Depression Scale (HADS); Coping Scale for Adults (CSA) short form; General Self-Efficacy Scale (GSE); Sydney Psychosocial Reintegration Scale (SPRS) form B. The participants' therapists completed the SPRS as well as the Self-awareness of deficits interview (SADI).

Results: Multi-level regressions revealed no significant change over time in terms of psychological adjustment, anxiety and depression. Good psychological adjustment was significantly correlated with low levels of anxiety and depression. Both good psychological adjustment and low levels of depression were correlated with the use of productive coping styles, high levels of self-efficacy and good psychosocial reintegration on almost all measurement occasions. Low levels of anxiety were correlated with the non-use of un-productive coping styles, high levels of self-efficacy and psychosocial reintegration.

Conclusions: This study indicates that positive psychological adjustment processes are associated with low levels of depression and anxiety. This demonstrates the importance of supporting brain injured individuals in their process of psychological adjustment. The findings also indicate that supporting injured individuals in learning to cope with their injury and creating opportunities for developing a sense of mastery might foster the development of psychological adjustment.

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R. COETZER. Is the phenomenological experience of loss associated with anxiety and depression after Traumatic Brain Injury?

Objective: Anxiety and depression are some of the most common emotional difficulties following Traumatic Brain Injury (TBI). Many factors may contribute to the evolution of emotional difficulties after TBI. These include biological, environmental and psychological factors, among others. Less is known about the phenomenological psychological factors potentially involved in the onset and maintenance of depression and anxiety after TBI.

Participants and Methods: This retrospective study reports data extracted from 2 earlier studies, for 53 persons (Average age 44.66 years, SD = 13.34) with TBI who were at least 2 years (Range 24 – 457 months) post-injury. Data from questionnaires assessing subjectively reported levels of anxiety and depression (Hospital Anxiety Depression Scale) as well as grief versus adjustment related to loss (Brain Injury Grief Inventory) were analyzed to investigate the role experience of loss, may possibly play in the presentation of depression and anxiety after TBI.

Results: The main finding was that the subjectively reported phenomenological experience of grief in response to loss was positively associated with depression ($r = .650$; $p < .001$) and anxiety ($r = .505$; $p < .001$), whereas a reported experience of having adjusted to losses was inversely associated with depression ($r = -.524$; $p < .001$), but not associated with anxiety ($r = -.196$; $p = .159$).

Conclusions: While there were limitations to this study, including small sample size and retrospective design, these findings may have implications for the rehabilitation of some of the persons who present with emotional difficulties post-TBI. In particular, to augment exiting treatment approaches for post-TBI depression and anxiety, for some persons considering the provision of psychological therapy focusing also on facilitating adjustment to loss, may under some circumstances possibly have some clinical relevance.

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C.E. LONGWORTH, A. BATEMAN, J. EVANS, E. GREENFIELD, G. HARDY, J. INGHAM, D. MALLEY, S. SIMBLETT, B. WILSON, T. MANLY & F. GRACEY. Are executive functioning and coping style after acquired brain injury associated with depression and fatigue?

Objective: Executive impairment is common after ABI and may be associated with less adaptive coping styles and depression. Fatigue is also a major problem that can be associated with depression following ABI. This research investigated the associations between executive functioning, coping style, depression and fatigue after ABI.

Participants and Methods: A sample of adults with ABI identified by clinical rehabilitation services as having executive functioning problems impacting day-to-day tasks (N = 78) completed a range of questionnaire and neuropsychological measures. These included the Hotel Task, the Sustained Attention to Response Task (SART), a new modification of the Coping Inventory for Stressful Situations (CISS) and the Profile of Mood States (POMS), to evaluate goal neglect, coping style and mood respectively.

Results: Multiple regression indicated that the Hotel Task total deviation time (beta=.183, p=.008), emotion-focussed coping (beta =.53, p<.001) and fatigue (beta=.44, p<.001) are significant predictors of depression ($R2=.69$, $F(5,72)=31.81$, $p<.001$). The Hotel Task (beta=-.19, p=.03), avoidant coping (beta=-.19, p=.03) and depression (beta =0.71, p<.001) are significant predictors of fatigue ($R2=.5$, $F(5,72)=14.38$, $p<.001$). SART variables approached significance as predictors of depression (errors of commission beta=.13, p=.09) or fatigue (anticipatory errors beta=.19, p=.058).

Conclusions: Substantial variance in depression after ABI is accounted for by goal neglect, coping style and fatigue, suggesting that these are important mechanisms to consider in understanding psychological adjustment to ABI. The impact of goal neglect on depression may reflect negative emotional responses to the effects of goal neglect on everyday life, or the disruption of cognitive aspects of psychological adjustment.

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F. GRACEY & C.E. LONGWORTH. Towards an evidence-based cognitive-behavioural model of adjustment following brain injury.

Objective: Psychological and social factors are thought to be important to emotional adjustment after brain injury (ABI). Effectiveness of cognitive-behavioural therapy (CBT) receives growing support in the literature. An evidence-based cognitive-behavioural model of post-ABI adjustment which could help with refinement and development of interventions is still lacking. This paper presents a review of post-ABI adjustment research in order to propose a provisional CBT model.

Participants and Methods: Literature regarding emotional outcomes following ABI was reviewed and synthesised. A provisional model was developed to illustrate the cognitive-behavioural processes that evidence suggests interact to determine emotional outcomes.

