

Symposium

1. From action planning to motor output, the neuropsychology of motor cognition

Organizer: Guy Vingerhoets, Ghent University, Department of Experimental Psychology

The ability to plan actions and interact with the world around us is one of the major achievements of our nervous system. The complex regulation of our motor behavior is performed by the brain and investigating the motor deficits in patients with brain lesions can inform us about the neural organization of motor cognition. In this symposium we will address different manifestations of impaired tool use, multi-step action planning and the relation with other cognitive functions. Based on patient data and behavioral research we aim to provide an updated account of motor cognition and its neural correlates.

Speakers:

1. Kathleen Y. Haaland, University of New Mexico, USA: Definitions and Clinical Examples of Limb Apraxia
2. Peter H. Weiss-Blankenhorn, Institut für Neurowissenschaften und Medizin (INM-3), Germany: Where language meets action: clinical and lesion studies of aphasia and apraxia
3. Joachim Hermsdörfer, Technische Universität München, Germany: Tool Use in Multi-Step Actions. Deficits following stroke and neural correlates
4. Ferdinand Binkofski, University of Aachen, Germany: When an object becomes a tool, implications for affordances and embodiment

2. Definitions and Clinical Examples of Limb Apraxia

Kathleen Y. Haaland, Departments of Psychiatry & Behavioral Sciences and Neurology, University of New Mexico, Albuquerque, NM, USA

The historically-defined forms of limb apraxia will be delineated with videotape examples. These different types of limb apraxia will be discussed in the context of more recent theoretical conceptualizations. In particular, I will discuss (1) different methods for studying limb apraxia; (2) progress in defining the neuroanatomical correlates of limb apraxia based on patient studies that combine innovative neuroanatomical techniques (e.g., voxel lesion symptom mapping) and hypothesis-driven cognitive paradigms as well as functional imaging; (3) different theoretical frameworks that have driven these studies; and (4) the functional implications of limb apraxia given the historical view that there were no real world implications of limb apraxia.

3. Where language meets action: clinical and lesion studies of aphasia and apraxia

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Objective: Clinically, the co-occurrence as well as the dissociation of apraxia and aphasia has been reported. These clinical observations fuel the debate how language and praxis are co-represented in the left hemisphere (LH). We here test the hypothesis that language and (meaningful) action are linked via semantic processing in Broca's region. **Participants and Methods:** Using voxel-based lesion symptom mapping (VLSM) and comprehensive neuropsychological testing for apraxia and aphasia in 50 sub-acute LH stroke patients, we investigated the relationship between language and praxis deficits at the behavioral and lesion levels.

Results: Behaviorally, half of the patients suffered from co-morbid aphasia and apraxia. While 24% (n=12) of all patients exhibited aphasia without apraxia, apraxia without aphasia was rare (n=2, 4%). Left inferior frontal, insular, inferior parietal and superior temporal lesions were specifically associated with deficits in naming, reading, writing, or auditory comprehension. In contrast, lesions affecting the left inferior frontal gyrus, premotor cortex and the central region as well as the inferior parietal lobe were associated with apraxic deficits (i.e., pantomime, imitation of meaningful and meaningless gestures). Thus, contrary to the predictions of the embodied cognition theory, lesions to sensorimotor and premotor areas were associated with the severity of praxis but not language deficits. Lesions of Brodmann area (BA) 44 led to combined apraxic and aphasic deficits.

Conclusions: Data suggest that BA 44 acts as an interface between language and (meaningful) action thereby supporting parcellation schemes (based on connectivity and receptor mapping) which revealed a BA 44 sub-area involved in semantic processing.

4. Tool Use in Multi-Step Actions. Deficits following stroke and neural correlates.

Joachim Hermsdörfer, Department of Sport and Health Sciences, Technische Universität München, Germany

Stroke may cause deficits in activities of daily living (ADL) which cannot be explained by motor disorders. Despite these deficits can seriously affect independent living, research is rare. Thus it is not clear how frequent the deficits occur after a stroke, which neuropsychological symptoms are predictive for the impairments and which brain lesions are typically associated.

We tested 57 stroke patients (38 left brain damage, LBD) in two ADL tasks (making tea, filing a document) as well as in a variety of neuropsychological tests. In addition, lesions were analyzed in the LBD patients.

More than one-third of the patients (37-55%) failed to attain the action goal. Interestingly, duration and error patterns on both tasks were not correlated. In the LBD group poor task performance was related with apraxia, but not with aphasia. In the RBD group performance moderately correlated with various tests including figure copying. Lesion analyses in LBD patients found an anterior to posterior order in main lesion location responsible for errors in concepts, spatio-temporal aspects, and sequence for document filing and tea making.

Although LBD and RBD patients exhibited similar patterns and frequencies of errors in the ADL tasks, the underlying sources for the deficits seem to differ. In LBD patients, apraxia is moderately predictive for errors. Results in RBD patients suggest multiple causes for ADL deficits with a particular importance of spatial attention. Although the error patterns for the two tasks differ substantially, lesion analysis suggests regularities on an anatomical processing level of conceptual and sequencing aspects.

5. When an object becomes a tool, implications for affordances and embodiment

Ferdinand Binkofski, RWTH Aachen University

Houpan Horoufchin

Katrin Sakreida

Antonello Pellicano

Simon Eickhoff

The concept of affordances indicates “action possibilities” as represented by object properties the environment provides to interacting organisms. Affordances relate to perception as well as action and refer to sensory-motor processes emerging from goal-directed object interaction. For instance, the handle on a cup provides an affordance for grasping and holding. There is growing experimental evidence that affordances are not a static properties of objects but can vary with the environmental context. Consequently, a sub-classification of affordances into stable and variable was proposed. Of particular interest is the processing of affordances in unknown tools. In the process of identifying unknown objects as tools, affordances are attributed to them coherently with the dedicated context meaning.

Here we present data from two studies: 1) a meta-analysis of existing imaging studies on neuronal representation of stable and variable affordances, and 2) from an own fMRI imaging study in which unknown tools were presented in the appropriate action context. In the meta-analysis four independent raters categorized functional imaging studies on hand-object interaction as featuring either stable or variable affordances. A coordinate-based meta-analysis using the Activation Likelihood Estimation (ALE) algorithm revealed the existence of two distinct, but to some extent overlapping functional pathways. In the imaging study participants were shown animated clips of known and unknown tools, in rotation, in dedicated action and again in rotation.

The ALE analysis revealed that the network for stable affordances was consisting of bilateral inferior parietal and premotor cortices, whereas the network for variable affordances was localized in more dorsal cortical areas. In our imaging study we found that after learning the new function of an object as a tool, the perception of the tool only – without any action or manipulation – recruited a similar network as previously known tools. Additionally the left prefrontal cortex was active in the process of understanding the new tool function and during the implementation of its new concept.

Our findings are in line with the proposal of two different types of affordances emerging in the interaction with objects: stable affordances are characterized by the knowledge of the invariant object and experiences in object interaction, whereas variable affordances underlie the adaptation to changing object properties such as the position and space orientation, thus, emerging during actual interaction with objects. The anatomical localization of two parallel networks suggests that variable affordances are processed preferentially in the dorso-dorsal stream and stable affordances in the ventro-dorsal stream. The left prefrontal cortex is important for the implementation of new concepts of tools.

Symposium

6. Sport concussion: recognition, assessment and recovery

Organizer: Laura Hokkanen, Institute of Behavioural Sciences, University of Helsinki

Concussions or mild traumatic brain injuries (mTBI) are common neurological injuries in contact and collision sports. In the majority of sport concussions, athletes recover quickly and have no apparent neurological deficits, but a risk of structural damage and prolonged impairment exists. Neuropsychological assessment can be used in recognizing the cases with poor outcome and it has been recommended as one of the tools in making the decision on return to play. The most often assessed cognitive domains are learning and memory, mental processing speed, attention, and executive functions. In addition to tests of cognition, the evaluation of motor speed, coordination and balance has become an important part of the assessment protocol. In Europe, few teams have trained neuropsychologists closely working with the athletes and the assessments are often conducted by other personnel. Therefore reliable methods and normative values must be available. The symposium presents studies on assessment methods in team sports that are in use in Europe. The symposium also presents results from a prospective study of in adults with mTBI, where the recovery from sports injuries will be compared with non-sports-related TBI. The psychological issues in recovery from sports concussion will also be touched upon.

Speakers:

1. Gerhard Müller, König & Müller, Zentrum für Sport-Neuropsychologie, Würzburg, Germany: Recognition, Treatment and Prevention of Concussions in Team Sports
2. Matti V. Vartiainen, Institute of Behavioural Sciences, University of Helsinki, Finland: Integrated assessment of motor and cognitive symptoms following concussions in ice-hockey
3. Kati Peltonen, Institute of Behavioural Sciences, University of Helsinki, Finland:
Cognitive assessment tests (ImPACT and K-D) in Finnish sport-related concussion management
4. Jennie Ponsford, School of Psychological Sciences at Monash University, Monash-Epworth Rehabilitation Research Centre at Epworth Hospital in Melbourne, Australia:
How does outcome following sports concussion differ from that of mild TBI sustained due to other causes?

7. Recognition, Treatment and Prevention of Concussions in Team Sports

Gerhard Müller, Zentrum für Sport-Neuropsychologie

Do you remember the soccer world cup final 2014 between Argentina and Germany? Did you see a prime example of concussion management?

Not much attention has been paid to mild traumatic head injuries in team sports in Germany and other European countries until now. Recognition, treatment and prevention have been widely in the focus of neurological and neuropsychological research and practice in North America for more than two decades. This lecture will focus on concussion recognition (causes, mechanism of damages, symptoms, examinations) and its short-, medium-, and long-term consequences. What are treatments and interventions? How can athletes return to training or play stepwise? An outline of prevention strategies (equipment, technique, rule changes and education) will lead to conclusions for team sports and steps to be taken. What can neuropsychologists contribute? Where can athletes, coaches, team physicians and manager get support? Concussion in team sports will be a major topic in next the years.

8. Integrated assessment of motor and cognitive symptoms following concussions in ice-hockey

Matti Vartiainen, M.Sc^{1,2}

Anu Holm, Ph.D³

Jani Lukander, M.Sc⁴

Kristian Lukander, M.Sc⁴

Sanna Koskinen, Ph.D¹

Robert Bornstein, Ph.D⁵

Laura Hokkanen, Prof., Ph.D¹

1 University of Helsinki, Institute of Behavioural Sciences, Division of Cognitive Psychology and Neuropsychology

2 Validia Rehabilitation Helsinki, Finland

3 Department of Clinical Neurophysiology, Satakunta Central Hospital, Pori, Finland

4 Brain Work Research Center, Finnish Institute of Occupational Health, Helsinki

5 The Ohio State University College of Medicine

Objective: Concussions typically occur in high-velocity- and contact sports often resulting in problems with working memory, executive functions, and motor control. Our aim was to characterize minor motor and cognitive changes after sports-related concussions with a test battery including a balance test, and multilimb reaction time and speed tests.

Participants and methods: A total of 113 ice hockey players were assessed before a season. During the season nine concussed players were retested after the concussion, and after the season. A control group of seven non-concussed players was also retested. Performance was measured using a computerized balance test, and the Motor Cognitive Test battery (MotCoTe) with multilimb responses in simple reaction, choice reaction, inhibition, and conflict resolution conditions. The cognitive demands of the battery gradually increase from a simple stimulus response to a complex task requiring executive attention.

Results: The performance of the concussed group decreased at the post-concussion assessment compared to both the baseline measurement and the controls. For multilimb reaction times, statistically significant changes were observed for choice reaction inhibition test. Multilimb speed and balance showed a decreased trend, but no statistical difference in performance.

Conclusion: In sports-related concussions, complex motor tests can be valuable in assessing the outcome. In the current study, as the complexity of the cognitive demands grew, larger impairments were detected for the reaction times of the concussed subjects. In concussions, the increased reaction times may reflect the disruption of complex and integrative cognitive function.

9. Cognitive assessment tests (ImpACT and K-D) in Finnish sport-related concussion management

Peltonen Kati, Institute of Behavioural Sciences, University of Helsinki, Finland

Vartiainen Matti., Institute of Behavioural Sciences, University of Helsinki, Finland

Hokkanen Laura, Institute of Behavioural Sciences, University of Helsinki, Finland

Objective: Concussion is common in collision sports, such as ice hockey, and the assessment of cognitive function should be an important component in any return to play protocol. The computerized evaluation system ImpACT (Immediate Post-Concussion Assessment and Cognitive Testing) is one of the most widely used test batteries in concussion management. However, published Finnish norms for ImpACT are lacking. There is also a need for quick sideline tests, and recently King-Devick (K-D) test has shown promise as supplemental screening tool. Yet limited studies have been published to validate this test against others, more recognized ones.

First we establish Finnish normative data for the ImpACT test using a large sample of professional ice hockey players. Second we assess concurrent validity of the K-D test by correlational analysis. We also studied the effects of age, education, and prior self-reported concussions on cognitive performance.

Participants and Methods: The ImpACT and K-D tests were administered to 185 Finnish National Ice Hockey league players at baseline in seasons 2012-13 and 2013-14, mean age 23.8 years (median 22.0 y, range 16-40 y).

Results: Age affected ImpACT Visual Motor Speed, Reaction Time and Impulse Control composites, so Finnish normative values for ImpACT were presented in different age groups. Significant correlations were found between K-D Time and ImpACT composites scores (Reaction Time and Visual Motor speed).

Conclusion: This study establishes Finnish norms for ImpACT and supports K-D as an additional screening tool in concussion assessment and management.

10. How does outcome following sports concussion differ from that of mild TBI sustained due to other causes?

Jennie Ponsford PhD, Monash University, Monash-Epworth Rehabilitation Research Centre

Objective: Outcome following mild TBI represents a continuing controversy. Findings of Chronic Traumatic Encephalopathy in the brains of deceased footballers have created fears that mild TBI may cause serious cognitive sequelae. The present study examined outcome following sports-related concussion in the context of a broader study of outcome following mild TBI.

Participants and methods: Participants were 123 adults with uncomplicated mTBI and 100 trauma controls with minor injuries not involving the head presenting to a hospital Emergency Department (ED), of whom 10% had sustained injury due to sports concussion. Participants were assessed on measures of post-concussive symptoms (PCS), cognitive performance (ImPACT), psychiatric state, health-related quality of life, pain and other life stressors in the ED and one week and three months post-injury.

Results: MTBI participants, including those with sports concussion, reported significantly more PCS than controls at acute ED assessment. At one-week post-injury whilst the MTBI group still reported more PCS than controls and performed more poorly on the ImPACT Visual Memory Index, the sports concussion group did not. By three months all groups had improved significantly, with no group differences in PCS, cognitive performance or psychological adjustment.

Conclusions: In this study, whilst mild TBI clearly resulted in more symptoms and cognitive difficulties than were experienced by trauma controls, those with sports concussion had less complicated recoveries, having generally recovered within one week of injury. The study is, however limited by the small sample of concussed athletes. Issues in managing concussion in athletes will be discussed.

Symposium

11. State-of-the-art in neuropsychology: An international study of neuropsychology professionals

Organizer: Arango, J.C. Department of Psychology, University of Deusto

Neuropsychology is a fairly young field of psychology and, across countries, there is great diversity with respect to who can be a neuropsychologist, what kind of training they receive, what kind of work they do, and what barriers they perceive as hindering advancement in the field. In order to better understand who makes up the population of neuropsychologists in a given country, their common practices, and perceptions of work in their field, an online survey was disseminated in 23 countries. This symposium describes the survey and its results, including differences between the US, Spain, and Latin American neuropsychologists and among neuropsychologists in the Nordic countries. Speakers will emphasize education and training, qualifications, activities engaged in, neuropsychological test use, and rehabilitation. Results can inform local and regional policy of the countries surveyed; experiences can be shared to guide the development or creation of new regulations in countries with less history in this field.