Results: Factors that appear to influence emotional outcomes were predominantly related to coping style and appraisals, in addition to self-esteem, perceived self-efficacy, self-discrepancy, self-awareness, loss, social role/identity and social participation. There is some evidence for

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interactions between low self-esteem, threat appraisals, awareness, executive function and coping. Social factors such as access to support and rehabilitation, maintenance of social group membership and perceived social stigma may impact identity and well being. Studies have a range of conceptual orientations posing difficulties for integrating findings into a single model. A broad mapping of factors of potential use for future research and clinical practice was possible to inform a provisional transdiagnostic CBT model of emotional adjustment.
Conclusions: The synthesis of the literature on emotional outcomes following ABI provides a framework for assessment, intervention and future outcome research. Understanding presenting problems in terms of 'threat-to-self' reactions, self-efficacy and coping behaviours that aim to preserve coherence of personal and social identity may be central to the development of evidence-based interventions.
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A. KÜNEMUND, S. ZWICK, R. DUGUÉ, C. RAKEL, W. RIEF & C. EXNER. Posttraumatic growth following acquired brain injury.
Objective: The concept of posttraumatic growth (PTG) comprises perceived positive psychological changes as the result of the struggle with highly stressful, traumatic events which manifest in different domains such as changed priorities of life or more meaningful relationships. This study aimed at investigating whether PTG is reported by survivors of an acquired brain injury (ABI), and whether PTG after ABI is associated with injury chronicity, functional status and psychological variables.
Participants and Methods: In this cross-sectional study self-report measures of PTG, positive and negative affect, depression, quality of life, functional status and centrality of event were administered to 33 ABI patients on average 1.8 months after injury (early sample), 44 ABI patients on average 21 months after injury (late sample) and 40 healthy controls (HC).
Results: A medium group difference (d=0.51) was found between the early sample (M=44.7, SD=27.6) and the late sample (M=57.02 SD=20.7), while the PTG values of the control group fell between the ABI groups (M=50.7 SD=20.9). After adjustment for multiple comparisons, PTG group differences only approached statistical significance (p=.059) due to limited sample size. Within the late sample, higher PTG-scores were associated with higher self-esteem (r=.41, p=.009) and positive affect (r=.40, p=.01). In both ABI groups, PTG correlated positively with the centrality of event, but not with negative affect depression and quality of life.
Conclusions: ABI patients do report positive psychological changes as the result of struggling with consequences of the injury. PTG was unrelated to negative sequelae of ABI but showed positive associations to resources. In ABI rehabilitation, patient reports of personal growth should be validated and supported.
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Invited Symposium: Sex Differences in Brain Function

Chair: Ira R. Hebold Haraldsen

9:30–11:00 a.m.

I.R. HEBOLD HARALDSEN. Sex Differences in Brain Function.
Symposium Description: A maturing brain is characterized by diverse development of gender-specific functional circuits, developing at diverse rates and patterns in each sex. Subcortical regions mature functionally much faster than prefrontal top-down control regions; suggesting as an explanation for observed changes in behaviour during puberty in humans and animals. In addition, these circuits develop differently in boys and girls. These morphological and functional brain differences could in fact exist to reduce behavioural differences in males and females. The life stages of puberty, per menopause and further ageing indicate a rise and a decline in reproductive capacity. At the same time, brain morphology and cognitive functioning undergo subtle changes. The changes of ageing can be understood as the counterpart to the physiological changes occurring during puberty when the remodelling of cortical and limbic circuits accompany sexual maturation, which leads to the acquisition of adult cognition, decision-making strategies, and social behaviour.
Even more interestingly, during puberty pulsatile hypothalamic hormone secretion is in fact a re-activation of a system that was highly active in the perinatal period, a time when there are high neuronal changes in the form of pruning. Therefore, we believe that it is of significant importance to analyse the association between sexual maturation and brain development. Understanding these mechanisms will lead to better understanding of pathological mechanisms. Consequently, our focus in this symposium is the analysis of male-female differences in fronto-temporal-limbic circuit maturation, and the role of endocrine modulators onto these circuits during puberty. In this interdisciplinary symposium reaching from clinical to neuropsychological observations and to identifying potential molecular biological and genetic mechanism, we wish explaining the so called sex-differences.
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I. KREITSCHMANN-ANDERMAHR. Visualizing the effect of sex hormones in the brain.
Objective: Hormones, especially sex hormones exert a strong influence on the structure and function of the developing and even the mature human brain. Distinct areas of the human brain are sexually dimorphic and this is thought to be a consequence of the influence of sex hormones but also of genetic factors. In addition to the organizational effects of sex hormones on the human brain, sex steroids are linked to neuropsychiatric and neurodegenerative disorders and influence cognitive and behavioural patterns. Men and women display different proficiencies in certain cognitive domains. Men consistently perform better in tasks relating to spatial abilities such as mental rotation and spatial perception, whereas ovarian hormones (estradiol and progesterone) have been linked to enhanced cortico-cortical and subcortico-cortical functional connectivity. The rapidly evolving field of imaging techniques, especially magnetic resonance imaging, allows to augment our knowledge on the effect of sex steroids by enabling in vivo insights into the human brain. The present talk is intended to give an overview on the current knowledge of the impact of sex hormones on the human brain gained with these techniques and to discuss the potentials and limitations for exciting new research aspects in endocrinology and neuropsychology.
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T. PAUS. Sex-hormone genes and connectivity in the adolescent brain.
Objective: In my lecture, I will introduce the concept of population neuroscience (Paus 2010) and describe the design of the Saguenay Youth Study as an example of a large-scale population-based study combining MRI-based phenotyping with an assessment of other relevant phenotypes, as well as that of the individual's environment and his/her genetic background (Pausova et al. 2007). To illustrate how environment and genes interact to shape the adolescent brain, I will draw on our findings of sexual dimorphism in the development of white matter (Perrin et al. 2008) and functional connectivity (Tahmasebi et al. 2011) during adolescence.
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S. MUELLER. Influence of sex hormones on brain development: evidence from pediatric endocrinology.
Objective: Longitudinal functional imaging (fMRI) studies have revealed differences in brain development between males and females. However, despite known differences between the sexes in underlying brain development, the precise contribution of sex and steroid hormones in human brain development is still unclear. In this talk, I will present

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functional (fMRI) and structural (VBM) imaging evidence from adolescent patients with severe perturbations in steroid hormone levels (i.e., testosterone, cortisol) such as Congenital Adrenal Hyperplasia (CAH) and Familial Male Precocious Puberty (FMPP). Specifically, affective processing in the form of evaluation of emotional faces indicated sex-specific functional changes in neurocognitive processing in CAH, particularly in emotion 'circuitry' such as the medial temporal lobe and the amygdala. Complementary structural imaging evidence in boys with testosterone excess revealed changes in grey matter volume in medial temporal, striatal, and prefrontal cortical regions. Importantly, these structural changes were associated with performance on a spatial cognitive task. Taken together, these findings suggest steroid hormone contributions to sex-specific neural development of affective and cognitive function. The findings are discussed in the context of sex differences within adolescent brain development.
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S. NURRUDIN. Peripubertal GnRH agonist treatment involved in sex differences of brain development during puberty.
Objective: Brain development during puberty is characterized by regressive and progressive processes such as synaptic pruning and progressive myelination. In order to further investigate these, magnetic resonance imaging (MRI) has been used to observe the brain of domestic ruminants after being treated with a peripubertal pharmacological blockage of gonadotropin releasing hormone action (GnRHa) for several weeks.
Participants and Methods: The study was conducted with 46 same-sex Scottish Mule Texel Cross sheep twin lambs, half of which were treated with the GnRH analog (GnRHa) goserelin acetate every 4th week, beginning prior to the expected time of puberty until 50 weeks of age. The post mortem MRI scanning was performed with a 3.5 Tesla Philipps machine. Following regions of interest (ROIs) were determined: amygdala (left and right hemisphere), hippocampus (left and right hemisphere), cerebellum (left and right hemisphere), frontal lobe as well as the whole brain volume. Twenty male (12 controls and 8 treated) and 21 female brains (10 controls and 11 treated) were used for further analyses.
Results: We show significant sex differences and treatment effects in whole brain volume with male voxel volumes being significantly higher than females. Furthermore, treatment effects on sex differences in hippocampus, amygdala and cerebellum are shown.
Conclusions: GnRH plays a role in sex specific brain development during puberty.
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Invited Symposium: Challenges in Characterizing and Diagnosing Children and Adolescents with ADHD

Chair: Astri Lundervold

9:30–11:00 a.m.

A. LUNDERVOLD, A. LUNDERVOLD, L. SØRENSEN & R. TANNOCK. Challenges in Characterizing and Diagnosing Children and Adolescents with ADHD.
Symposium Description: In this symposium we will present and discuss challenges that are well known to clinicians and researchers dealing with children and adolescents with ADHD, such as: what is a normal function; should we use categorical diagnoses or describe symptom-continuums; how should we handle fluctuations in function from childhood through adolescence? In spite of extensive research during the last decades, we still miss a solid understanding of the pathophysiology of ADHD to guide our treatment. Although executive dysfunction is described as a cardinal symptom in everyday life of most individuals with ADHD, it is not always detected by standard neuropsychological test procedures. More extensive translational research on ADHD is thus still demanded.
In our lectures, we will present results from two Norwegian research projects, the Bergen Child Study (Astri Lundervold) and a study on motivational control in children with ADHD (Lin Sørensen). Professor Rosemary Tannock will give a DSM-5 update. Challenges in characterizing and diagnosing children with ADHD will be illustrated by results from our research and case-reports, with an aim to engage the audience in a discussion.
Learning Objectives:
1. Recognize the impact of assessment instruments, informants and co-existing problems when diagnosing ADHD
2. Recognize the impact of motivational control, response inhibition and anxiety on cognitive function in children and adolescents with ADHD
3. Recognize major concerns about the current diagnostic criteria for ADHD
4. Recognize consequences of DSM-5 changes related to ADHD
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R. TANNOCK. Challenges in characterizing and diagnosing children and adolescents with ADHD: A DSM-5 update.
Objective: To highlight the major concerns about the current diagnostic criteria for ADHD

Results: The diagnostic criteria for ADHD have evolved through several iterations since DSM- III. However, an understanding of pathophysiology needed for a truly revolutionary transformation of the core criteria has not yet emerged. This presentation will highlight the major concerns about the current diagnostic criteria for ADHD and present the suggestions for changes under consideration. Proposed changes address the general structure of the DSM taxonomy, the number, content and distribution of diagnostic criteria for ADHD, age of onset criteria, ascertainment of cross-situationality, and subtypes, as well as the inclusion and exclusion criteria. Also, recent research finding will be presented that challenge the current two-dimensional structure of ADHD (inattention, hyperactivity-impulsivity). Final decisions regarding DSM5 criteria for ADHD will be made this year. The presentation will conclude with a discussion of the implications of the impending DSM-5 changes in diagnostic criteria for ADHD for clinicians and researchers.
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A. LUNDERVOLD. ADHD in the context of the Bergen Child Study.
Objective: Present results from the Bergen Child Study illustrating challenges in characterizing and diagnosing children.

Results: Several decisions will influence our work when diagnosing children and adolescents with ADHD. Which assessment instrument should be used? Who are the most reliable informants, and what about co-existing problems? And not at least, what is the benefit and limitations of an early diagnosis of ADHD? To illustrate the importance of such decisions, I will present some results from the Bergen Child study, a population based, longitudinal, case-control study of mental health and development from childhood through adolescence. The study was launched when the children were 7 to 9 years old, and included a screening phase, a diagnostic interview with the parents and an extensive clinical assessment of the children. Three more waves have been conducted, the fourth during this spring when the participants were between16 and 18 years old (www.unghordaland.no). The design of BCS study enables investigations of a range of symptom dimensions, their overlap, the continuity and discontinuity of mental health problems during development, as well as how different instruments and reports from different informants identify and predict developmental pathways.
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L. SØRENSEN & K. PLESSEN. The impact of response inhibition and anxiety on motivational control in children with ADHD.
Objective: To study motivational control in children with ADHD and the role of response inhibition with a motivational gambling task.