Speakers:

1. An online survey to study neuropsychology professionals in 23 countries Presenter: Diego Rivera.
2. An international survey of neuropsychology professionals: comparison of profiles between the US, Spain, and Latin America. Presenter: Ivan Panyavin.
3. Education, qualifications and practice among Nordic neuropsychologists: results from the professional practices survey. Presenter: Anne Norup.
4. Test use among Nordic neuropsychologists: results from the professional practices survey. Presenter: Jens Egeland.
5. Trends in the practice of neuropsychological rehabilitation among neuropsychologists in Nordic countries: results from the professional practices survey. Presenter: Solrun Sigurdardottir.

12. An online survey to study neuropsychology professionals in 23 countries

Rivera, D. University of Deusto

Arango-Lasprilla, J.C. University of Deusto

Objective: To describe the online survey used to study neuropsychology professionals in various countries in three world regions (Europe, the US, and Latin America)

Participants: 2485 neuropsychology professionals from 23 different countries completed an online survey from July to December of 2014. An email was sent to neuropsychologists in these countries with the purpose of evaluating the state-of-art of the profession in the relevant country or region (e.g., Latin America). Individuals were asked to respond to the survey if they had (1) received a minimum of a bachelor's degree in psychology or discipline related to neuropsychology, and (2a) self-identify as a neuropsychologist or (2b) have engaged in at least one of the following neuropsychological activities in the past year: evaluation/assessment/testing, diagnosis, rehabilitation/treatment, teaching, or research. After examining the data received, respondents were excluded from analysis if they: were less than 18 years old, were not currently living/working in the country corresponding to the country/region of survey.

Results: This presentation will describe the survey and some of the processes to select appropriate questions and ensure adequate translation/adaptation in various countries. The survey consisted of 85 questions in 7 core areas: 5 socio-demographic and screening questions, 14 questions on training, 8 questions on current working situation, 14 on evaluation and diagnosis activities, 7 related to rehabilitation, 6 on teaching activities, 10 on research, and 21 on ethics.

Conclusions: The survey data will contribute much needed knowledge concerning the state-of-the-art in the profession.

13. An International Survey of Neuropsychology Professionals: Comparison of profiles between the US, Spain, and Latin America

Panyavin, I.S. University of Deusto

Rivera, D. University of Deusto

Arango Lasprilla, J.C. University of Deusto

Objective: To establish and compare the profiles of clinical neuropsychologists (sociodemographics, educational and training background, work settings and practices) in the US, Spain, and Latin America.

Participants and methods: 1572 Individuals from 19 countries (339 from Spain, 424 from the United States, and 809 from 17 countries across Latin America) completed an online survey between July 2013 and December of 2014. These respondents reported engaging in the professional practice of neuropsychology. The 66-item survey asked respondents about their neuropsychology training and current practice, including assessment/ evaluations, rehabilitation, teaching, research, and ethics.

Results: Overall, 67% of the sample had a Master's degree, and 43% reported having a Doctoral degree; 92% identified themselves as psychologists and 54% were employed full-time. Average age was 38.7 years (standard deviation=11.2, range 21-78) and 70% were female. The majority of respondents (85%) performed neuropsychological evaluations, 50% endorsed working in neuropsychological rehabilitation, 48% conducted research, and 37% worked as professors/ instructors in neuropsychology in the past year. Only about half (54%) indicated receiving formal training on the topic of professional ethics.

Conclusions: Comparisons between responses from neuropsychologists in US, Spain, and Latin America will be presented with a focus on reported education, training, work settings, and work practices. Implications of diversity in these areas on the field will be discussed.

14. Education, qualifications and practice among Nordic neuropsychologists: Results from the professional practices survey

Norup, A. Department of Neurology, Glostrup University Hospital

Egeland, J. Vestfold Hospital Trust, Division of Mental Health & Addiction; University of Oslo, Department of Psychology.

Lovstad, M. Research Department, Sunnaas Rehabilitation Hospital; Department of Psychology, University of Oslo

Nybo, T. Clinical Neurosciences, Neurology, Unit of Neuropsychology, University of Helsinki and Helsinki University Hospital

Persson, B. A. Linnaeus University, Department of Psychology

Rivera, D. F. Department of Psychology. University of Deusto, Bilbao.

Schanke, A.-K. Research Department, Sunnaas Rehabilitation Hospital; Department of Psychology, University of Oslo

Sigurdardottir, S. Research Department, Sunnaas Rehabilitation Hospital; CHARM, Faculty of Medicine, University of Oslo

Arango-Lasprilla, J. Department of Psychology, University of Deusto, Bilbao.

Objectives: To investigate education, qualifications and practice among neuropsychologist in the Nordic countries.

Methods: In 2014, an online survey was distributed to members of the neuropsychological societies, non-members registered neuropsychologists and psychologists following specialization courses in Norway (n=449), Denmark (n=550), Sweden (n=867) and Finland (n=393). A total of 1040 professionals in Norway (n=234), Denmark (n=138), Sweden (n=490) and Finland (n=178) completed the survey.

Results: Of the professionals completing the survey, the majority was female (75.5%), and the mean age was 47.6 years (SD 11.67; range 24-86). The majority of neuropsychologists worked full time, in hospital setting and was employed in salaried positions. Seniority (years since authorization as a psychologist) varied amongst participants from 0 to 45 years with a mean of 14.7 years (SD 9.90). However across the Nordic countries, the mean years of seniority were similar ranging from 12.6 years in Denmark to a mean of 16.8 years in Norway. Similar results were found in relation to years of work experience in neuropsychology, where a mean of 12.1 years was found in the total sample. Less than 10% had obtained a PhD in the total sample, with the lowest frequency of PhD's in Sweden (6.9%) and the highest in Norway (14.1%). Of the participants, 35.9% had been approved as specialists in neuropsychology. The lowest frequency of specialists was found in Sweden (19.4%), and the highest in Norway (64.1%).

Conclusions: Differences and similarities between the Nordic countries in relation to education, qualifications and practice will be discussed at the symposium.

15. Test use among Nordic neuropsychologists: Results from the professional practices survey

Egeland, J. Division of Mental Health, Vestfold Hospital Trust; Department of Psychology, Universi
Løvstad, M. Sunnaas Rehabilitation Hospital; Department of Psychology, University of Oslo
Norup, A. Department of Neurology, Glostrup University Hospital
Nybo, T. Unit of Neuropsychology' Neurology, University of Helsinki; Helsinki University Hospital
Persson, B. Department of Psychology, Linnaeus University
Rivera , D.F. Department of Psychology, University of Deusto, Bilbao
Schanke , A.-K. Sunnaas Rehabilitation Hospital; Department of Psychology, University of Oslo
Sigurdardottir, S. CHARM, Faculty of Medicine, University of Oslo
Arango-Lasprilla, J. Department of Psychology, University of Deusto, Bilbao

Objectives: The aim was to investigate the test use patterns of Nordic Neuropsychologists.

Participants: An online survey was distributed to members of the Nordic neuropsychological societies and other neuropsychologists. 702 neuropsychologists completed the test-use division of the survey.

Results: Thirty-six percent reported that they were flexible in using tests, 58% used a flexible battery while 6% used a fixed battery. The median number of tests used either occasionally, often or standard (in total use) was 20, and the median number of tests used as standard was 7. The 10% having most tests in use reported 42 tests, of which 17 as standard. The flexible group used fewer tests both in total and as standard. The Wechsler-scales ranked highest as standard tests, followed by subtests from D-KEFS and RCFT. Seventy-nine percent used at least one computer based test, Conners' CPT-II ranking highest. Raven's Progressive Matrices, Movement ABC and Stroop Color Word Test ranked high in total use, but low as standard. There were substantial differences regarding the type and number of tests used between the Nordic Countries, Denmark and Norway being at the extremity. Mean and median values for Norwegian neuropsychologists were 36 tests in total use and 13 as standard, while the corresponding values for Danes were 18 and 6 (mean), median 5. Specialists used 36% more tests in total and 45% more tests as standard compared to non-specialists.

Conclusion: Factors that may mediate differences in test use patterns will be discussed.

16. Trends in the practice of neuropsychological rehabilitation among neuropsychologists in Nordic countries: Results from the professional practices survey

Sigurdardottir, S. Institute of Health and Society, Research Centre for Habilitation and Rehabilitation Models and Services (CHARM), Faculty of Medicine, University of Oslo, Oslo

Løvstad, M. Research Department, Sunnaas; Department of Psychology, University of Oslo

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Schanke, A.K. Research Department, Sunnaas; Department of Psychology, University of Oslo

Arango-Lasprilla, J. Department of Psychology. University of Deusto. Bilbao, Spain

Objective: The aim was to investigate the practice of neuropsychological rehabilitation regarding diagnostic groups and domains of cognitive functions treated. Also, the clinicians' time spent on rehabilitation and numbers of patients treated monthly were focused on.

Participants and methods: In 2014, an online survey was distributed to members of the neuropsychological societies, non-members registered neuropsychologists and psychologists following specialization courses in Norway (n=449), Denmark (n=550), Sweden (n=867) and Finland (n=393). A total of 1040 professionals (75.5% women) in Norway (n=234), Denmark (n=138), Sweden (n=490) and Finland (n=178) completed the survey.

Results: 342 (45%; 76% females, mean age 46.6 years) of 760 respondents in the rehabilitation section of the survey reported to have performed neuropsychological rehabilitation. The most frequently treated groups were traumatic brain injury (59%), stroke (51%), ADHD (34%), brain tumor (29%) and learning difficulties (29%). The least frequently treated group was schizophrenia (5%). Clinicians offered mostly individual treatments (69%) with interventions focused on executive functions (73%), attention (73%), emotional adjustment (70%), awareness (69%) and memory (64%). The neuropsychologists provided neuropsychological treatment over an average of 9.3 hours per week (range 1–40 hours), and treated eight patients each month (range 1-70 patients) on average.

Conclusions: Clinicians offering neuropsychological rehabilitation were more often involved in treating patients with brain dysfunction and less often involved in patients with psychiatric disorders. Cognitive deficits were targeted more often than family-oriented and vocational issues. Knowledge about the practice choices of clinicians is essential for improving the rehabilitation practice.

Paper session

Aging and dementia

Chair to be announced

17. The Effect of Simultaneous Interpreting on Age-Related Changes of Executive Functions Across Lifespan

Henrard, S. University of Mons

Van Daele, A. University of Mons

Objective: Various studies show that cognitively stimulating work could slow the normal cognitive decline with advancing age. Underlying mechanisms behind this association suggest that stimulating environments increase « cognitive reserve », which protects against the effects of aging on the cognitive function. Our study aims to evaluate the effects of simultaneous interpretation on the decline of executive functions.

Participants and methods : 225 participants were divided into three groups (75 Interpreters, 75 translators and 75 monolinguals) and five age groups (25 – 34 ; 35 – 44 ; 45 – 54 ; 55 – 65 and 66 +). They performed five tasks, testing their reaction time, dual tasking and executive functions (updating, inhibition, flexibility). The three groups were statistically comparable for gender, level of education, age and seniority at work.

Results: Multiple analyses of variance (MANOVA), followed by Post Hoc (Bonferroni) show that among younger subjects (25-34 years old), there was no significant difference in performance on tests. For participants 35 years and older, differences appear between interpreters and the two other groups. These differences appear in tasks assessing cognitive functions most involved in simultaneous interpretation (information speed processing and updating). However, after retirement (66 +), the differences between interpreters and translators disappear but remain present when compared to monolinguals.

Conclusion: During working life, it seems that simultaneous interpretation may slow the decline of executive functions. However, once retired, interpreters seem to lose the benefits of cognitive stimulation of their work activity even if the benefits of bilingualism are preserved.

18. Premorbid intelligence as cognitive reserve against brain pathology in Alzheimer's disease

Schoenfeld, R. Martin Luther University Halle-Wittenberg, Institut of Psychology

Kleinschmidt, M. Fraunhofer Institute of Cell Therapy and Immunology, Department of Drug Design and Target Validation

Leplow, B. Martin Luther University Halle-Wittenberg, Institut of Psychology

Demuth, H.-U. Fraunhofer Institute of Cell Therapy and Immunology, Department of Drug Design and Target Validation

Introduction: Brain atrophy and amyloidplaques are important biomarkers of Alzheimer's disease. However, detectable brain pathology is not always associated with neuropsychological dysfunctions of a dementia. A compensatory benefit of cognitive reserve is discussed and seems to moderate the association between brain pathology and neuropsychological functioning.

Method: Cognitive reserve was defined as the premorbid intellectual and socio-economic state. In study 1 we studied 20 mild demented out-patients with MRT volumetric and a spatial navigation and memory task. In study 2 we screened 100 participants aged 65-85 years with the CERAD plus test battery, and blood serum concentration of amyloid beta ($A\beta$) was analyzed. In both studies regression models were used to test the moderator hypothesis.

Results: In study 1 the cognitive reserve moderated the association of hippocampal atrophy and spatial memory. Patients with high cognitive reserve and mild hippocampal atrophy reached normal test scores in the delayed recall, whereas those patients with sever hippocampal atrophy and all patients with low reserve did not cope with the spatial task. Also in study 2 the cognitive reserve moderated the association between $A\beta$ and the neuropsychological scores. If $A\beta_{40}$ was elevated the CERAD scores of the delayed recall conditions were decreased, but solely in participants with low cognitive reserve.

Discussion: If cognitive reserve is high older people with existing brain pathology could show normal neuropsychological profiles and very likely no impairment in daily life. On the other hand, minor deteriorations could suggest advanced stages of a neurodegenerative disease in those individuals.

19. Improving Early Diagnosis of Alzheimer's Disease: Predictive Power of Elongated Cognitive Tests and Brain Atrophy

Schmand, B. University of Amsterdam

Lammers, N. University of Amsterdam

Rienstra, A. University of Amsterdam

Caan, M. University of Amsterdam

Majoie, Ch. University of Amsterdam

Richard, E. University of Amsterdam

van Gool, W.A. University of Amsterdam

Objective: To improve the detection of early Alzheimer's disease (AD) by combining well-known predictors (brain volume, cognitive performance) with novel predictors (elongated cognitive tests).

Participants and software: We calculated the volumes of hippocampi, entorhinal cortex, inferior temporal gyri and anterior and posterior cingulate gyri. After two and six years, patients were evaluated using cognitive screening instruments and clinical examination. Different prediction models of conversion to dementia were analyzed using logistic regression.

Results: Standard NPA correctly predicted diagnosis at follow-up after six years in 82% of cases. Adding MRI measures to standard NPA improved the predictive power to 91% accuracy. Adding elongated tests to standard NPA slightly increased the predictive power to 83% correct. The most accurate prediction model included NPA with elongated tests and MRI measures, with an accuracy of 92%. Accuracy of all models, except for standard NPA, was higher for six-year follow-up than for two-year follow-up.

Conclusions: Our results complement prior research of early AD detection by demonstrating that when improved behavioral measurements and state-of-the-art neuroimaging techniques are included in a single model, very high accuracy can be reached in predicting who will develop AD within six years.

20. Social cognition distinguish amnestic and non amnestic bvFTD from AD

Bertoux, M. University of Cambridge
de Souza, L.C. Universidade Federal de Minas Gerais
Sarazin, M. Université Paris V
Dubois, B. Université Paris VI
Hornberger, M. University of Cambridge

Background: Increasing evidence suggests that a subset of behavioural variant frontotemporal dementia (bvFTD) can show episodic memory deficits similar to Alzheimer's disease (AD), making a diagnostic distinction difficult. Nevertheless, novel social cognition tests, such as the Social cognition & Emotional Assessment (mini-SEA), emerge as promising to distinguish bvFTD from AD. The current study investigates whether social cognition performance reliably distinguishes bvFTD and AD, regardless of amnestic bvFTD presentation.

Methods: 103 participants, including 19 amnestic bvFTD, 19 non-amnestic bvFTD, 35 AD and 30 controls were included. 48% of patients (n=17 bvFTD and n=18 AD) underwent cerebrospinal fluid biomarkers analysis corroborating their initial diagnosis. All underwent neuropsychological assessments, including the mini-SEA, which include theory-of-mind (Faux-pas) and facial emotion recognition parts.