Results: In the current study we investigate motivational control in children with ADHD and the role of response inhibition. Two parallel pathways are described to cause ADHD in children; a deficit of motivation and response inhibition. However, when characterizing children with ADHD, the challenge is to disentangle the role of response inhibition problems from the motivational deficit that is apparent in children with ADHD (Sonuga-Barke, 2008; 2010) in their impulsive and risky decision-makings on motivational gambling tasks (DeVito et al., 2008). Also, there is a question if the effect of symptoms of anxiety in decreasing the adverse decision-makings in children with ADHD while performing a motivational gambling task (Garon et al., 2006), is caused by anxiety strengthening the motivational control or the response inhibition function. Presently, thirty children with ADHD and 33 controls have been part of the study, including a careful diagnostic procedure using the K-SADS-PL and a cognitive assessment procedure including the Cambridge Gambling Task and tasks measuring response inhibition (i.e. the Stop Signal Task and the Stroop Color-Word Interference Task). Anxiety has been assessed by child- and parent reports on the State-Trait Anxiety Inventory for Children. Results from the study will be presented and discussed.
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Invited Symposium: Cognitive Neuropsychology - State of the Art and Future Perspectives.

Chair: Randi Starrfelt

11:15 a.m.–12:45 p.m.

R. STARRFELT, J.R. CRAWFORD, R. STARRFELT, D.T. STUSS & M.A. LAMBON RALPH. Cognitive Neuropsychology - State of the Art and Future Perspectives.
Symposium Description: Traditionally, studies in cognitive neuropsychology have reported single cases or small groups of patients with seemingly selective impairments of specific cognitive processes or modules. Many studies, particularly older ones, have used simple and coarse tasks to show that patients are disproportionally impaired in one task or domain compared to another. In many cases data for normal performance has not been referred to or reported. This has resulted in several theories of cognitive functioning in different domains such as language, visual perception, and memory, specifying a number of different modes or modules of processing.
With the development of more sensitive, computer-based (and theory based) tests, the development of methods for neuroimaging of single patients, alongside development of statistical methods for comparing (single) patients to control subjects, new perspectives for cognitive neuropsychology are opened up. The questions addressed in this symposium is whether the questions posed by cognitive neuropsychology are still relevant, and whether new methods can spark a new interest in the field, or if the time has passed when the observation of single and double dissociations in patients' test performance can inform theories of (normal) cognitive function.
In four talks, this symposium will present and discuss methods for investigating impairment patterns in neuropsychological patients: 1) a talk on basic assumptions and statistical methods in single case methodology; 2) a talk reviewing and re-evaluating the single case-literature on a commonly assumed dissociation, 3) a talk on small group studies of patients with frontal pathology, and advances in group study methodology, and 4) a talk presenting studies of semantic cognition combining neuropsychological, computational and imaging techniques. At the end of the symposium, there will be a panel discussion about whether it is time to bury or resuscitate the art of cognitive neuropsychology.
Learning Objectives:
1. Summarize major methodological issues relating to design and analysis of single case studies and small group studies of cognitive function in brain injured subjects.
2. Summarize the major contributions of structural and functional imaging to cognitive neuropsychology.
3. Apply statistical methods for analysis of data from single case studies.
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J.R. CRAWFORD. Testing for Dissociations in the Single-Case: Problems and Solutions.
Objective: There has been a resurgence of interest in single case studies in neuropsychology. Much of this work is aimed at detecting dissociations of function. The presentation will provide a largely non-technical guide to the issues and methods surrounding the detection of dissociations; the main focus will be on the most commonly used single case design in which a patient is compared to a (modestly sized) control sample. The conventional criteria for a dissociation requires only that a case is "impaired" or "exhibits a deficit" on Task X and is "not impaired" or "within normal limits" on Test Y. Simulation studies have shown that these criteria misclassify alarmingly high numbers of both healthy controls and patients with strictly equivalent impairments on the tasks compared. It is argued that a further criterion is required: that the case's performance on Task Y should be significantly poorer than performance on Task X. Classical and Bayesian methods have been developed that provide such a test and also allow for the uncertainties inherent when using modest control samples. Simulation studies show that the false positive rate for dissociations are low when this additional criterion is applied. More recently these methods have been extended to allow for the effects of covariates when testing for a deficit or dissociation. These new methods add great flexibility and allow more sophisticated hypotheses to be tested. For example, they can (a) increase the power to detect deficits or dissociations, but also (b) test whether effects survive controlling for covariates (e.g., testing if an apparent dissociation survives controlling for general processing speed). All of the statistical methods developed by the author and his colleagues for testing for deficits and dissociations have been implemented in user friendly computer programs (available at www.abdn.ac.uk/~psy086/dept/SingleCaseMethodology.htm). Details of these programs and examples of their use will be provided.
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R. STARRFELT. Looking Back over Your Shoulder: Re-evaluating Data from Cognitive Neuropsychology.
Objective: Over the last 40 years, a large amount of data and findings concerning dissociations of cognitive functions have been generated within cognitive neuropsychology, and influential theories of cognitive functions have been developed on this basis. However, many older studies made little use of statistical methods, or comparison with normal performance, to support claims of dissociation of functions. With the new methods developed for statistical tests for dissociations in single case studies, there is a potential for re-evaluation of these findings. I will present findings from a review of the literature on pure alexia (a selective reading disorder following damage to the posterior left hemisphere). It is commonly claimed that these patients may have intact abilities for number reading. Yet, a review of the literature reveals that most studies are performed without reference to normal performance. Also, in the studies including controls, none show significant differences between tests of number and letter identification when compared using tests for dissociations. These findings have implications for theories of pure alexia, and the selectivity of visual symbol processing. More generally, they suggest that some of the commonly accepted dissociations of cognitive functions may be spurious. But is it fair to return to history to re-examine such claims? And if so, should this exercise be done for all dissociations reported in the literature?
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D.T. STUSS. Advances, Advantages, and Limitations of Small Group Studies.
Objective: The zeitgeist of the best approach in cognitive neuropsychology has waxed and waned - group studies, single case studies, functional imaging – to the extent that grants and manuscripts could be rejected if you did not use the approach most in vogue. Each has value, as each provides information not easily available to the other approaches. What every cognitive neuropsychologist must have is an armamentarium of approaches, depending on the question being asked. This presentation emphasizes the value of small group lesion studies, particularly as a bridge between single case and functional imaging studies. Examples drawn from studies of frontal lobe patients with focal lesions, and patients with traumatic brain injury with more diffuse lesions, will illustrate different statistical approaches to isolate cognitive processes, and/or to provide methods for phenotyping (sub-grouping) of patients. The potential importance of small group studies, particularly for subsequent functional imaging studies and network analysis, will be illustrated. The clinical assumption underlying this approach is that improved sub-grouping of patients is the key for any behavioural or pharmacotherapeutic intervention.
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M.A. LAMBON RALPH. Semantic Cognition: New Insights from Neuropsychology, Computational Modelling, and Neuroimaging.
Objective: Semantic cognition (semantically-driven behaviour) is a crucial element in verbal and nonverbal activities. Many different neurological disorders generate semantic impairment as a result of damage to one or more aspects of semantic cognition, including representation, control and access. Our approach for investigating the nature of these impairments and their neural basis has been to adopt multiple clinical and basic neuroscience methods (including neuropsychology – especially comparative case-series design, computational modelling, function and structural neuroimaging, TMS, etc.). Each method has various intrinsic advantages and disadvantages. Thus, by adopting multiple complementary methods and making the most of the positive features of each, it is possible to move towards a convergent, secure understanding of neuropsychological disorders. By adopting this multi-method convergent approach, for example, we are beginning to map out the various neural networks that underpin these various aspects of conceptual processing and how they are impaired in different patient groups.
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Invited Symposium: Mechanisms of Emotion Regulation and Cognitive Control in Affective Disorders

Co-Chairs: Nils I. Landrø, Stein Andersson

11:15 a.m.–12:45 p.m.

N.I. LANDRØ, S. ANDERSSON, C. HARMER, T. FURMARK, S. ANDERSSON, V. HAALAND ØKSENDAL & R. JONASSEN. Mechanisms of Emotion Regulation and Cognitive Control in Affective Disorders.
Symposium Description: Emotion regulation is important for adaptation and less effective emotion regulation is a core element in anxiety-, mood- and personality disorders. The focus of this symposium is mechanisms of the interplay between emotion regulation and cognitive control functions and their underlying brain correlates. Harmer will present an fMRI study showing that active suppression of threat relevant stimuli led to activation of dorsolateral prefrontal cortex in subjects with panic disorder as well as in healthy controls, while maintaining emotion led to increased activation of the amygdala. Effects of CBT on symptoms severity and responses in the amygdala to threat among panic disorder patients will also be presented. Furmark discuss the pharmacologic actions underlying anxiety relief. Stress-related brain activity, measured with PET, was measured in a sample of patients with social anxiety disorder that were treated with SSRI's or placebo under double-blind conditions. Andersson will present data showing that impulsivity influences cognitive control and decision making in patients with borderline personality disorder but not in patients with bipolar disorder type II. Haaland Øksendal's data indicate that affective responding is associated with working memory in inpatients with borderline personality disorder. Finally, Jonassen will discuss the implications of an fMRI study in which healthy individuals at genetic risk for depression, i.e. carrriers of the short 5-HTTLPR genotype, show an activation pattern that resembles what is found in patients suffering from acute Major Depressive Disorder when performing a working memory task.
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C. HARMER. Early Treatment Effects on Emotion Regulation for Anxiety
Objective: Anxiety has been associated with exaggerated automatic responses and vigilance to threat relevant information combined with impaired cognitive control. In neuroimaging studies, this has been manifest as an over-active response within the amygdala and deficient frontal cortical function in response to threat based stimuli in individuals prone to anxiety and anxiety disorders. However, this has not been examined systematically across different anxiety disorders and the effect of treatment on the dynamic interplay between these circuits is unknown.
Participants and Methods: We used an emotion suppression paradigm in fMRI to compare the response of unmedicated participants meeting DSM criteria for panic disorder relative to healthy controls.
Results: Active suppression of threat-relevant stimuli led to activation of dorsolateral prefrontal cortex across groups, while maintaining emotion led to increased activation of the amygdala. However, there were no differences in responses during suppression between groups, suggesting similar cognitive control function. In the maintain emotion conditions, the expected hyperactive amygdala response to threat was seen in the participants with panic disorder. To explore the effects of treatment on this response, a further cohort of participants with panic disorder were randomised to receive a 4 session cognitive behavioural therapy (CBT) intervention compared to waiting list. CBT was effective in reducing symptoms severity compared to the waiting list group. Furthermore, responses in the amygdala to threat were reduced. There were no effects in prefrontal cortex.
Conclusions: Panic disorder is largely characterised by overactivity of amygdala based circuitry rather than deficient higher order control and regulation, and this overactivity is also targeted
early in treatment with CBT.
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T. FURMARK. Neural mechanisms of anxiety relief: Changes in brain activity and connectivity patterns in patients with social anxiety disorder treated with SSRIs or placebo.
Objective: Although prevailing neurobiological models of anxiety disorders are amygdalocentric, the neural mechanisms that control anxiety are incompletely understood.
Selective serotonin reuptake inhibitors (SSRIs) are commonly accepted as the first line pharmacological therapy for anxiety disorders. While neuroimaging studies suggest that SSRIs attenuate amygdala hyper-responsivity to threat-relevant stimuli, it has been difficult to separate the neural changes specifically associated with clinical response from non-specific changes that may occur due to general, symptom-unrelated, pharmacodynamic effects of the drug.
Additional concerns regarding the clinical efficacy of SSRIs have been raised by meta-analyses questioning the effectiveness of antidepressants over placebo. Placebo-induced clinical benefits seem to target brain regions similar to the ones usually recruited by active drugs, e.g. the amygdala in anxiety patients. However, it is possible that SSRIs and placebo engage different subregions of the amygdala and/or different modulatory cortical activation patterns.
To further understand the pharmacologic actions underlying anxiety relief, we recently analyzed stress-related brain activity, measured with positron emission tomography, in a large sample of patients with so-