Results: bvFTD had lower mini-SEA scores compared to controls and AD, regardless of memory performance. More importantly, the mini-SEA showed high sensitivity and specificity to distinguish bvFTD and AD. These results were corroborated in the patients with confirmed pathology.

Conclusion: Regardless the presence of amnesia, the mini-SEA, a short social cognition assessment, can accurately distinguish bvFTD from AD. These findings challenge the current diagnosis criteria of bvFTD by highlighting the need (1) to remove amnesia as an exclusion criterion and (2) to include social cognition deficit as a diagnosis marker.

21. Social cognition and the self-reference effect in Alzheimer's disease and behavioural variant frontotemporal dementia

Wong, S. Neuroscience Research Australia

Irish, M. Neuroscience Research Australia

Leshikar, E.D. University of Illinois

Duarte, A. Georgia Institute of Technology

Savage, G. Macquarie University

Hodges, J.R. Neuroscience Research Australia

Piguet, O. Neuroscience Research Australia

Hornberger, M. University of Cambridge

Objective: Evidence shows that processing information in reference to the self enhances subsequent memory for the source of this information. While both Alzheimer's disease (AD) and behavioural-variant frontotemporal dementia (bvFTD) patients show source memory impairment, it remains unclear whether these patients show the typical memory advantage for self-referenced materials. We also aimed to explore the relationship between self-referential processing and social cognition.

Participants and methods: The 'self reference effect' (SRE) was assessed in AD (n=16) and bvFTD (n=22) patients and age-matched healthy controls (n=16). In this task, participants studied pictures of common objects paired with one of two background scenes (sources) under self-reference, other-reference or self-external encoding instructions, followed by an item and source recognition memory test. Perspective taking and empathy were assessed using the Interpersonal Reactivity Index (IRI). Voxel-based morphometry was used to investigate correlations between SRE and IRI measures and grey matter atrophy.

Results: Our findings confirmed the source memory impairment in both AD and bvFTD. We found that the SRE was similarly reduced in both patient groups. IRI ratings were lower in both AD and bvFTD, with the latter group most impaired. Higher ratings of perspective taking and empathy were associated with a larger SRE. The medial prefrontal cortex (mPFC) was identified as a shared neural substrate of SRE and IRI measures.

Conclusions: Self-referential encoding does not appear to ameliorate the significant source memory impairments in AD and bvFTD patients. This study confirms the importance of the mPFC in mediating self-referential aspects of memory and social cognition.

Symposium

22. My body + my movement is = me? Body ownership, agency and the bodily self

Organizer: Lorenzo Pia, SAMBA (SpAtial, Motor & Bodily Awareness) Research Group Psychology Department & Neuroscience Institute of Turin (NIT) University of Turin (Italy)

The bodily self is at the root of human nature and pivotal in our interactions with the environment. Recent advances in cognitive neuroscience have challenged our understanding of the experience of the body as our own, i.e., the immediate and self-specific representation of body-related information.

At present, there is a wide consensus that at least two fundamental components contribute to the experience of the bodily self: body ownership (i.e., the sense that bodily states are perceived as mine) and sense of agency (i.e., the feeling of intending and controlling willed actions). Both are omnipresent during movements but denote different aspects of bodily experience. Indeed, whereas the sense of agency is only present during voluntary actions, thus seems dependent on efferent signals, the sense of ownership seems to rely primarily on afferent signals.

For this proposal, we will address the issue of the complex interplay between body ownership and agency, which have implications for understanding both the neurocognitive mechanisms underpinning bodily self and a variety of neurological and psychiatric diseases affecting the experience of the own body. In order to obtain a full picture of the issue, we will have speakers with different theoretical point of views and/or methodological approaches.

23. Delusional ownership and its relationships with the sense of agency

Lorenzo Pia, SAMBA (SpAtial, Motor & Bodily Awareness) Research Group Psychology Department & Neuroscience Institute of Turin (NIT) University of Turin (Italy)

A key approach to the understanding of bodily self-consciousness is inferring from patients those information that might help to explain intact brain functioning.

In the present talk, I will present a novel, neurologically-based monothematic delusion of body ownership (i.e., patients who misattribute someone else's arm to themselves) which shows abnormalities at the level of the integration among different aspects of body ownership. I will also examine whether and how such altered body ownership affects conscious awareness of movements. This evidence suggests that studying the interactions between body ownership and sense of agency could be key step for the understanding the nature and the neurocognitive mechanisms underpinning human bodily self-consciousness.

24. The body of my own? The sense of ownership and agency in bodily self-recognition

Andreas Kalckert, Brain , Body & Self Lab, Department of Neuroscience, Karolinska Institute, Stockholm (Sweden)

Recent research in psychology and cognitive neuroscience suggests that the experience of the own body can be experimentally manipulated. Paradigms like the rubber hand illusion have revealed the basic cognitive and perceptual mechanisms of the so-called sense of ownership, the feeling that the body we experience is part of my own. In this experiment participants experience a sense of ownership as a consequence of the manipulation of visual and tactile stimulation to the hand. We have recently introduced a new version of this experiment, the moving rubber hand illusion. These experiments have shown that movements can produce a similar ownership illusion and that the illusion relies on similar perceptual principles like the classical paradigm. Crucially though, this experiment complements and extends the classical illusion with the sense of agency, the sense that we are in voluntary control of our actions.

Here, I like to review the basic concepts of these experiments and summarize how ownership and agency contribute to the experience of the own body. I will also briefly introduce potential implications for research on psychopathological conditions. A careful distinction between both these aspects might help us to understand conditions, which affect the experience of the own body and its actions.

25. Bimanual coupling: an effective tool to investigate the sense of ownership and agency in pathological conditions

Francesca Garbarini. SAMBA (SpAtial, Motor & Bodily Awareness) Research Group, Psychology Department & Neuroscience Institute of Turin (NIT), University of Turin (Italy)

When people move both hands simultaneously, each motor program imposes constraints to the other (bimanual coupling). Here, I will review the basic principles of bimanual paradigms and I will pinpoint how they are useful to understand the bodily-self within those pathological conditions in which motor and bodily awareness are altered. In the motor domain, I will focus on brain-damaged patients affected by anosognosia for hemiplegia who, despite the presence of severe left paralysis, obstinately claim that they can still move their contralesional limbs. By using bimanual tasks, both in the spatial and the temporal domain, it has been shown that despite the absence of movements, an effective motor intentionality and a spared sense of agency can be present. In the body domain, I will focus on brain-damaged patients affected by a specific monothematic delusion of body ownership, namely the pathological belief that other people's body parts belong to their own body. By using a modified version of a bimanual task, it has been shown that an altered sense of body ownership profoundly affects the patients' sense of agency (i.e., patients ascribed the alien limb movements to themselves). In summary, these evidences show that bimanual tasks are effective tools to investigate body ownership and the sense of agency in pathological conditions, unveiling specific aspects, otherwise, hidden in normal functioning brain.

26. Probing agency and sensation of movement

Mark Schram Christensen, Copenhagen Neural Control of Movement, Department of Neuroscience and Pharmacology & Department of Nutrition, Exercise and Sports, University of Copenhagen (Denmark)

Sense of agency (SoA) has been, within the framework of the comparator model, been explained by the matching of prior intentions of goals of actions with the actual outcome of the movements. Thereby both the formation of action goals and sensory feedback become critical for the experience of SoA and of Sensation of Movement (SoM). In this talk I will review some of my recent findings pointing towards the importance of either sensory feedback or efferent information in the formation of SoA and SoM performed under experimental settings using transcranial magnetic stimulation and EEG. Suggesting that the mechanisms involved in SoA and SoM cannot solely be explained by the comparator model, but may be much more context sensitive and thereby less simple than previously thought.

Symposium

27. Traumatic Brain Injury - a life-time perspective

Organizer: Løvstad Marianne, Sunnaas Rehabilitation Hospital/University of Oslo, OBIOR

The Oslo Traumatic Brain Injury Outcome and Rehabilitation Research Group (OBIOR) will present data related to a life-time perspective on acquired brain injury (ABI). Data will be presented highlighting that self-perceived health-related quality of life and psychosocial measures are more apt to detect longstanding symptoms following mild traumatic brain injury (mTBI) than standardized neuropsychological test measures. A marked proportion of the TBI population experiences unmet emotional, cognitive and vocational needs 5 years post injury. Young age and poor mental health 1 year post injury predicts unmet needs 4 years later, indicating need for a strong long-term rehabilitation focus. Mortality is high in elderly TBI patients, and extremely high in the very old age (>75). In the very old age group, falls and female gender dominate among severe TBI victims. Noteworthy, very old survivors of TBI have a very good functional outcome at one year follow up. Vocational rehabilitation efforts are an intrinsic part of long-term rehabilitation. About half of patients with severe TBI who were employed before injury returned to work 1 year post injury, and injury severity was associated with unemployment. Results from a randomized controlled trial of group-based Goal Management Training (GMT) indicate long-term efficacy of GMT compared to an unspecific psychoeducational service delivered to patients in the chronic phase following ABI.

Speakers:

1. N. von Steinbüchel, Germany
2. C. Røe, Norway
3. N. Andelic, Norway
4. S. Sigurdardotir, Norway
5. S. Tornaas, Norway.

28. Outcome after Mild Traumatic Brain Injury

von Steinbüchel, Nicole Institute of Medical Psychology and Medical Sociology, University Medical Center, Georg-August University, Göttingen

Groenefeldt, Annette Institute of Medical Psychology and Medical Sociology, University Medical Center, Georg-August University, Göttingen

Schmidt, Holger Institute of Medical Psychology and Medical Sociology, University Medical Center, Georg-August University, Göttingen

Wild, Klaus Institute of Medical Psychology and Medical Sociology, University Medical Center, Georg-August University, Göttingen

Backhaus, Joy Institute of Medical Psychology and Medical Sociology, University Medical Center, Georg-August University, Göttingen

Little is known with respect to generic health-related Quality of Life (HRQOL) of individuals after mild traumatic brain injury (mTBI) and the association with cognitive functioning. No investigations have yet been conducted concerning disease-specific HRQOL and the relation with possible medical symptoms, cognitive and emotional deficits in mTBI.

This study compared 60 individuals after mTBI with 30 matched brain healthy controls in a cross-sectional retrospective design. Applying inclusion, exclusion and matching criteria resulted in equal groups concerning demographic characteristics and variables such as depression, anxiety or alcohol abuse.

Although at least three months had to have passed since the mTBI was diagnosed, all patients suffered from post concussive symptoms. Only two significant group differences were found for all 12 administered neuropsychological tests. This implies that the patient either did not develop any noticeable cognitive deficits or that the tests were not sensitive enough to detect them. However the HRQOL and psycho-social instruments in contrast were most sensitive in identifying impairments related to mTBI: as with the RPQ, the BSI and the PCL. Analyses revealed also significant differences for the SF-36 and for the QOLIBRI. Assessing the cognitive dimension of HRQOL in detail with the COGQOL resulted in most significant differences for all subscales. Multidimensional correlation-sensitive analyses underlined the fact that mTBI is a heterogeneous population, which can suffer from important long-term consequences.

29. Predictors of one year functional outcome in elderly with severe traumatic brain injury

Røe, C. OUS

Anke, A. UNN

Skandsen, T. St Olav University Hospital

Andelic, N. OUS

Background: The aim of the present study was to assess whether demographic factors, injury mechanisms and outcome after one year differed in elderly and very old subjects.

Material and methods: Prospective, national multicentre study including Norwegian residents above 64 years with severe traumatic brain injury (TBI) (Glasgow Coma Scale (GCS) score 3-8), admitted to the trauma centres in Norway, from January 2009 to January 2012.

Results: A total of 97 patients, mean age 75 (SD 7) years, 64% men were included. The dominating mechanism of injury was fall (84%). Two subjects were lost to follow up. Of the remaining 95 subjects, 45 died in the trauma hospitals and additionally 18 subjects died before 12 months follow up. The mortality was twice as high in the very old group (≥ 75 y) compared to the elderly (65-74 y) ($p < 0.001$) with only eight surviving subjects ≥ 75 years. Among the survivors functioning at 12 month follow up as evaluated by Glasgow Outcome Scale Extended was higher in the very old group with a median of 8 (IQR 2) compared to 6 (IQR 2) in the elderly ($p = 0.03$).

Conclusion: In the very old age falls and female gender dominate among severe TBI victims. The mortality is high in the elderly and extremely high in the very old age. It is however worth to note that very old survivors of TBI have a very good functional outcome at one year follow up.

30. Self-perceived healthcare needs and delivery of health care services 5 years after moderate-to-severe traumatic brain injury

Andelic, Nada Oslo University Hospital/University of Oslo

Soberg, Helene L. Oslo University Hospital

Berntsen, Svein Sørlandet Hospital, Kristiansand

Sigurdardottir, Solrun Sunnaas Rehabilitation Hospital/University of Oslo

Røe, Cecilie Oslo University Hospital/University of Oslo

Aims: The study aims were to describe the self-perceived healthcare needs in patients with moderate-to-severe traumatic brain injury (TBI), and to assess the impact of functional level at the 1-year post-injury on patients' unmet needs at the 5-year follow-up.

Material and Methods: A prospective cohort study of patients with moderate-to-severe TBI, aged 16-55 years, admitted to the Trauma hospital in 2005-2006. Clinical follow-ups were performed at the 1 and 5 years post-injury. Patients' self-perceived healthcare needs in 13 different domains of functioning and use of healthcare services at 5 years were main outcome measures. Independent variables were demographics and injury-related variables registered at the hospital admission, Disability Rating Scale (DRS) scores, SF-36 subscales scores of physical functioning (PF) and mental health (MH) registered at 1-year follow-up.

Results: A total of 93 patients participated at the 5-year follow-up, and 70% reported at least one perceived need. The self-perceived healthcare needs were met in 39% of patients. Patients with unmet needs (31%) reported frequent needs in emotional (65%), vocational (62%) and cognitive (58%) domains. These patients were more likely to present a less severe disability on DRS 1-year post-injury (OR 0.11; $p=0.02$). Worse MH 1-year post-injury and younger age (16-29 years) largely predicted unmet needs at the 5-year follow-up (OR 3.28; $p=0.04$ and OR 4.93; $p=0.005$ respectively).

Conclusion: Gaps between self-perceived healthcare needs and healthcare services received at the 5-year follow-up were found in cognitive, emotional and vocational domains. To ensure the appropriateness of healthcare service delivery, healthcare services should be better targeted at less severe TBI population.

31. Cognitive and functional factors influencing employment after severe traumatic brain injury: A Norwegian population-based study

Sigurdardottir, S. Institute of Health and Society, Research Centre for Habilitation and Rehabilitation Models and Services (CHARM), Faculty of Medicine, University of Oslo, Oslo

Wehling, E. Department of Physical Medicine and Rehabilitation, Haukeland University Hospital, Bergen

Andelic, N. Division of Surgery and Clinical Neuroscience, Department of Physical Medicine and Rehabilitation, Oslo University Hospital, Oslo

Anke, A. Department of Rehabilitation, University Hospital of North Norway, Tromsø

Skandsen, T. Department of Physical Medicine and Rehabilitation, St. Olavs Hospital, Trondheim University Hospital

Roe, C. Division of Surgery and Clinical Neuroscience, Department of Physical Medicine and Rehabilitation, Oslo University Hospital, Oslo

Objectives: To investigate how many individuals return to employment after severe traumatic brain injury (TBI) and to identify possible differences between employment groups regarding injury severity, cognitive outcome and functional recovery 1-year post-injury.

Participants and methods: The sample of patients with severe TBI (Glasgow Coma Scale 3-8) employed before injury included 79 individuals (61 males, 18 females), age 16-65 (mean age 33.4), who were prospectively recruited (January 2009-January 2011) from four Trauma Referral Centres in Norway. Measures included injury severity (GCS, posttraumatic amnesia), CT characteristics (Rotterdam CT scores), neuropsychological evaluations (memory, processing speed, executive functions) and functional measures (Glasgow Outcome Scale Extended, Functional Independence Measure). The outcome measure was employment status 1-year post-injury.