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cial anxiety disorder that were treated with SSRIs or placebo for 6-8 weeks under double-blind conditions. Conjunction analysis and interaction contrasts were used to examine overlapping and unique neural change patterns in responders and nonresponders of both treatments. We also examined SSRI- and placebo-related changes in functional connectivity between the amygdala and other regions in the fear network.
Results will be discussed during this presentation.
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S. ANDERSSON, E. BØEN, B. HUMMELEN & U. MALT. Impulsivity, cognitive control, and decision making in bipolar disorder and borderline personality disorders.
Objective: Impulsivity is a core phenomenological feature in both bipolar spectrum disorders and borderline personality disorder that may underlie various behavioral and cognitive aspects of executive dysfunction such as emotional dysregulation, reduced cognitive control, and poor decision making. In this study we use self-reporting and performance based methods to index impulsivity, executive function, and decision making to explore how these methods may differentiate between bipolar disorder type II (BD II) and borderline personality disorders (BPD.
Participants and Methods: Neuropsychological tests measuring different aspects of executive function (inhibition, flexibility, working memory), decision making (Iowa Gambling Task, IOG) and self-report instruments measuring impulsivity (UPPS) and executive dysfunction in everyday life (BRIEF-A) were administered to patients with bipolar type II disorder, patients with borderline personality disorder, and healthy controls
Results: Performance on standard neuropsychological test methods were generally in or above average range across groups even though both patient groups reported significantly more executive dysfunction and impulsivity compared to controls. On several subscales, especially regarding aspects of impulsivity, BPD patients report significantly more symptoms than BD II patients. On the IOG results showed significantly poorer decision making compared to both controls and BD II patients.
Conclusions: Both BD II and BPD report significant executive dysfunctions and impulsivity interfering with everyday function. However, only the BPD group showed test results that significantly differed from healthy controls and that also differentiate the two patient groups, especially regarding decision making. The results may indicate that impulsivity affect executive function in different ways, affecting cognitive control and decision making in BPD but not in BD II patients.
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V.Ø. HAALAND & N.I. LANDRØ. Association between affective responding and working memory and executive functioning in patients with borderline personality disorder.
Objective: Patients with borderline personality disorder are characterized by emotional and behavioral dysregulation. Deficits in executive functioning hs been relatively consistently reported. The aim of this study was to investigate associations between emotional responding and neuropsychological performance in patients with borderline personality disorder and healthy controls. A secondary objective was to compare the emotional responding of patients and healthy controls.
Participants and Methods: Outpatients and inpatients with borderline personality disorder (N=35) and healthy comparison subjects (N=35) were tested with an extensive neuropsychological battery. Emotional responding was measured on the dimensions of arousal and valence using positive, neutral, and aversive pictures from the International Affective Picture System.
Results: A group effect on valence but not on the arousal dimension was found. In the patient group, but not in the healthy controls, executive functioning and working memory were found to be positively associated with valence response to aversive stimuli.
Conclusions: These findings indicate a link between emotion processing, and possibly emotion regulation and cognitive control functions in patients with borderline personality disorder.
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R. JONASSEN, T. ENDESTAD, A. NEUMEISTER, K.B. FOSS HAUG, J.P. BERG & N.I. LANDRØ. The Serotonin Transporter Polymorphism in Cognition: Intermediate Phenotypes associated with Emotion Regulation and Brain Function.
Objective: The polymorphic region 5-HTTLPR in the serotonin transporter gene (SLC6A4) has been shown to modulate MDD risk, but the neural underpinnings are incompletely understood. Cognitive control of emotion plays an important role in emotion downregulation when emotion activation is no longer adaptive. Therefore, individual differences in the ability to perform emotion downregulation may contribute in an important way to the risk for developing MDD.
Participants and Methods: We used fMRI and an n-back task to unmask altered brain function in healthy women who were grouped by 5-HTTLPR genotypes. We tested the hypothesis that short 5-HTTLPR allele carriers, but not long 5-HTTLPR carriers may be normal under resting conditions but show altered brain function while performing the n-back task as expressed by elevated activation within the lateral prefrontal cortex.
Results: Short 5-HTTLPR allele carriers showed more blood-oxygen-level-dependent (BOLD) bilateral prefrontal cortex activation within the ventrolateral prefrontal cortex (VLPFC) with increasing n-back task difficulty relative to long 5-HTTLPR allele carriers. Short 5-HTTLPR allele carriers also had inferior task performance on the most difficult n-back condition.
Conclusions: Individual differences in ones genetic make up may have equipped short 5-HTTLPR carriers with inferior cognitive control functioning compared to long 5-HTTLPR carriers. This activation pattern found in healthy at risk individuals resembles an activation pattern that is typically found in patients suffering from acute MDD. Altered function in these areas may reflect intermediate phenotypes and may help explain the increased risk of depression in short 5-HTTLPR allele carriers.
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SATURDAY AFTERNOON, JUNE 30, 2012

Students of INS Symposium: Acquired Brain Injury

Co-Chairs: Ingrid Funderud, Knut Kristian Kolskår

1:00–2:30 p.m.

N. VAN DER STOEP, S. VAN DER STIGCHEL, K. HUISMAN, J. KAPPELLE, A. VISSER-MEILY, A. EIJSACKERS, M. KOUWENHOVEN & T. NIJBOER. Exploring Space: Dissociations and Interactions Between Neglect in Near and Far Regions of Space.
Objective: There is some evidence that severity of neglect can differ between different regions in space. This study systematically investigated the relation between regions in space (near vs far) and performance on star cancelation (SC), line bisection (LB) and cross-modal (visual, auditory, tactile) extinction tests (ET).
Participants and Methods: So far, 54 stroke patients were included. Patients performed the LB and SC in near (30 cm) and far (120 cm) space. They were divided into four groups based on their performance on the SC. The criterion for neglect was an asymmetry in the number of misses between the left and right part of the SC (N≥2). This resulted in a group with no neglect (N-), with more severe neglect in near space (NN), with more severe neglect in far space (NF), and with comparable severity in both near and far space (NNF). We compared performance on the tests between groups and tests using multivariate, regression and correlational analyses.
Results: Based on the performance of SC, our preliminary data shows that 30.4% showed signs of neglect (33.3% NN, 40% NF, 26.7% NNF). The NN group performed similar to the N- group on the SC in far space, while the NF group performed similar to the N- group in near space. The NNF group performed significantly worse than the N- group on the SC in both regions. The performance on the visual ET significantly predicted performance on SC in far space (Beta=-.593, p<.001), but

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not in near space. We found a significant correlation between number of misses on the SC and deviation in degrees from the center in the LB in near (r=.498, p<.01) and far space (r=.662, p<.01). We also found a relation between visual ET and number of misses on the star cancellation in far space (r=.366, p<.25), but not in near space.
Conclusions: These preliminary data already indicate evidence for dissociations between near and far space neglect. We only found a relation between visual ET and far space performance on the SC. This suggests that ET tap into different processes than the SC.
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M. CHECHLACZ, P. ROTSHTEIN, K.L. ROBERTS, W. BICKERTON, J. LAU & G.W. HUMPHREYS. Acute versus Chronic Prognosis of Allocentric versus Egocentric Neglect Symptoms Based on Clinical Scans.
Objective: The present study examined neuroanatomy of acute versus chronic neglect and whether persistent neglect symptoms could be predicted based on clinical scans.
Participants and Methods: We contrasted the neuronal substrates of subacute and chronic deficits associated with neglect using computed tomography scans acquired as a part of routine clinical diagnosis. Voxel-wise statistical analyses were conducted on a group of 160 stroke patients scanned at a subacute stage. Lesion-deficit relationships were examined across the whole brain, separately for grey and white matter. We assessed lesions that were associated with behavioural performances at subacute stage within 3 months and chronic stage - 9 months post stroke.
Results: Allocentric and egocentric neglect at subacute stage was associated with lesions to dissociated regions within the frontal lobe, amongst other regions. However, the frontal lesions were not associated with chronic neglect. Lesions in the angular gyrus were associated with persistent allocentric neglect, while lesions within the superior temporal gyrus extending into the supramarginal gyrus, as well as lesions within the basal ganglia and insula, were associated with persistent egocentric neglect. Damage within the temporo-parietal junction was associated with both types of neglect at 9 months. Finally, we demonstrated that white matter disconnections resulting from damage within the superior longitudinal fasciculus were associated with both types of neglect and critically related to both subacute and chronic deficits.
Conclusions: In summary, we provide evidence that although wide spread lesions are associated with subcute symptoms, only some of these are critical for predicting whether neglect will become a chronic disorder. The presented findings strongly advocate the potential of using CT data to predict functional recovery and we conclude that the use of this imaging modality to develop novel tools for making clinically meaningful predictions of stroke outcome presents a feasible possibility.
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T. KAURANEN, P. BAUMANN & E. POUTIAINEN. Association of diabetes mellitus 2 with cognitive deficits and their persistence after stroke.
Objective: Experimental research suggests that diabetes exacerbates cognitive deficits after stroke. This study aimed to explore whether the association can be seen in a clinical setting.
Participants and Methods: A consecutive sample of 224 patients with a first-ever cerebral infarct, aged 18-65, had a neuropsychological assessment within the first weeks after the infarct and at six- month follow-up. The medical history of the patients was gathered as well. Patients' cognitive deficits in seven cognitive functions were defined as being below the 10th percentile performance of 50 healthy control subjects. The patients were grouped according to whether they had diabetes mellitus type 2. Step-wise logistic regression models with forward likelihood ratio elimination were calculated to see whether diabetes plays a role in cognitive deficits found in two neuropsychological assessments at zero and six months, when age, sex, education, the size of the infarct and the pathophysiological etiology is controlled for.
Results: An early cognitive deficit was found in 18 (72%) of 25 diabetic patients, whereas 111 (56%) of 199 non-diabetics had at least one cognitive deficit in the initial assessment. At six-month follow-up, the prevalences were 68% (n=17) and 45% (n=90), respectively. In the initial neuropsychological assessment, the size of the infarct (OR=2.2) was more important than diabetes (non significant) together with age (OR=1.2), education (OR=.81) in predicting cognitive deficits. However, for the cognitive deficits at six-month follow-up, diabetes (OR=2.9) displaced the size of the infarct (non significant) as a predictor.
Conclusions: In our clinical sample, cognitive deficits due to first-ever cerebral infarct tended to persist more firmly in the diabetics than non-diabetics, giving tentative support for the animal model hypothesis of diabetes exacerbating cognitive deficits after stroke.
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R. DACOSTA, M. FERNANDEZ, M. MILLÁN, S. REVERTÉ, M. GOMIS, E. LÓPEZ CANCIO, N. PÉREZ DE LA OSSA, C. CÁCERES, N. BARGALLÓ, M. BARRIOS, I. CLEMENTE, A. DÁVALOS & M. MATARÓ. Whole Brain Resting-State Analysis in Patients with First Ever Stroke: A Functional MRI Study with Independent Component Analysis (ICA).
Objective: Focal brain lesions may have important remote effects on the function of distant brain regions. The resulting network dysfunction may contribute significantly to behavioral deficits observed after stroke. The aim of this study is to investigate the different patterns of activation in resting state networks in stroke patients in relation to their different cognitive recovery at three months post-stroke.
Participants and Methods: 21 patients received neuropsychological assessment within the first 72 hours after ischemic stroke and at three months post-stroke. Functional MRI was performed at 3 months post stroke. Patients were classified into two groups according to their scoring in the Grooved Pegboard Test (normalized versus non-normalized scoring at three months). Independent Component Analysis (ICA) with dual regression and general linear model (permutations = 5000, threshold p<0.05; Threshold-Free Cluster Enhancement (TFCE) method to define the clusters) were performed to test for differences between brain networks among the two groups.
Results: The group with better improvement at three months post-stroke showed higher neural activity in the right Angular Gyrus, Middle temporal Gyrus, Supramarginal Gyrus and Lateral occipital cortex. However, when adjusting for age and premorbid intelligence, the group differences did not remain significant.
Conclusions: Application of fMRI technique has proved to be sensitive in detecting brain activity differences in spontaneous BOLD signal fluctuations in patients with a better cognitive recovery at three months post-stroke. The current data suggest that younger age and great intellectual enrichment could explain these differences helping patients to cope better with the neurocognitive challenges associated with stroke on cognition.
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M.F. ANDÚJAR, R. DACOSTA-AGUAYO, I. CLEMENTE, M. GOMIS, E. LÓPEZ_CANCIO, M. MILLAN, N. PÉREZ DE LA OSSA, S. REVERTÉ, C. CÁCERES, N. BARGALLÓ, M. BARRIOS, A. DÁVALOS & M. MATARÓ. Thalamic Anisotropy Indices and Cognitive Function in Stroke Patients.
Objective: Focal cerebral stroke may be responsible for remote histological and functional changes that can also contribute to the cognitive patient's outcome. The aim of this study is to explore remote microstructural abnormalities in thalamus distant from ischemic area and its relationship with cognitive function three months after stroke.
Participants and Methods: The sample comprised 18 subjects, 9 patients with an stroke within the middle cerebral artery (MCA) territory and 9 paired control subjects. All patients had a neurological, neuropsychological and thalamic diffusion tensor image (DTI) examination three months after stroke. DTI analysis included fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (AD) and radial diffusivity (RD). Asymmetry indices (ipsilateral/contralateral to the ischemic lesion) were compared between control and patient groups by Students's t test. The relationship between neuropsychological scores and anisotropy indexs was carried out by Pearson coefficient.