Results: Employment rates in patients employed before injury improved from 16% at 3 months to 52% at 1-year post-injury. The unemployed group had more severe injury as assessed by GCS ($p < .05$), longer duration of posttraumatic amnesia ($p < .001$), poorer cognitive and physical functions (all $ps < .05$), and lower levels of general functioning ($ps < .001$) compared with the employed group. Functional recovery was observed in both groups, showing the same recovery curve over time.

Conclusions: About half of those who were employed before injury were able to return to work. More severe TBI injuries (i.e., injury severity, cognitive deficits, functional and motor impairments) were associated with unemployment that probably will extend for many years post-injury. Given the complexity status of those left unemployed, post-rehabilitation and community based interventions can be designed to address problems with return to work.

32. Goal Management Training of executive functions in patients with acquired brain injury

Tornås, S. Sunnaas rehabilitation hospital

Løvstad, M. Sunnaas rehabilitation hospital/University of Oslo, Psychological department

Schanke, A-K. Sunnaas rehabilitation hospital/University of Oslo, Psychological department

Solbakk, A-K. Department of Neurosurgery, Oslo University Hospital – Rikshospitalet

Stubberud, J. Sunnaas rehabilitation hospital

Objective: To explore the efficacy of a group-based standardized, manualized compensatory cognitive rehabilitation intervention, Goal Management Training (GMT), compared to an active control condition, Brain Health Workshop (BHW), in a randomized controlled trial. We hypothesized that GMT would reduce dysexecutive problems in everyday living.

Participants and methods: Sixty-nine patients (45% females, age 45±13 years) with acquired brain injury (ABI) and self-reported executive dysfunction were included.

GMT relies on metacognitive strategies for improving attention and problem solving. BHW covers ABI-related topics.

Participants underwent 16 hours of group-intervention (GMT: n = 31; BHW: n = 38). The two groups were comparable with regard to age, sex, education, IQ, and time since injury. Assessment of executive functioning in daily living and emotional functioning at pre- and post-intervention, and at 6 months follow-up included two self-rating measures; Behavior Rating Inventory of Executive Function (BRIEF-A) and Hopkins Symptom Checklist 25 (HSCL-25).

Results: Repeated measures analysis of variance showed a significant Group X Session interaction for all three BRIEF-A indexes (Global Executive Composite, Behavioral Regulation, and Metacognition), due to reduced self-reported dysexecutive symptoms from T1 to-T3 for the GMT group, but not the BHW group. No significant treatment related changes in emotional status were found for the HSCL-25.

Conclusions: GMT resulted in improvement of subjectively experienced executive functioning. Stable emotional functioning indicates that this was not due to an unspecific reduction of emotional distress.

Symposium

33. Neuropsychological Perspective on the Effects of Prenatal Stress - Findings from FinnBrain Birth Cohort Study

Organizer: Korja, Riikka University of Turku

Four sub-studies of the FinnBrain cohort study will be presented in the symposium. FinnBrain study is a pregnancy cohort-study. The aim is to study the combined influence of environmental and genetic factors on the development of a child. Especially the aim is to study the factors and the mechanisms leading to child's or parent's stress regulation. The study cohort comprises approximately 4000 pregnant women and their spouses. Study comprises also a smaller focus-cohort including 200 children of mothers with prenatal mood disturbances and their matched controls (n=200). Families participate to an intensive follow-up from the early pregnancy. Methods including the self-report questionnaires, the psychological tests and the observation methods are described more in the abstracts of the sub-studies.

The symposium include studies where parent's stress or psychiatric symptoms are studied in relation to the parent's own cognitive or emotional outcome or in relation to the maternal caretaking behavior or the child's development.

Speakers:

1. Eija Sinerva, PhD-student: Mother's or father's symptoms of depression or anxiety in relation to the adult's ability to process infant facial emotional expressions,
2. Eeva-Leena Kataja, PhD-Student: Maternal symptoms of depression or anxiety and the maternal executive functioning,
3. Riikka Korja, senior-researcher: Maternal symptoms of prenatal anxiety or depression and the maternal caretaking behavior, especially the amount of fragmentation at 8 months of infant's age.
4. Saara Nolvi, PhD-student: Using A-not B procedure in investigating infant's executive function at 8 months and the effects of maternal prenatal stress on infant's performance

34. Mother's or father's depressive symptoms or anxiety in relation to the adult's ability to process infant facial expressions

Sinervä, E. University of Turku

Parsons, C. Oxford University

Karlsson, L. University of Turku

Karlsson, H. University of Turku

Nummenmaa, L. Aalto University

Korja, R. University of Turku

Objective: Parents' ability to identify and interpret infant facial and vocal cues and to be attuned to infant's needs, are the crucial elements in the development of secure attachment relationship. Secure attachment relationship in turn is known to have a beneficial effect on subsequent development of child emotional and affect regulation systems.

Participants and methods: 6000 adult participants of the FinnBrain Birth Cohort Study was invited to participate online in the infant facial expression recognition task, current n=600. In the task fifty infant facial expressions ranging from negative to positive were presented to the participants, and asked to i) categorize the expressed emotion and ii) evaluate how negative versus positive the child's expression is. The participants' responses were linked with their age, gender, socio-economic status and several questionnaires. The selected cut points for the clinical level of depression or the anxiety were: depression, EPDS > 11 points /max score 30; anxiety, SCL-90 anxiety scale > 9 points / max score 40.

Results: Detailed results of the parents' ability to process infants facial emotional expression in the groups of depressed or anxious parents and in their controls will be presented in the symposium.

Conclusions: There is an increasing evidence that depressive symptoms create negative cognitive bias and effects mothers' ability to recognize infant facial expressions accurately (Stein et al., 2010). Results may help to specify the markers that increase the risks for problems in the early parent-infant interaction and in turn in the child emotional and regulation systems development.

35. Prenatal stress and neuropsychological processes

Kataja, E.-L. FinnBrain Birth Cohort Study, University of Turku

Karlsson, H. FinnBrain Birth Cohort Study, Turku Brain and Mind Center, Department of psychiatry, University of Turku

Ketola, S. University of Turku

Peltoniemi, J. University of Turku

Parsons, C. University of Oxford

Karlsson, L. FinnBrain Birth Cohort Study, Turku Brain and Mind Center, University of Turku, Department of Child Psychiatry, Turku University Hospital

Depression and anxiety and maternal executive functioning in the finnbrain birth cohort study

Objectives: Both pregnancy and psychiatric symptoms may have an effect on cognitive functions. We conducted a neurocognitive assessment to a birth cohort women either during pregnancy or 4 months after delivery with two different cognitive test (the CogState and the WAIS-IV). We compared the test performance of the pre- and postnatal groups, and effects of their self-reported anxiety and depressive symptoms on this performance.

Participants and methods: The participants (N=80) were drawn from a larger FinnBrain Birth Cohort Study (www.finnbrain.fi). The WAIS-IV -battery (assessing verbal comprehension, visual perceptual reasoning, working memory, processing speed, full scale IQ) was administered during pregnancy (mean 28 gwks) for all participants. 35 of these women completed the CogState –computerized test (assessing e.g. executive functioning, memory, attention) during pregnancy (mean 28 gwks), and 45 participants after delivery (mean 18 weeks).

Results: Depression symptoms correlated systematically and moderately with the performance in the CogState executive functioning task (Groton Maze Learning, GML) both in pre- and postnatal groups, range $r = 0.327 - 0.428$, p -values < 0.05 , by weakening it. However, anxiety symptoms correlated positively and strongly with the performance errors in GML in prenatal group $r = .363 - .584$, p -values < 0.05 , but not in the postnatal group $r = .185 - .258$, p -values > 0.05 .

Conclusions: Depression and anxiety symptoms have a special effect on cognitive functioning during pregnancy. Most complicated executive functions may be perturbed while other functions remain intact.

36. Maternal symptoms of prenatal anxiety or depression and the maternal care taking behavior at 8 months of infant's age

Korja, Riikka University of Turku

Karlsson, Linnea University of Turku

Sinerva, Eija University of Turku

Nolvi, Saara University of Turku

Kataja, Eeva-Leena University of Turku

Lahtela, Hetti University of Turku

Karlsson, Hasse University of Turku

Objective: Only little is known about the specific characteristics of the parenting behavior moderating the effects of prenatal stress on the child's outcome. The aim is to study if maternal caretaking behavior at 8 months is affected by the maternal prenatal mood disturbances or maternal prenatal stress. In addition, the aim is study whether the maternal caregiving behavior moderates the link between prenatal mood disorder and the parental reports of child temperament.

Methods: Overall, the sample includes 200 children of mothers with prenatal mood disturbances and their matched controls (n=200). In the symposium preliminary results will be presented of the smaller sample (n=80). Pre- and postnatal mood have been assessed from the beginning of the pregnancy repeatedly until 3 years using EPDS, STAI and PRAQ questionnaires. Child Behavior Questionnaire (IBQ and CBQ) temperament measures are used at 6 months, and 12 months. Mother-infant interaction will be video-recorded in the free play situation at 8 months. It will be analyzed using a coding system developed originally by Davis et al. (2014). The aim of the assessment is to analyze the amount of fragmentation in the maternal caretaking.

Results: The amount of maternal fragmentation behavior will be analyzed in the mothers 'of depression or anxious and in non-depressed/anxious mothers. In addition, the relation between fragmentation and child's temperament will be analyzed in these groups.

Conclusions: When successful, we will provide new data on the elements of the caretaking behavior relevant to child development in the group of mothers of maternal prenatal mood disturbances.

37. Using A-not-B procedure in investigating infant executive function and the effects of maternal prenatal stress on infants' performance at 8 months

Nolvi, Saara University of Turku

Karlsson, Linnea University of Turku

Objective: Piagetian A-not-B and other delayed response tasks have been used as a measure of infant early executive functioning (Wolfe & Bell, 2007; Diamond & Doar, 1989). Moreover, several prenatal factors are related to the development of child neurocognitive functioning, which in turn predicts positive development later. Aim of this study is to investigate how maternal prenatal stress affects infant performance in A-not-B task at 8 months and test the suitability of the measure for infants.

Participants and methods: Study sample (target enrollment=400, current n=250) comes from FinnBrain Focus Cohort (n=1000). Sample will consist of the experimental group of 200 mothers with self-reported severe stress during pregnancy and a comparison group of 200 mothers reporting low stress during pregnancy and their babies. Infant executive function is assessed at 8 months postpartum using A-not-B protocol with gaze distraction and fixed order.

Results: Initial results indicate that:

1. There is a trend towards a difference in performance between infants of mothers with severe stress and infants of the mothers with low or moderate stress during pregnancy ($t(112)=-1.875$, $p=0.063$).
2. When using gaze distraction, the performance of infants at 8 months is normally distributed only at the 0 second delay. The use of higher delay at this age is not suggested.

More detailed results will be presented in the symposium.

Conclusions: This study will provide information of the effects of maternal prenatal stress on infant's executive function at 8 months. Furthermore, the suitability of the A-not-B task for 8-month-old infants will be discussed.

Invited workshop

38. Publishing and Reviewing in the Field of Neuropsychology

Roy Kessels and Guy Vingerhoets

In this student workshop we will take a closer look at the academic review process with a focus on publishing in the field of neuropsychology. The key principles and steps of the review process will be explained, and various pitfalls and strategic choices will be discussed. We will deal with what is expected of you as a (future) reviewer and as an author. Getting your research published is usually a rewarding experience, but can sometimes also be quite frustrating. We will address the main reasons for publication stress and how to deal with it. In addition, we will discuss the issue of selecting an appropriate journal for your manuscript and provide an overview of the major journals within or related to the field of neuropsychology.

Symposium

39. Neuropsychology of environmental navigation: from place & grid cells to infinity and beyond

Organizer: Cecilia Guariglia, Department of Psychology, Sapienza University, Rome, Italy, Cognitive and Motor Neurorehabilitation Unit, Santa Lucia Foundation, Rome, Italy

Following the 2013 Nobel Prize to O'Keefe, Moser and Moser, whose descriptions of Place Cells and Grid Cells represent important milestones for the development of cognitive neurosciences, present symposium will offer an up-to-date overview of current knowledge about neuropsychology of human navigation, linking models derived from animal studies to experimental and clinical data on human beings.

Speakers will present behavioral, psychophysiological and neuroimaging studies which allow to shed some lights on the systems corresponding in humans to rodents' place and grid cells.

The contribution of grid cells to human navigation will be discussed by Daniel Bush (UCL, London, UK).

Neuropsychological experimental data about the development of landmark knowledge, which plays an important role in constructing allocentric environmental maps will be presented, together with data about deficit in landmark processing following brain lesions by Albert Postma (Utrecht University, Utrecht, NL).

In human beings environmental navigation is subserved by a wide, complex neural network; the role played by different brain regions in encoding different aspects will be discussed by Gaspare Galati (Sapienza University, Rome, Italy).

Finally, a series of studies of studies analyzing different aspects of navigational memory will be presented by Federico Nemmi (Karolinska Institutet, Stockholm, SE).

All together, the symposium presentations will result in an updating of the cognitive and neural bases of human navigation.

40. Human Hippocampal Theta Oscillations, Grid Cells and Goal Directed Navigation

Daniel Bush, UCL Institute of Cognitive Neuroscience

Objective: The rodent hippocampal local field potential (LFP) is dominated by 6-10Hz theta frequency oscillations during translational movement. This movement-related theta oscillation is believed to contribute to the generation of grid cell firing fields, which are arranged in a periodic hexagonal pattern that covers all environments visited by the animal. In humans, theta oscillations have also been associated with spatial memory function. The objective of this experiment is to clarify the relationship between theta oscillations, movement and human spatial memory function. We then consider how grid cell firing patterns might support goal directed navigation.

Participants and Methods: We examine intracranial EEG recordings from depth electrodes located in the hippocampi of fourteen pre-surgical epilepsy patients performing a self-paced virtual reality navigation and spatial memory task. In this task, participants were asked to navigate towards, and encode the location of, various visible objects within a single environment. Participants were subsequently cued with the image of a single object, and then asked to navigate to the remembered location of that object.

Results and Conclusions: We demonstrate a significant increase in 6-10Hz theta power during 1s periods around virtual movement onset, compared to stationary periods. Moreover, theta power during this 1s movement onset period correlates with subsequent memory performance. Finally, we present an algorithmic solution and several potential neural network implementations that describe how grid cell responses could be used to support human goal directed navigation.

41. On the acquisition and breakdown of landmark knowledge

Albert Postma, Experimental Psychology, Helmholtz Institute, Utrecht University, The Netherlands

Objective: In order to construct a flexible, allocentric map of space knowledge of landmarks are critically important. Landmarks are objects (buildings; natural structures) that stand out in the environment and as such are well suited for navigation purposes. Is this ability to use landmark knowledge hardwired in our brains or does it develop with age and experience? How does it break down with brain damage?

Participants and methods: Children, between 7 and 10 years of age, were tested with a spatial memory test within a circular environment, resembling the set up of the Morris water maze. Students from Utrecht university answered questions on the spatial layout of the landmarks within their city, amongst others on distance judgments and relative positions. Stroke patients engaged in a navigation test through a virtual environment.

Results and conclusions: Our ability to use landmarks and distract a detailed mental map improves both with age and experience. In particular the right parietal-temporal cortex seems involved.

42. Spatial representations contributing to human navigation: neuroimaging studies

Gaspere Galati, Brain Imaging Laboratory, Department of Psychology, Sapienza University, Rome, Italy, Cognitive and Motor Neurorehabilitation Unit, Santa Lucia Foundation, Rome, Italy

Objective: Human navigation is a complex and multifaceted ability which relies on a combination of spatial representations which differ for their spatial and temporal scale and for the spatial frames of reference involved. We examined how brain regions known to be critical for human navigation, such as the hippocampus, the parahippocampal (pHC) and retrosplenial (RSC) regions, and the posterior parietal cortex, differently encode core features such as the subject's position and orientation in the environment and the allocentric location of landmarks.

Participants and Methods: In a series of functional magnetic resonance imaging studies conducted on healthy volunteers, we used an immersive virtual reality setup with images taken from a simple square virtual room. Participants were asked to encode the spatial location of a target object relative to different frames of reference, or to simply observe images taken from different perspective, in the absence of navigation. We employed a combination of event-related activation, fMR adaptation, and multivariate classification analysis. We also examined resting-state functional connectivity of the aforementioned brain regions as a predictor of navigational abilities.

Results and Conclusions: Taken together, our results show that the posterior parietal cortex holds relatively short-lived, egocentric spatial representations, which are however dynamically updated across changes in point of view. On the other side, the pHC and the RSC encode the identity and allocentric location of objects that maintain a stable location in the environment over time and thus can be used as landmarks. Together with the hippocampus, they also track the changing position of the subject in the scene. The strength of the connectivity at rest between the posterior hippocampus and the pHC and the RSC predicts navigational abilities.

43. More than grids and places: the life of spatial representations

Federico Nemmi, Neuroscience Department, Karolinska Institutet, Retzius vag 8, Stockholm, Sweden

Objective: Knowledge about space can be acquired, stored and retrieved in different formats. Egocentric and allocentric representations are the formats most commonly inquired in human spatial research. A complete inquiry on the relationship between these different formats, their acquisition and their retrieval, as well as their development is lacking. The main objective of these series of experiments was to investigate the acquisition, interplay, retrieval and development of different format of spatial representations from a neuroimaging and behavioral perspective.

Participants and methods: More than 80 subjects participated in these studies (healthy young and elderly as well as Mild Cognitive Impairment participants). Several behavioral tasks were performed inside the MRI scanner: a landmark sequencing task, the Corsi Tapping and the Walking Corsi test, an allocentric-demanding task and an egocentric-demanding task. Some of the subjects underwent to an extensive spatial learning. fMRI data were analyzed using SPM. Behavioral analyses were performed by means of ANOVA.

Results and Conclusions: The results revealed a network comprising parietal and striatal areas, as well as medial temporal areas. Moreover, we show that a complex interplay between the areas within this network is necessary to perform spatial tasks, depending from the format of the representation involved. Our results also highlight a marginal role for the hippocampal formation, especially for well-known environment.

As a whole, these studies suggest that more than place cell and grid cell are at play during spatial navigation. The great flexibility of human navigation behaviors is reflected in a widespread network that underlie this ability and in the interplay within this network.

Symposium

44. Aspects of mild acquired cognitive impairment. Mechanisms, diagnosis and treatment

Organizer: Bartfai Aniko, Karolinska institutet

The focus is on patients with mild traumatic brain injury (mTBI) and mild acquired cognitive impairment (MACI) in general. MACI is a significant health problem resulting from different medical conditions. Incidence and prevalence are difficult to obtain except for those with mTBI. Although most mTBI patients resume normal functioning quickly, 5% - 15% report persistent cognitive and emotional symptoms. The neuropsychological diagnosis of MACI is challenging. The aim of the present symposium is to elucidate some aspects, influencing diagnosis and management. A frequent finding is normal or nearly normal cognitive performance in spite of activity limitations and subjective complaints. Studies indicate increased cognitive fatigability, measured by neuropsychological tests after mTBI. Marika Möller presents some functional aspects of fatigability, measured by fMRI. In mTBI patients, premorbid and postinjury variables influence cognitive performance and symptom development. Christian Oldenburg explores the role of cognitive and emotional reserve in symptom development after mTBI. The predominant treatment approach for persons with MACI is training of compensatory techniques and activity based training. Gabriela Markovic will present the results of an RCT study comparing Attention Process Training, and activity based training. Finally Aboozar Eghdam describes ICT tools for patients with MCI, how patients perceive and use them.

45. Fatigability - an objective marker for a functional impairment after mild traumatic brain injury (mTBI)?

Neuronal correlates

Möller, Marika Karolinska Institutet

Engström Nordin, Love Karolinska Institutet

Bartfai, Aniko Karolinska Institutet

Li, Tiequiang Karolinska Institutet

Julin, Per Karolinska Institutet

Objective: Fatigability is one of the most challenging symptoms after an mTBI but the pathophysical mechanisms are unclear. The aims of this study was to investigate if mTBI patients, compared to controls, present fatigability on a vigilance test and the correspondence to resting state BOLD before and after the test and the relationship with cortical activity during performance on the vigilance test.

Participants and methods: Ten mTBI patients (aged 37.5 +/- 11.2 years) with persisting symptoms of fatigue (Fatigue Severity Scale >4.0) and 10 healthy controls (aged 36.9 +/- 11.0 years) were included. In the 3T MRI scanner resting state BOLD technique and, for measurement of cortical activation during a 20 min long vigilance test, pseudo-continuous arterial spin labeling (PCASL) were used. All participants were additionally scanned with a clinical brain protocol including DTI. Self-report questionnaires were also administered.

Results: The patients performed significantly slower than controls on the vigilance test ($p=.002$) and showed a greater variability in reaction time ($p=.003$). The controls successively improved during the vigilance test, while patients decreased their performance ($p=.035$). Before the task subjective fatigue, measured with an analog VAS scale, was comparable in both groups but after the test the patients rated greater fatigue ($p=.001$). Results regarding neuronal connectivity and its relation to the vigilance test will be presented.

Conclusions: Both subjective and objective fatigability were more pronounced among the patients. The results indicate that measuring successive performance during sustained cognitive load might be a suitable objective indicator for functional impairment in mTBI.

46. The role of cognitive reserve in symptom development after mild traumatic brain injury (mTBI)

Oldenburg, C. Division of Rehabilitation Medicine, Department of Clinical Sciences, Karolinska Institutet, Danderyd hospital, Stockholm

Edman, G. Neurogenetics Unit, Department of Molecular Medicine and Surgery, Karolinska Institutet and Center for Molecular Medicine, Stockholm

Lundin, A. Dizziness Center, Neuropsychiatry section, Stockholm

de Boussard Nygren, C. Division of Rehabilitation Medicine, Department of Clinical Sciences, Karolinska Institutet, Danderyd hospital, Stockholm

Bartfai, A. Division of Rehabilitation Medicine, Department of Clinical Sciences, Karolinska Institutet, Danderyd hospital, Stockholm

Objective: Persisting (i.e. > three months) post concussion symptoms (PCS) affect a significant number of those who suffer a mild traumatic brain injury (mTBI). A common subjective complaint is cognitive deficits. However, several meta-analyses have not found evidence for long-term cognitive impairment in mTBI-patients. Two questions emerge. First, is there a difference between PCS patients and recovered mTBI patients in cognitive impairment? Second, is lower cognitive reserve, i.e. reduced brain reserve capacity, a risk factor for developing PCS?

Participants and methods: In a prospective cohort study, 122 adult patients were recruited within 24 hours after an mTBI. Baseline symptom and pre-injury demographic data were collected. Three months post-injury participants completed the Rivermead Post Concussional Symptoms Questionnaire and neuropsychological assessment. A control group of healthy volunteers (n=32) were recruited for reference data. The estimate of cognitive reserve was based upon WAIS-R Information, educational level according to ISCED-2011, and occupational skill level according to ISCO-08.

Results: All mTBI patients showed reduced memory performance in the Buschke Selective Reminding Test when compared to healthy controls. In addition, PCS-patients had lower processing speed, measured by Digit Symbol test than recovered patients. A logistic regression analysis showed that patients with lower cognitive reserve were nearly six times more likely to suffer from PCS.

Conclusions: Group differences emerged within the mTBI cohort when specifically analysing those with PCS versus those who recovered. Lower cognitive reserve appears to be a risk factor for PCS and points towards individual vulnerabilities.

47. Cognitive training in mild acquired cognitive impairment (MACI)

Markovic, G. Rehabilitation Medicine University Clinic, Danderyd University Hospital; Karolinska Institutet, Department of Clinical Sciences

Schult, M-L. Rehabilitation Medicine University Clinic, Danderyd University Hospital; Karolinska Institutet, Department of Clinical Sciences; Department of Neurobiology, Care Sciences and Society, Stockholm

Elg, M. Department of Management and Engineering, IEI, Linköping University

Bartfai, A. Rehabilitation Medicine University Clinic, Danderyd University Hospital; Karolinska Institutet, Department of Clinical Sciences, Stockholm, Sweden

Objective: MACI, resulting from stroke or traumatic brain injury is a significant health problem, usually referred to as an invisible handicap resulting in impaired activity level in complex activities and in social relations, and in younger individuals impaired work capacity. The purpose of the study was to examine the efficiency of structured attention training as compared to activity based training in the early phase after brain injury in patients with MACI compared to patients with moderate cognitive impairment after stroke and TBI.

Participants: Sixty patients (18-60 yrs) within four months (starting 7,08+/- 3,7 weeks) after brain trauma or stroke.

Methods: A randomized, controlled single-blind study with a 6 months follow-up. The participants received 20 hours of attention process training (APT) or activity based training within the context of multiprofessional rehabilitation. Results were analysed serially with the Paced Auditory Serial Addition Test (PASAT) and with pre- and post measures using other neuropsychological tests and activity measures.

Results: Serial analyses were carried out with Statistical Process Control (SPC). Preliminary results indicate differences in effect of APT training as a function of level of impairment.

Conclusions: APT appears as a more robust method. SPC allows a more transparent comparison of data, including the influence of external factors and demonstrates the usefulness of process measures for more calibrated individual rehabilitation.

48. Supporting persons with mild acquired cognitive impairment through e-services.

Eghdam, Aboozar Karolinska Institutet

Bartfai, Aniko Karolinska Institutet

Oldenburg, Christian Karolinska Institutet

Koch, Sabine Karolinska Institutet

The objective of this research is to present an overview of the mild/moderate acquired cognitive impairment (MACI) persons' experience with e-services such as social media, mobile and assistive technology.

This project started with an exploratory study exploring the current assistive information and communication technology (ICT) as a systematic review of the existing literature about available ICT tools for MACI patients using 8 different medical, scientific, engineering, and physiotherapy library databases. The functionality of tools was analyzed using an analytical framework based on the International Classification of Functioning, Disability and Health (ICF). The research was followed by a postal self-administered questionnaire, asking a total of 600 members of a patient association for patients with brain injury (Hjärnkraft) regarding the persons' use of e-services and social media in relation to their cognitive problems. The project will be followed by an evaluation of a public Facebook group established for people with fatigue brain injury. A content analysis approach will be employed to examine the types and frequencies of observable interactions in the posts and comments appeared on the Facebook group page during 2014.

Several studies within this project have shown what kinds of available services/tools have frequently been used by people with MACI. Communication has been identified as the most important aspect of e-services for this group and the results also indicated a lack of special supporting ICT tools.

This demonstrates that ICT has the potential to be one of the right tools and treatments to support these people.

Symposium

49. ADHD in schools

Organizer: Närhi V., University of Eastern Finland and Niilo Mäki Institute

ADHD is a common developmental disorder. Poor executive function skills and symptoms of ADHD pose risk for both school failure and interactional problems. Efficient interventions for children with ADHD symptoms are available for different intensity of school support. In the symposia H. Savolainen (Attention problems and academic achievement trajectories between grades 5 and 7 in Finnish schools) presents the results of a longitudinal study on the effects of ADHD symptoms on the academic achievement over the transition to middle school; L. Klenberg (Teacher ratings of executive function difficulties in a Finnish sample of children with ADHD) shows that teacher identified problems in EFs of children with ADHD common, and discusses the possibilities of using teacher identified EF problems as a basis for planning interventions at school. V. Närhi (The possibilities of short consultation for teachers to improve learning climate and reduce disruptive behavior in elementary school classrooms) presents preliminary results of a short group consultation for teachers, which is targeted at enhancing teachers' abilities to support students' behavior and improving learning climate with classroom level support. A. Karhu (Check in Check out, intensified support for pupils with behavioral difficulties) presents results of experimental single case study on intervention, which was carried out as part of general education for children with ADHD-symptoms. H. Katajamäki (Effectivity of the groups intervention of attention and executive functions (Malti-program) introduces a school based group intervention program (Malti), and its effects on children's EFS and attention at home and at school.

50. Attention problems and academic achievement trajectories between grades 5 and 7 in Finnish schools

Savolainen, H University of Jyväskylä

Objective: The objective of this study was to find out what relationship do attention problems have on the academic achievement of students transiting from elementary school to lower secondary education.

Participants and methods: The participants were from 6 Eastern- Finland municipalities from 30 schools and 57 classes. Teachers rated the behavior of 281 students with Goodman's SDQ. The sumscore of items measuring inattention / hyperactivity was used in this study with a cut-off point of lowest 10% as an indicator of attention problems. Students' school grades were received from the teachers in elementary school and from school records in the lower secondary schools. A latent profile analysis of school grade averages was conducted resulting with a three-class solution. Then the membership of students on these classes was saved and cross-tabulated with the attention problem variable.

Results: Three different trajectories of school achievement were found and named as: stable high (57,8 %), stable low (20,2 %), and rapid decrease (22,0%). Students with attention problems were over-represented in the groups of stable low (Adj.Res 2,7) and rapid decrease (Adj.res 2,3) groups. In total 79,3 % of students with attention problems belong to these two trajectories.

Conclusions: This study confirms that attention problems are a risk for problems with school achievement. This risk manifests in greater likelihood of having continuous difficulties in learning (stable low) and experiencing difficulties over the transition to lower

51. Teacher ratings of executive function difficulties in a Finnish sample of children with adhd

Klenberg, L. P. University of Helsinki

Objective: Difficulties in executive functions (EFs) are common in children with ADHD and increase the risk for impairment in academic functioning. Assessment of EFs in school environments is necessary for identifying and targeting support for students with EF difficulties.

Participants and methods: The present study examined teacher ratings of EF behaviors of 7- to 15-year-old students from Finnish general education classes using the Attention and Executive Functions Rating Inventory. The participants were 189 children with combined symptoms of attention deficit/hyperactivity disorder (ADHD-C), 25 with predominantly inattentive symptoms (ADHD-I), and 691 controls.

Results: The teacher ratings showed that both ADHD groups had more EF difficulties than controls. The ratings also indicated specific profiles of EF difficulties for the ADHD subtypes, students with ADHD-I having wide-ranging EF difficulties in attention as well as initiation, planning, and execution of actions in school situations. In addition, co-occurring learning disorders were associated with higher ratings of EF difficulties.

Conclusions: According to this study, teacher ratings distinguish between different kinds of EF profiles in children with ADHD. Acquiring a detailed profile may help to single out the problematic EF behaviors of the student and serve as a basis for collaborative work among teachers and school psychologists when planning individual interventions for improving EFs in educational settings.

52. The possibilities of short consultation for teachers to improve learning climate and reduce disruptive behavior in elementary school classrooms

Närhi, V.M. University of Eastern Finland and Niilo Mäki Institute

Objective: Disruptive behavior reduces the students' possibilities for learning and is a cause for teachers' stress. A short in-service group consultation/training for teachers was developed, and its effects on learning climate of elementary school classes studied.

Participants and methods: The training was carried out in groups of about 15 classroom teachers. The training consisted of preassignments (weekly evaluations, by both teacher and students, of learning climate of the class; written and videoed pre-material on classroom management, and structured evaluation of the practices used in the classroom). The first meeting consisted of elaboration and discussions on the pre-assignment material, and intervention planning supported by group of other participants. The teachers then implemented their intervention, spend weekly ½ hour to modify the intervention if needed, and continued the weekly evaluations. During intervention the teachers were given feedback on their and their students' evaluations. The effects on learning climate were evaluated with the weekly evaluations, and fidelity and acceptance of the interventions with teacher evaluations.

Results: The weekly evaluations of teachers and students indicated a large improvement in learning climate of the classes. Based on teacher self-evaluations, the interventions were carried out with modest fidelity and the acceptance of the interventions was good.

Conclusions: Based on the preliminary results a short consultation/training for teachers can be very effective in improving learning climate. The class-level support can also be seen as a basis for behavioral interventions for students who need enhanced support for behavior at school.