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Results: Patients showed higher significant asymmetry in RD (t=-2.33; p=0.042) which correlated with Stroop Color-Word Interference Test (r=-0.894; p=0.003) and percentage of verbal memory learning (r=-0.748; p=0.021).
Conclusions: We have reported microstructural remote thalamic abnormality in RD asymmetry which are related to cognitive dysfunction at three months after ischemic stroke.
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Invited Address: A Cognitive Neuropsychological Model of Antidepressant Drug Action

Speaker: Catherine Harmer

1:30–2:30 p.m.

C. HARMER. A Cognitive Neuropsychological Model of Antidepressant Drug Action.
The neurochemical actions of antidepressant drug treatment are relatively well understood but it has remained unclear how these changes lead to clinical improvements in mood and psychological function in the treatment of depression. In addition, these neruochemical theories, in isolation, cannot explain the delayed clinical onset of antidepressant drug action. A recent series of studies suggests that antidepressants affect key psychological processes important in depression early in treatment and before therapeutic effects are seen. In particular, antidepressant treatments have been observed to bias emotional processing towards positive compared to negative affective information in healthy volunteers and depressed patients. This increase in positive bias could therefore provide a platform for subsequent cognitive restructuring and learning which contributes to later improvements in depression. Consistent with this, we have also found that changes in emotional bias in depressed patients with a single dose of an antidepressant predicted therapeutic response after 6 weeks of treatment.
fMRI studies further suggest modulation of amygdala and extra-striate responses to emotional stimuli, indicating that early attention to emotional stimuli may be targeted by antidepressant drug treatment. These results challenge long held assumptions that the delay in antidepressant drug action results solely from the need for neurophysiological processes to be completed. Rather, the role of psychological mechanisms may be important in antidepressant drug response as patients learn to re-evaluate themselves and their emotional context in the light of new processing biases. Such an approach may therefore help us to understand how drug treatments are working, how we might be able to improve treatment approaches and also may provide biomarkers for early candidate selection.
Learning Objectives;
1. Summarize cognitive neuropsychological approaches to explain antidepressant action and generate key predictions based on these models
2. Design experimental medicine studies using emotional processing as a biomarker for early drug response
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Invited Address: Can Working Memory Be Improved In ADHD?

Speaker: Rosemary Tannock

2:45–3:45 p.m.

R. TANNOCK. Can Working Memory Be Improved In ADHD?
Objective: Burgeoning evidence from neuroscience supports the notion of the neuroplasticity of working memory, indicating that improvement is indeed plausible.Clinical enthusiasm for improving working memory via intensive training is high. So one critical question is whether the evidence warrants such enthusiasm. My objectives are: 1) to review the evidence for the efficacy of working memory training, with a focus on Attention Deficit/Hyperactivity Disorder (ADHD); and 2) to illustrate some of the benefits and limitations of working memory training via reference to two randomized controlled trials of working memory training in ADHD.
Participants and Methods: First I will review and discuss the robustness and range of effects of working memory training obtained to date. Next I will report findings from two randomized, controlled trials of WM training, which involved adolescents and young adults with ADHD/LD. Outcome measures were classified as: i) criterion measures (measures of WM similar to training activities); ii) near-transfer measures (non-trained measures of WM and other cognitive functions; and iii) far-transfer measures (measures of behavior, academic achievement, and measures of WM in daily life).
Results: Our review of extant evidence for the efficacy of working memory training reveals that the evidence is modest, in part because of few well-controlled randomized trials with strong clinically and theoretically motivated outcome measures. Results from the Intent-to-Treat analyses of our data reveal remarkably similar and modest findings across the two studies.
Conclusions: I conclude with a discussion of the potential benefits and limitations of this intervention approach, highlighting possible effects that might be gained. Also I evaluate the potential of working memory training to form a stand-alone, alternative or adjunctive intervention for individuals with ADHD. as well as the critical issues that plague most intervention research.
At the conclusion of this plenary, participants will be able to:
1. Recognize the potential and limitations of computerized working memory training
2. Utilize the evidence to date on outcomes of computerized working memory training to inform and advise patients with ADHD
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