53. Check in Check out, intensified support for pupils with behavioral difficulties

Karhu, A. University of Eastern Finland

Närhi, V. University of Eastern Finland and Niili Mäki Institute

Savolainen, H. University of Eastern Finland and University of Jyväskylä

Objectives: Support for students in Finnish schooling system consist of general level support for all pupils, intensified support for pupils with mild behavior difficulties or pupils at-risk for more severe problem behaviors and special interventions for pupils in special education settings. Intensified level interventions are targeted for those pupils for whom general level support is inadequate. Intensified interventions which are effective, acceptable and can be implemented with high fidelity in general classrooms are needed.

Participants and methods: The key features of the Check in Check out (CICO) intervention are brief morning and afternoon meetings with the adult, the use of daily point card, regular positive feedback during the day and parental involvement. With an experimental single case design we examined the effects of CICO on problem behavior and academic engagement of general education primary school students high on disruptive behavior. Also the implementation fidelity and acceptability of the intervention was analyzed.

Results: CICO resulted in decrease of problem behavior and increase of academic engagement for all subjects. CICO was implemented with high fidelity, and it's acceptability among school personnel was excellent.

Conclusions: The results indicate that effective behavior support for pupils with disruptive behaviors can be easily applied in general education classrooms. Student observation in real life situations in the school provides a valid ground for planning the intervention. The daily point card is also an assessment tool of intervention for schools' personality.

54. Effectivity of the Group Intervention of Attention and Executive Functions (MALTTI-program)

Katajamäki, H.M. Kainuu Social and Health Care Joint Authority
Paananen, M.J. Niilo Mäki Institute & University of Eastern Finland

Cognitive-behavioral group treatments of ADHD have shown promising results, further research is still needed. As ADHD symptoms have multifaceted effects on children's lives, interventions should include behavioral, cognitive and motivational aspects, and relate to the children's natural environments. This study examined the effects of multifaceted group intervention program on children's attention and executive functioning. Intervention was implemented in primary school as part of the educational support system.

Eighteen children (7.8yrs – 10.7yrs) with doctor, psychologist or teacher identified attentional problems took part in the intervention (Malti-program), in five groups. Groups (20 to 24 sessions) were led by psychologist and special education teacher. Children completed neurocognitive tests at pre- and post-treatment. Parents and teachers evaluated children's attention and executive functions with questionnaires at pre- and post-treatment and 6 months follow-up. Differences were statistically analyzed.

At post-treatment children showed a significant improvement in fluency of action, inhibition and visual attention. In teacher evaluations significant improvement was observed in attention and executive functions. Changes in attention and executive functions were maintained during the follow-up period. In parent evaluations significant post-treatment improvement was observed in underactivity, the change was not maintained during the follow-up. Parents also reported improvements in attention; the change was significant at the follow-up.

The results suggest that group intervention of attention and executive functions as part of school's educational support may have positive impacts on children's executive functioning skills and attention at school and home.

Symposium

55. Theoretical and practical applications of neuropsychotherapy – An intervention for neuropsychological and neuropsychiatric disorders throughout the lifespan

Organizer: Koskinen, S University of Helsinki, Institute of Behavioural Sciences

Neuropsychotherapy is a form of treatment based on recent advances in the domains of neuroscience, neuropsychological rehabilitation, and models of psychotherapy. It is the concept for interventions needed when treating persons suffering from emotional, behavioral or personality problems after brain dysfunctions or syndromes.

The symposium will start with a developmental neurobiological disability, ADHD. It emerges in childhood and often continues into adulthood. The topic of Maarit Virta, PhD, will be: "Treatment of adults with ADHD in the context of neuropsychotherapy". The practical applications of cognitive behavioural therapy and its relationship to neuropsychotherapy will be discussed.

The next topic, presented by PhD Titta Ilvonen, is titled: "Adapting psychotherapeutic interventions into neuropsychology: suitability of schematherapy into TBI rehabilitation". Schematherapy integrates the elements from different models of psychotherapy and aims at helping the patients getting their core needs met.

Jaana Sarajuuri, LicPsych, and Sanna Koskinen, PhD, continue with the treatment of TBI patients in their presentation: "Neuropsychotherapeutic elements as an integrative part of holistic rehabilitation programs". They will talk about the applications of neuropsychotherapy and give examples of the rehabilitation procedures in practice.

Finally, PhD Annamari Tuulio-Henriksson will highlight the core symptoms and their treatment in severe psychiatric disorders, especially schizophrenia. In her speech, titled: "Could a neuropsychotherapeutic treatment and rehabilitation model be helpful in schizophrenia?" she will outline a comprehensive treatment and rehabilitation package of schizophrenia patients, including medication, cognitive rehabilitation, psychoeducation as well as psychotherapy.

56. Treatment of adults with ADHD in the context of neuropsychotherapy

Virta, Maarit University of Helsinki

Attention-deficit/hyperactivity disorder (ADHD) is a developmental neurobiological disability that emerges in childhood and often continues into adulthood. ADHD is characterized by deficits in attention, executive functioning, processing speed, regulating alertness, modulating emotions and utilizing memory. Psychiatric comorbidities, e.g. anxiety, depression, personality disorder and substance abuse, are common. Adults with ADHD often have considerable difficulties in managing finances, education, work, and/or social relationships. Here, I review the published results of the effectiveness of psychological treatments with special emphasis on cognitive behavioural therapy (CBT) and also shortly the results of our own studies. The practical applications of CBT and its relationship to neuropsychotherapy in adults with ADHD are discussed. Short case description is included.

57. Adapting psychotherapeutic interventions into neuropsychology: suitability of schematherapy into TBI rehabilitation

Ilvonen, T. Validia Rehabilitation Helsinki

The possibility of applying schematherapy into neuropsychotherapeutic rehabilitation is applied and described to meet the emotional challenges of the TBI patient.

Neuropsychologically and neuropsychotherapeutically oriented rehabilitation programs are shown to be effective in TBI rehabilitation which takes place through the processes of increased awareness, acceptance and realism. Psychotherapies in general provide working alliance, emotionally safe setting to provide acceptance, support, and confidentiality where the resistance of change can be met. Psychotherapies are interpersonal, relational interventions to aid a person in life problems with goal in increasing sense of well-being. The meaning of working alliance is even more emphasized in neuropsychological rehabilitation since there are special challenges in rehabilitating brain injured individuals: the deterioration of memory, the lack of acknowledging symptoms, and overall cognitive stiffness should be carefully taken into account.

Schematherapy integrates elements from cognitive-behavioral therapy, attachment theory, psychodynamic concepts, emotion-focused therapies, and experiential methods. Goal of schematherapy is to help patients get their core needs met by identifying linking the schema to early history by using schema questionnaires and observing therapy relationship as well as many experiential methods, such as imagery, dialogues etc. to overcome the emotional avoidance.

58. Neuropsychotherapeutic elements as an integrative part of holistic rehabilitation programs

Sarajuuri, J.M. Validia Rehabilitation Helsinki

Koskinen, S.K. Helsinki University

Traumatic brain injury (TBI) is a disorder of major public health concern because of its high incidence, prevalence, and economic aftereffects. Patients and their families are faced with long-lasting changes and suffering while attempting to manage with the diverse consequences of the injury. TBI is a heterogeneous disorder, and different forms of rehabilitation are needed for different subgroups of patients and at different phases over the course of recovery to optimize outcomes. According to the evidence-based studies, persons with TBI are best served by a holistic, multidisciplinary, and neuropsychologically oriented rehabilitation. The main elements of the holistic programs include promotion of a therapeutic milieu, psychotherapy and cognitive remediation, supported work trials, family guidance, and follow-up procedures. Due to disabling cognitive, behavioural, and emotional changes after TBI, patients cannot be adequately treated with conventional psychotherapy, therefore neuropsychotherapy is needed. The prerequisite for the neuropsychotherapeutic process to arise is to establish a therapeutic alliance between the therapist and the patient. Only if the patient is sufficiently knowledgeable about the injury, personal reactions, and prognostics, can he or she understand what is happening and distinguish between self-related, injury-related, and reactive phenomena. In the holistic programs besides individual format, neuropsychotherapy is also carried out in group settings which aim to help patients to break down their sense of social isolation, provide approval and a sense of belonging, and to identify their present emotional and motivational difficulties. A case study will be presented to demonstrate how neuropsychotherapy in a holistic setting may enhance the rehabilitation process.

59. Could a neuropsychotherapeutic treatment and rehabilitation model be helpful in schizophrenia?

Tuulio-Henriksson, A. Social Insurance Institution

Virta, M. University of Helsinki

Ilvonen, T. University of Helsinki

Koskinen, S. University of Helsinki

Sarajuuri, J. Validia Kuntoutus

Cognitive impairments are among the core symptoms in severe psychiatric disorders. In schizophrenia, they may already be present before the clinical symptoms appear. The impairments in cognitive functioning associate with deficits in general psychosocial functioning, and may pave the way to severe individual and societal marginalization of these patients. The most complex parts in treating patients with schizophrenia are the poor compliance, interruptions of medication, and relapses of acute psychosis. Cognitive rehabilitation together with other forms of treatment and psychoeducation has been shown to be at least moderately effective in enhancing the cognitive functions of these patients. This in turn may help them to better understand the demands of their illness and its treatment. Cognitive rehabilitation comprises an individually planned training program aiming at enhancing attention, concentration, working memory, motor functions, problem solving and executive functions as well as forms of social cognition. At best, the comprehensive treatment and rehabilitation package of schizophrenia patients should include appropriate medication, cognitive rehabilitation, psychoeducation as well as psychotherapy, of which the best form is cognitive-behavioral psychotherapy along the present clinical guidelines. This presentation will outline the benefits as well as the challenges of this kind of a combination of treatment and rehabilitation for these patients. Although the scientific evidence of cognitive impairments in schizophrenia is indisputable, there is a substantial need for case-control studies that aim at developing such an evidently neuropsychotherapeutic model of rehabilitation for patients with schizophrenia.

Symposium

60. The assessment of frontal lobe functions: Where are we now?

Organizer: Dr Sarah E. MacPherson, Centre for Cognitive Ageing and Cognitive Epidemiology, University of Edinburgh, Edinburgh, UK

Almost 50 years ago, Luria proposed the existence of “frontal lobe syndromes” where distinct frontal subregions have different functional roles. Yet, functional fractionation of the frontal lobes has made surprisingly slow progress and there still remains a debate as to whether frontal functions are overlapping or separate. It is only more recently that lesion studies have started to consider frontal patients in their subgroups rather than under the umbrella of a frontal group. The aim of this symposium is to present some of the recent research investigating frontal lobe fractionation and whether functionally separate systems within the frontal lobes exist. Presentations will comprise lesion studies which differentiate frontal patients into separate subgroups to investigate their performance on frontal executive tasks. We will also discuss some of the important issues associated with the assessment of frontal patients including sample size and grouping patients according to their etiology. Finally, we will discuss some recent neuroimaging data which provides evidence of distinct anatomical and functional organisation of the prefrontal cortex. These presentations will provide an overview of the current position of the frontal lobe literature and whether frontal functions should be considered multiple, separate processes.

61. Prefrontal contributions to initiation, suppression and strategy use: Evidence from lesion studies

Gail A. Robinson, School of Psychology, University of Queensland

Verbal initiation, suppression and strategy generation/use are cognitive processes thought to be implemented by the frontal cortex. The Hayling Test was specifically designed to tap these within the same sentence completion task. Patients with focal frontal (n = 60) and posterior (n = 30) lesions, and matched healthy controls (n = 40), were investigated on the Hayling Test. The standard Hayling Test clinical measures (Initiation Response Time, Suppression Response Time, Suppression Errors and Overall Score), composite errors scores and strategy-based responses were calculated. Lesions were analysed by classical frontal/posterior subdivisions as well as a finer-grained frontal localisation method and a specific contrast method that is somewhat analogous to voxel-based lesion mapping methods. Thus, patients with right lateral, left lateral and superior medial lesions were compared to controls and patients with right lateral lesions were compared to all other patients. The results showed that all four standard Hayling Test clinical measures were sensitive to frontal lobe damage although only Suppression Errors and the Overall Score were specific to the frontal region. All frontal patients produced suppression errors; however, there was a specific Right Lateral effect for producing semantically related 'subtle' errors. In addition, frontal patients overall produced fewer correct responses indicative of developing an appropriate strategy but only the Right Lateral group showed a significant deficit. No specific frontal effect was found for verbal initiation. These results support a role for the right lateral frontal region in verbal suppression and, for the first time, in strategy generation/use.

62. The effect of aetiology, age and cognitive reserve on frontal patients' performance

Lisa Cipolotti, Department of Neuropsychology, National Hospital for Neurology and Neurosurgery, London, UK, Dipartimento di Psicologia, University of Palermo, Italy

In this study we investigated whether: 1. grouping of patients with frontal lesions caused by stroke or tumours is methodologically appropriate; 2. age affects cognitive performance of patients with focal lesions and 3. environmental factors such as years of education and premorbid intelligence can protect frontal patients against cognitive impairment. We investigated patients who had had a cerebrovascular accident (CVA), high (HGT) or low grade (LGT) tumour, or meningioma, all at the post-operative stage. The same frontal 'executive', nominal and perceptual tasks were compared. Assessments of focal frontal lesion location, lesion volume, global brain atrophy and non-specific white matter (WM) changes were undertaken. We found no significant difference in performance between the four aetiology subgroups on the 'frontal' executive and nominal tasks. However, we found robust effects of age only on the frontal tasks. Years of education and premorbid intelligence did not modify the rate of decline in executive functioning with age. No between-group difference was found with respect to the location of frontal lesions, lesion volume, global brain atrophy and non-specific white matter hypertensities (WMH). Only WMH was significantly related to performance on the executive tasks. Our results suggest that the grouping of frontal patients caused by different aetiologies is a justified methodological approach that can help to further the understanding of the organisation of frontal executive functions. We argue that the combined effect of aging, frontal lesions and WMH impairs the frontal cortical systems, resulting in sub-threshold computational power to successfully complete executive tasks.

63. Atlasing the frontal lobe connections and their variability due to age and education

Michel Thiebaut de Schotten, CNRS UMR 7225, Inserm, UPMC-Paris6, UMR_S 1127; CRICM, GH Pitié-Salpêtrière, Paris, France, Natbrainlab, Brain and Spine Institute, Paris, France

In neuroscience, there is a growing consensus that higher cognitive functions may be supported by distributed networks involving different cerebral regions, rather than by single brain areas. Communication within these networks is mediated by white matter tracts and is particularly prominent in the frontal lobes for the control and integration of information. However, the detailed mapping of frontal connections remains incomplete, albeit crucial to an increased understanding of these cognitive functions. We built a statistical normative atlas of the frontal lobe connections in stereotaxic space. We reported age-related changes in the microstructural organization of several, specific frontal fiber tracts. Our atlas also build the capacity of clinicians to further understand the mechanisms involved in brain recovery and plasticity, as well as assist clinicians in the diagnosis of disconnection or abnormality within specific tracts of individual patients with various brain diseases.

64. Neural mechanisms of Trail Making Test performance

Sarah E. MacPherson, Centre for Cognitive Ageing and Cognitive Epidemiology, University of Edinburgh, Edinburgh, UK, Department of Psychology, University of Edinburgh, Edinburgh, UK

Part B of the Trail Making Test (TMT-B) is widely used as a quick and easy to administer measure of executive dysfunction. Performance on Part B of the Trail Making Test (TMT-B) declines with age and this is thought to be due to age-related deterioration of prefrontal structures. Yet, some research indicates that age-related decrements in TMT-B performance might be symptomatic of more global age-related brain changes of either cortical regions or the white matter (WM) tracts that connect anterior and posterior brain regions. The current study aims to investigate the relationships between TMT-B performance and quantifiable measures of cortical volume and WM characteristics in a large sample of older participants. Three hundred and sixty eight healthy, community-dwelling older participants who were all born in 1936 and sat a validated intelligence test at age 11 years were assessed on TMT-B, processing speed measures and provided structural and diffusion MRI data. The results demonstrated that in older adults performance on TMT-B is related to the cortical volume of both frontal and nonfrontal regions even when speed of processing is controlled for. In terms of WM integrity, the corpus callosum is significantly related to TMT-B completion time beyond speed of processing. These findings support the role of both frontal and nonfrontal cortical regions and WM tracts in the executive aspects of TMT-B performance in older age.

Symposium

65. From the body to the brain: changes in body, space and action representations due to body disorders

Organizer: Valentina Moro, University of Verona, Italy

How the body is represented in the brain depends on the continuous, bidirectional flow of information between the brain and the body, and in particular on the integration between motor commands and somatosensory feedback. For these reasons, studying cases of body disorders impairing sensory-motor loops at different levels is highly informative for understanding neural body representations. In this symposium, we will present on-going research about the effects of motor impairments due to spinal cord injury, amputation and stroke not only on primary motor and somatosensory processing but also, more interestingly, on higher-order representation of body, space and actions. At the same time, we will focus on the contribution of different sensory feedbacks, namely somatosensory, visual, vestibular, from the body to the brain in mediating such effects. Finally, we will explore the contribution of new technology, based on brain-computer-interface (BCI), allowing bypassing peripheral damage to interface motor commands and bodily effectors. By combining approaches from behavioural experiments, neuropsychology, neuroimaging and BCI, this symposium will suggest a new perspective – i.e., from the body to the brain - onto the classic concept of body schema by Head & Holmes's study (1911-1912), with important applications to the field of rehabilitation and prosthetics

Speakers:

1. Michela Bassolino / Andrea Serino: Neural mechanisms, functions and plasticity of Peripersonal Space representation in humans.
2. Michele Scandola: Effects of expertise on Action anticipation after Spinal Cord Injury
3. Bigna Lenggenhager: Vestibular contributions to the bodily self and its disturbances
4. Emmanuele Tidoni: Bodily illusions and control of virtual and robotic agents after spinal cord injury

66. Neural mechanisms, functions and plasticity of Peripersonal Space representation in humans.

Serino Andrea, Canzoneri Elisa, Michela Bassolino, Laboratory of Cognitive Neuroscience, Center for Neuroprosthetics, École Polytechnique Fédérale de Lausanne

The space immediately surrounding the body, i.e., peripersonal space (PPS), is represented by a dedicated neural system of fronto-parietal areas, which integrate tactile, auditory and visual stimuli presented on or close to the body.

In this talk, we will present neuroimaging evidence showing how, in humans, premotor and posterior-parietal areas integrating multisensory stimuli within PPS directly project to the motor system to trigger appropriate responses. We will also show that PPS representation is plastic, as its boundaries adapt as a function of experience (such as after tool-use) or changes in structure and function of the psychical body (such as amputation, prosthesis implantation and immobilization). Finally, we will present a computational model to explain neural mechanisms of PPS representation and plasticity. We will conclude that PPS represents a multi-sensory-motor interface between the individual and the environment.

67. Effects of expertise on Action anticipation after Spinal Cord Injury

Scandola Michele, NPSY-Lab.VR, Department of Philosophy, Education and Psychology, University of Verona, Verona, Italy and IRCCS Santa Lucia Foundation, Roma, Italy

Motor experts have a better performance in action forecasting than non-experts and visual experts (Aglioti et al., 2008).

Through a temporal occlusion paradigm (Abernethy, 1987) the ability in forecasting actions is studied in a group of paraplegic and healthy participants, naive for rollerblade and wheelchair actions. Two set of videos showed a person on rollerblades or a paraplegic on a wheelchair trying to go up a sidewalk. The videos can end in three ways: i) the action is successful; ii) the action failed; iii) the action failed and the main character fall. The entire action lasted 3000ms, but the video was played for 600ms, 1200ms, 1800ms, 2400ms or 3000ms. Participants had to report the outcome of the action among three possibilities: Success, Fail or Fall.

The participants' performances showed an advantage in the Paraplegic group for the Wheelchair videos and in the Control group for the Rollerblade videos.

These data indicate the advantage of motor expertise in judging the outcome of a wheelchair action in SCI people. The result of the advantage in the Rollerblade videos of the Control group may indicate two different conclusions: i) in the Paraplegic group there is a loss of the ability to predict an action where the use of the legs is fundamental, or ii) in the Control group the daily use of the lower limbs is a sufficient training for a better understanding of the outcome of rollerblade actions.

Indications for motor expertise, adaptive and maladaptive plastic reorganization in SCI will be discussed.

68. Vestibular contributions to the bodily self and its disturbances

Lenggenhager Bigna & Macauda Gianluca, Neuropsychology, Department of Neurology, University Hospital Zurich, Zurich, Switzerland

Vestibular signals have often been neglected in the question of how the body and the different sensory inputs shape the mind. We will present various scientific evidence that nevertheless suggest an important contribution of the vestibular system to the experience of the body, self and space. First, we will present neurological evidence both, from patients with bodily disorders as well as from patients with vestibular deficits. Second, we will show how combining techniques from traditional vestibular research (e.g. motion platforms, caloric and galvanic vestibular stimulation) with techniques from experimental psychology (e.g. induction of bodily illusions by situation of multisensory conflicts) and virtual reality might provide useful tools to investigate a vestibular contribution to the bodily self in healthy participants. Conclusively, we argue that vestibular processes play a crucial role in binding the body and the self.

69. Bodily illusions and control of virtual and robotic agents after spinal cord injury

Tidoni Emmanuele, Department of Psychology, University of Rome "La Sapienza", Rome, Italy and IRCCS Santa Lucia Foundation, Roma

After a spinal cord injury (SCI) the possibility to interact with the external world is dramatically affected by reduced abilities to send motor information to and receive sensory feedback from the body. Brain computer interfaces (BCIs) allow to control external agents without muscle recruitment and a future challenge for BCI-based applications is the possibility to provide multisensory feedback to the user to induce a feeling of embodiment toward the controlled device.

We studied body and action representation in healthy and SCI people using the rubber hand illusion (Study1) and by means of tendon vibration in the upper limbs (Study2). Moreover, we developed two immersive BCI-applications for virtual-local and robotic-remote control of a surrogate. The applications were designed both for healthy participants and people with motor and sensory disabilities. The first application (Study3) provided audio-visual feedback during a robotic navigation task, while the second (Study4) provided during a social interaction a vibratory stimulation to the right tendon biceps brachii, known to induce the illusory experience of arm extension.

We observed plastic mechanisms in SCI people for embodying an external object (Study1) and a reduced ability to experience an illusory perception of movement (Study2). Importantly, both healthy and SCI patients were able to control the virtual and robotic surrogate through BCI (Study3-4) and the results indicate a successful progress towards the integration of neuroscience and BCI systems and the possible role of multisensory stimulation in healthy and SCI people for inducing a feeling of ownership and control over an external device.

Symposium

70. Cognitive impairments in inherited metabolic disorders: State of the art and future directions

Organizer: Romani Cristina, Aston University

Cognitive functions are affected differently in different inherited metabolic diseases. For example, language functions seem to be particularly affected in galactosaemia and Niemann Pick, visuo-spatial functions in Gaucher type II and III disease, processing speed and executive functions in Phenylketonuria. It could be that the lack of specific enzymes results in different types of neurological damage. For example, it has been suggested white matter lesions affect particularly the arcuate fasciculus supporting language functions in galactosaemia, that hippocampal regions supporting visuo-spatial skills are particularly affected in Gaucher type II and III disease and that extensive white matter damage reduces processing capacity and the ability to carry out complex functions in Phenylketonuria. These different patterns offer us a new perspective from which to investigate cognition as well as important tools to track disease progression and the efficacy of treatment in these diseases.

The proposed symposium will be based on five contributions. 1. Palermo et al. will explore the relationship between cognitive functions and blood Phe concentrations and fluctuations in adult patients with Phenylketonuria; 2. Nardecchia et al. will explore the relationship between cognitive function and neuro-imaging measures in a longitudinal study of the same type of patients; 3. Wiggs et al., will assess differences between verbal and nonverbal skills in type 3 Gaucher Disease; 4. Lewis et al. will investigate verbal functions and semantic priming in a single case with galactosaemia; 5. Finally, Blundel et al. will contrast verbal and spatial functions in Morquio syndrome and Tyrosinemia type III patients.

71. Early-treated adults with phenylketonuria (PKU): neuropsychological profile and relationship with blood Phe concentrations and fluctuations.

Palermo, Liana Aston University

Hiwot, Tarek Queen Elizabeth Hospital

Limback, Ellie Aston University

Hall, Kate International Society for Neonatal Screening

MacDonald, Anita Birmingham Children's Hospital

Romani, Cristina Aston University

Objectives: To establish which cognitive functions remain impaired in early-treated adults with PKU (AwPKU) and their association with blood Phe concentrations and fluctuations at different points during the life span.

Method: 37 AwPKU (18-41 years) and 30 age-matched controls were assessed with an extensive battery of tasks (N=28) and their performance related to Phe concentrations and fluctuations.

Results: AwPKU showed a speed impairment across cognitive domains, but good accuracy in the same tasks and in untimed tasks probing memory and learning (verbal and visuo-spatial). Performance in tasks associated with executive functions was variable: impaired in tasks probing working memory, sustained attention, rule extraction, verbal fluency, and planning, but not in tasks probing inhibitory control and switching. Good dietary control though the life span showed strong associations with cognitive performance. Importantly, *adult* and *concurrent* Phe levels correlated with a number of measures including visuo-motor coordination, sustained attention, memory and learning *even* after adolescence Phe levels were partialled out. Instead Phe levels showed little association with speed measures and measures of inhibitory control and switching, in contrast with what found in children.

Conclusions: In well-treated AwPKU cognitive performance is suboptimal with deficits involving mainly speed of processing, working memory, sustained attention and strategic planning. Speed deficits are not modulated by dietary control in adulthood, possibly, because they are caused by early structural damage. Other functions, however, show clear associations, because, although performance is generally good, it fluctuates with Phe levels suggesting an alternative mechanism which remains plastic in adulthood.

72. Neurocognitive and neuroimaging outcome of early treated PKU subjects. A longitudinal study

Nardecchia, Francesca Department of Child and Adolescent Neuropsychiatry, & Department of Physiology and Pharmacology, SAPIENZA University of Rome

Manti, Filippo Department of Child and Adolescent Neuropsychiatry, SAPIENZA University of Rome

Chiarotti, Flavia Istituto Superiore di Sanità, Department of Cell Biology and Neuroscience

Pansini, Marianna Department of Child and Adolescent Neuropsychiatry, SAPIENZA University of Rome

Carducci, Claudia Department of Experimental Medicine, SAPIENZA University of Rome

Carducci, Carla Department of Experimental Medicine, SAPIENZA University of Rome

Leuzzi, Vincenzo Department of Child and Adolescent Neuropsychiatry, SAPIENZA University of Rome

Objective: To explore the outcome of neurocognitive deficits and neuroimaging correlates in young adult early treated phenylketonuric (PKU) patients.

Study design: We conducted a longitudinal study of 14 PKU patients that were assessed for IQ and neuropsychological functioning including executive functions (EF) over 14 years of follow-up. Performances were compared to 14 controls.

Results: IQ of all 14 PKU patients (age range 22.2-27.7) was within the normal range. With respect to the 1st assessment, mean IQ at follow-up did not decrease significantly. Compared to control subjects, mean IQ of patients was significantly lower ($p=.0005$). Throughout adolescence and early adulthood there was an overall improvement of neuropsychological functioning in PKU patients in spite of diet relaxation, however some downfalls were still detectable when compared to controls. All patients that underwent a second MRI scan showed white matter alterations ranging from mild to severe, but which were not correlated with either IQ nor with EF scoring. Cognitive, neuropsychological and neuroimaging outcomes were influenced by life-long and/or second decade of life metabolic control. Performance in tests exploring IQ and EF for patients who had maintained life-long IDC $<500\mu\text{M}$ did not show any statistical difference with controls. Nevertheless patients' developmental trajectories were in some cases independent from metabolic control.

Conclusions: Our results support the hypothesis of differences in individual vulnerability to phenylalanine. However, as long as individual factors that account for this vulnerability are not recognized, strict dietary control is recommended for all the patients also in the second decade of life

73. Information processing in a child with galactosaemia: an examination using behavioural and neurophysiological measures

Lewis, Fiona M School of Health and Rehabilitation Sciences, The University of Queensland

Knuepffer, Christina UQ Centre for Clinical Research, The University of Queensland

Coman, David J Department of Metabolic Medicine, The Royal Children's Hospital, & School of Medicine, The University of Queensland, Brisbane

Background/objectives: Neurocognitive and language deficits are known developmental sequelae for a large number of children with galactosaemia (GAL). While behavioural assessment batteries are important indicators of a child's developmental status, technology-assisted language assessments, such as event-related potential (ERP) recordings can provide on-line information on a child's neural language processing efficiency. Such on-line information may contribute to the understanding of the evolution of the neurocognitive and language phenotype in GAL.

Method: The current study relied on event-related potential recordings during a semantic priming paradigm in order to assess neural language processing efficiency in a 7-year old female with GAL to complement behavioural language and neurocognitive findings. Performance measures were compared to those from a small control group using statistical and descriptive measures.

Results: On behavioural language and neurocognitive outcomes, there were no statistically significant measures that differentiated the child with GAL from the control group.

ERP results point towards deviations in auditory word processing in the child with GAL, relative to her peers. The child with GAL appeared to require increased neural resources to integrate an auditory word with its pictorial presentation, as indicated by a larger N400 ERP component measured in response to congruent prime-target picture-word pairs.

Discussion: Whilst the child with GAL presented with behavioural language and neurocognitive skills on par with her peers, deviations in auditory word processing were noted. Such deviations may interfere with the child's ongoing language development and her academic outcomes, given the changing nature of classroom instruction as children progress through the school years.

74. Measuring neurodegenerative impairments in paediatric inherited metabolic diseases: Evidence from Morquio syndrome and Tyrosinemia type III patients

Blundell, James University of Birmingham

Olson, Andrew University of Birmingham

Frisson, Steven University of Birmingham

Chakrapani, Anupam Birmingham Children's Hospital

Gissen, Paul Great Ormond Street Hospital

Hendriksz, Chris Salford Royal NHS Foundation Trust

Objectives: To characterise markers of cognitive function in two metabolic diseases where effects on cognition are relatively mild. Understanding the patterns of spared/impaired function is necessary to understand development of cognitive function, link cognitive and biological changes, monitor patient status and evaluate new treatment efficacy.

Method: 13 Morquio syndrome patients, 11 Tyrosinemia Type III patients and 104 controls were assessed for attention (simple RT, feature and conjunction search), language (BPVS, BNT) and oculomotor function (fixation, pro-saccade, anti-saccade, smooth pursuit).

Results: There were different patterns of deficits in the two groups. Attention and oculomotor function was affected in Morquio patients, but language was relatively spared. Searching for simple and conjunction targets was slow, but not in proportion to display sizes, suggesting a deficit in a control/decision stage rather than attentional processing for items. Patients had difficulty maintaining gaze on a target in oculomotor tasks. Both impairments point to problems with control processes for attention.

In Tyrosinemia Type III, in contrast, there were modest effects in attention, but language tasks were clearly affected, and effects increased with age. Fixation duration was shorter in oculomotor tasks, but without frequent intrusive saccades.

Conclusion: Both diseases presented clear evidence of cognitive effects, but with different functional profiles. Attentional control was a sensitive index for Morquio patients and language for Tyrosinemia. The different markers are good candidates for establishing functional and biological links and suggest stronger functional impacts in different regions of the brain (frontal vs temporal areas).

Paper session

Autism spectrum disorder interventions and outcomes

Chair to be announced

75. Eye contact and its' intervention in young children with autism: Autism and Gaze -project

Kylliäinen, A University of Tampere

Objective: Atypical eye contact is a poorly understood phenomenon in autism. The Autism and Gaze -project investigates attentional and psychophysiological responses to direct gaze in young children with autism in a longitudinal design. In addition, a parent-led intervention method that aims to increase eye contact initiation has been piloted. The objective of this presentation is to combine the findings of the psychophysiological measurements and the intervention outcome.

Participants and methods: Twenty young children (2.5-5.5 years) with autism participated in the study. They were equally divided into a control and a 4-month parent-led intervention group. In addition, 20 typically developing children participated as a normative comparison group and 17 children with idiopathic developmental delay served as non-autistic comparison group. All the children participated in the experiments where eye movements, heart rate and EEG were measured whilst the children saw faces with direct gaze and downcast gaze in different computerised tasks. The longitudinal design includes three different time points: a baseline, a short-term (4 months) and a long-term (24 months) follow-up.

Results: The preliminary findings have indicated abnormal psychophysiological attentional responses in children with autism measured from both eye movements and heart rate. The findings of the intervention study suggested that the parent-led intervention had positive effects on the child's spontaneous eye contact initiation.

Conclusions: The findings of the Autism and Gaze –project stress the importance of motivating young children with autism towards another person's face and eyes. The use of psychophysiological measures as an intervention outcome will be discussed.

76. Pilot Intervention for Motivating Eye Contact Initiation in Young Children with Autism

Muuvila, M. Psychology, School of Social sciences and humanities, University of Tampere

Helminen, T.M. Human Information Processing Laboratory, Psychology, School of Social sciences and humanities, University of Tampere

Eriksson, K. Paediatric Neurology Unit, Tampere University Hospital

Charman, T. Institute of Psychiatry, King's College London

Hietanen, J. K. Human Information Processing Laboratory, Psychology, School of Social sciences and humanities, University of Tampere

Kylliäinen, A. Psychology, School of Social sciences and humanities, University of Tampere

Objective: Difficulties in eye contact are well recognised in children with autism. It seems important to motivate them towards other people's eyes as early as possible to reduce further abnormalities in social development. Involving parents in interventions of social communication skills has been shown to improve parent-child interaction. The aim of the study was to pilot a parent-led intervention method targeted to increase eye contact initiation in young children with autism. The intervention method was considered as an addition to treatment as usual (TAU).

Participants and methods: Twenty children (2.5-5.5 years) with autism participated in the study. They were randomly divided into an intervention (N=10) and a control group (N=10). Parents in the intervention group were taught to do daily exercises with their child for 4 months. Baseline and outcome measures included free-play with a parent, an observational measure of autism severity (ADOS-2), and an imitation-play session with an experimenter. Outcome measurements were done 4-6 months after the baseline.

Results: Amount of eye contact was analysed from the play sessions together with the information as to whether eye contacts were overtures, responses, or linked to other social communication. Preliminary findings indicate that although the initiation of eye contact over time increased in all the children, responsive eye contacts increased to a greater extent in the intervention group.

Conclusions: The present study suggests that the parent-led intervention as an additional part of TAU had positive effects on the children's spontaneous use of eye contact. Its effects for further social-communicative development require clarification.

77. Cognitive Flexibility Rehabilitation Program with Adolescents with Autism Spectrum Disorders

Pereira, A.P.A Universidade Federal do Parana

Gonçalves, Y.R. Universidade Federal do Parana

The atypical behavior of people with Autism Spectrum Disorders (ASD) suggest the presence of executive dysfunction (EF). Deficits in EF, particularly in cognitive flexibility are related to repetitive and stereotyped behavior. The objective of this study was to evaluate the effectiveness of a rehabilitation program for cognitive flexibility in adolescents with autism. The present study adopted a mixed design. The study included six teenagers (4 males) with ASD, a mean age of 14,33 (SD=2,42) and an education mean of 6 years (SD=3,06) who were assessed before and after the intervention. In addition to the standardized neuropsychological instruments, parents and professionals directly involved answered a questionnaire about observed inadequate and repetitive behavior and later, participated in an interview on cognitive flexibility. The 15 rehabilitation sessions were videotaped and each session followed a standard structure: Activities presentation, two individual activities, one ecological activity, one computer game, and a session feedback. Parameters of reaction time and numbers of errors were used to analyze performance during the intervention and showed significant improvement. The group mean IQ was 104 (SD=18,87). A significant difference in the WISC-III Coding subtest ($z=-2,02$, $p=0,04$) was found when comparing pretest and posttest results. Parents and Professionals reported behavioral improvements after intervention for the majority of participants and anxiety levels seemed to be an important moderating factor during the intervention programs. Frequency of behaviors during both the sessions and daily activities related to cognitive flexibility was analyzed, suggesting the effectiveness of the program. Intervention design and outcomes assessment for this population are presented.

78. The neuromotor profile of Autism Spectrum disorder: A kinematic study of handwriting in school-aged children

Grace, N. School of Psychological Sciences, Monash University, Melbourne, Australia

Enticott, P. Deakin Child Study Centre School of Psychology, Deakin University, Melbourne, Australia

Johnson, B.P. School of Psychological Sciences, Monash University, Melbourne, Australia

Paton, B. ARC Centre of Excellence for Integrative Brain Function, Australia

Rinehart, N.J. Deakin Child Study Centre School of Psychology, Deakin University, Melbourne, Australia

Objective: Motor functioning is well-known to be impaired in children with autism spectrum disorder (ASD), however the neuromotor profile is yet to be fully characterised. Children with ASD are commonly referred for occupational therapy for handwriting difficulties. This study aims to increase understanding of the neuromotor profile of autism by evaluating handwriting movements, which are a model task for assessing base motor plans.

Participants and methods: Participants aged between 8-12 years (N=55, M=10.80(1.13) years) included 24 ASD children (IQ>75) and 31 typically developing (TD) children. Overall motor functioning was indexed using the Movement Assessment Battery for Children (MABC-2). Handwriting performance was assessed using an adapted subtest of the Handwriting Performance Test, where children wrote “cat and dog” five times on a digitized tablet. Kinematic data per movement was extracted using an automated segmentation algorithm.

Results: Consistent with previous research, results indicate significantly poorer motor skills in the ASD group compared to the TD group (MABC-2, $p<.05$). Overall, kinematic analysis of writing trajectory indicated that the ASD group showed more inefficient writing ($p<.05$) and significantly greater transition time between movements ($p<.01$), compared to the TD group.

Conclusions: Children with ASD appear to have a unique handwriting profile characterized by more inefficient writing overall, compared to TD children. This is consistent with broader motor impairments commonly observed in the ASD population that have previously been linked to fronto-striatal dysfunction. The current findings provide greater understanding of the motor difficulties in the child ASD population and are valuable for informing future intervention strategies across educational settings.

Symposium

79. The neuropsychological challenge of clinically mild stroke

Organizer: Dr Marja Hietanen

Acute care in stroke units as well as early treatment with thrombolysis have improved functional poststroke outcome by reducing evident disability. Traditionally, clinical outcomes of stroke have been evaluated with measures of physical recovery or focal cortical syndromes such as aphasia or neglect. Neuropsychological impairment after stroke when no motor, sensory or language deficits are evident, remain often overlooked. Small vessel disease typically causes mild stroke and insidious ischemic changes, which are related to even progressive cognitive decline. Even milder cognitive or behavioural changes resulting from stroke can seriously affect patients' quality of life, independent functioning and working capacity. Neuropsychological rehabilitation should be tailored to take into account also milder cognitive deficits and thus support the patients' return to work. In order to improve the poststroke care and reduce the risk of future cerebrovascular events the modification of risk factors should be taken into account in neuropsychological practice.

80. Poststroke cognitive disorders are common despite good clinical recovery

Marja Hietanen, Hanna Jokinen, Susanna Melkas, Timo Erkinjuntti, the SAM Study Group, Clinical Neurosciences, Neurology, Unit of Neuropsychology, University of Helsinki and Helsinki University Hospital, Finland

Objective: Clinical outcomes of stroke are often evaluated with measures of physical recovery or major cortical functions (e.g. dysphasia, neglect) and subtle cognitive impairments are largely neglected. However, even milder cognitive deficits resulting from stroke can affect patients' quality of life, independent functioning and occupational abilities.

Participants and Methods: In the Helsinki Stroke Aging Memory (SAM) Study 409 consecutive patients aged 55-85 years were evaluated with extensive clinical and neuropsychological assessments 3 months poststroke.

Results: In spite of excellent clinical recovery at 3 months (modified Rankin Scale/mRS=0-1, no disability) 108/71 % of these 152 patients had impairment at least in one cognitive domain. Most commonly memory, visuoconstructional abilities and executive functions were impaired. Mini-Mental State Examination (MMSE) was able to detect only a small portion of these patients. Cognitive deficits were associated with age, years of education, depression, prior stroke and stroke severity.

Conclusions: Cognitive disorders as evaluated with a comprehensive neuropsychological assessment are common in stroke survivors even after successful clinical recovery. Neuropsychological evaluation is important even in clinically well recovered patients and should be regarded as an essential component of poststroke clinical practice.

81. Early markers of progressive cognitive decline in cerebral small vessel disease

Hanna Jokinen, Nicolau Gonçalves^b, Ricardo Vigário^b, Timo Erkinjuntti^a, the LADIS Study Group, Clinical Neurosciences, Neurology, University of Helsinki and Helsinki University Hospital, Finland^b Department of Information and Computer Science, Aalto University School of Science, Espoo, Finland

Cerebral small vessel disease (SVD) is the most common cause of vascular cognitive impairment in the elderly. The characteristic imaging findings of SVD are deep lacunar infarcts and ischemic white matter lesions (WML) caused by chronic hypertension and arteriolosclerosis. Typically, the acute clinical symptoms related to SVD infarcts appear mild, but in time, the course of the syndrome may be progressive. The early cognitive symptoms of SVD most commonly include impairments of executive functions, attention and processing speed, likely associated with disruption of the prefrontal-subcortical brain networks. Diffusion imaging and new tissue segmentation techniques have enabled earlier recognition of the insidious ischemic changes even in normal-appearing brain tissue (NABT). However, it is still unclear, to what extent these changes predict future cognitive and functional impairment.

In the Leukoaraiosis and Disability Study, subjects (age 65-85 yr) with mild to moderate WML underwent brain MRI and annual neuropsychological assessments in 3-year follow-up.

The results showed that microstructural changes in NABT predict faster decline in psychomotor speed, executive functions, and working memory regardless of conventional MRI findings. These changes were also related to functional disability and higher mortality. Furthermore, early-stage partial WML, still too faint to be clearly visible on conventional MRI, but detectable with a novel multispectral MRI tissue segmentation method, already predicted progressive executive dysfunction. In follow-up, these early-stage WML also indicated future locations of lesions.

To conclude, despite mild acute neurological symptoms, SVD is associated with increasing ischemic changes as well as progressive cognitive decline and poor functional outcome.

82. Neuropsychological interventions support return to work after stroke

Eeva-Liisa Kallio, Hanna Jokinen, Marja Hietanen, Clinical Neurosciences, Neurology, Unit of Neuropsychology, University of Helsinki and Helsinki University Hospital, Finland

Cognitive deficits are one of the most far-reaching and disabling consequences of stroke. Advances in acute care have diminished the risk of severe disability, but even mild cognitive deficits may complicate return to work (RTW) after stroke. The Department of Neurological Rehabilitation, Helsinki University Hospital, Finland, is responsible for the multidisciplinary outpatient rehabilitation of working-aged patients including neuropsychological interventions. We report the result of neuropsychological rehabilitation (NPR) for a sample of subacute stroke patients in Helsinki University Hospital during 2010-14 with RTW as an outcome. The indication for NPR was most often memory deficits, executive and/or attentional dysfunctions. The methods used in NPR were 1) a brief neuropsychological intervention (1-5 appointments for 1-3 months), 2) an individualised rehabilitation program (weekly appointments for 3-12 months) and/or 3) group counseling (a structured program of 6 sessions), all of which include different components of cognitive training, learning to use compensatory strategies, psychoeducation, psychotherapeutic support and follow-up. At the end of the rehabilitation period more than half of the patients were able to return either to their former work, modified or part-time work, or work trial. Thus, RTW is an attainable goal for working-aged stroke patients and one indicator of successful neuropsychological rehabilitation. When NPR is tailored to take into account also milder cognitive deficits and the psychosocial situation of a stroke patient, a considerable number of the patients are able to return to their former work or otherwise reach vocational reintegration. Furthermore, even short neuropsychological interventions can help stroke patients with RTW.

83. Stroke-Prevention: health-related quality of life in patients with transient ischemic attack (TIA) in modification of risk factors

Lettner, S., Pagani, M., Kampfl, A. , Department of Neurology, Academic teaching hospital, Hospital of the sisters of charity Ried, Austria

Objective: Medication taking behaviour is an important step in optimizing the use of secondary preventive therapies in patients with transient ischemic attacks (TIA) and stroke. No well-defined data of TIA in relation to strokes are available. The importance of specific factors including general health behaviour, quality of life, affective symptoms and medication taking behaviour in patients with TIA has not been investigated in detail. METHODS: Sixtyfive patients with TIA in the anterior or posterior circulation from an academic teaching hospital are included in this study. The index event is classified as a TIA if neurologic symptoms resolve within 24 hours and neuroimaging (cerebral CT and or MRI) is negative. Vascular risk factors assessed at baseline and three months after the index event included hypertension, diabetes mellitus, hyperlipidemia, obesity, smoking status and alcohol consumption.

Neuropsychological testing comprised self-assessed general health behaviour, quality of life, affective questionnaires (anxiety, depression) within 48 hours after admission and three months thereafter. RESULTS: We present the incidence of TIA in a well-defined study population. Furthermore sociodemographic data, detailed risk-factors and patients behaviour, as well as changes of these matters will be presented. CONCLUSIONS: Our data will document the adherence to secondary stroke prevention therapies in regard to specific neuropsychological factors. Starting points of prevention programmes will be discussed. Our results may improve the quality of care after stroke and may reduce the risk of future cerebrovascular events.

Symposium

84. My bodily-self in space: from bodily self-consciousness to out-of-body experiences

Organizer: Roberta Ronchi, Laboratory of Cognitive Neuroscience and Center for Neuroprosthetics, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

Chair and Co-Chair: Nadia Bolognini and Olaf Blanke

It is well known that humans normally experience the self within the boundaries of their body and that the body parts constitute the main reference frames from which the external space is represented. The continuous interaction between body and space is essential for forming a body representation, and for guaranteeing the distinction between corporeal and extracorporeal (objects but also other bodies) entities. How multiple sensory-motor signals are integrated to generate the feeling of bodily-self, as distinct from the environment? In this symposium, we will present new insights about the functional and neural mechanisms of peripersonal space (the space of the bodily-self) and self-other discrimination in mirror-touch synesthesia, based also on brain stimulation data. We will discuss recent findings about body and space representation, and multisensory integration, in brain-damaged patients with personal and spatial neglect, as well as cases of anosognosia for body-related deficits. We will also describe rare neurological disorders of bodily self-consciousness, such as feeling-of-presence and autoscopic phenomena, as cases of altered relationship between the representation of corporeal and extra-corporeal entities. This symposium will present innovative findings combining behavioural and neuroimaging evidence from the healthy and the damaged brain, to better characterize and possibly manipulate disorders of bodily-self.

85. The boundaries of corporeal sensations between self and others: insights from mirror-touch synaesthesia

Nadia Bolognini, Department of Psychology, University of Milano-Bicocca, Laboratory of Neuropsychology, IRCCS Istituto Auxologico Italiano, Milano, Italy

Human beings are social animals whose cognitive and social abilities capitalize upon the interaction with other conspecifics. Fundamental among social abilities is the capacity to understand others' sensations. This function has been proposed to involve a tactile mirror system, which matches observed touch with felt touch. Support to this proposal comes from the study of mirror-touch synaesthesia, a condition in which the view of a touch on another person's body elicits conscious tactile sensations on the observer's own body. In this talk, I will present evidence from non-invasive brain stimulation studies showing that behavioural responses functionally akin to mirror-touch synaesthesia can be induced in non-synaesthetes by priming the activity of the primary somatosensory cortex (SI) contingent upon touch observation. Moreover, individual differences in empathic abilities drive the activity of the SI when non-synaesthetes witness others' tactile sensations. This evidence indicates that SI is endorsed with specialized mechanisms for the interpersonal sharing of touch, which work in concert with empathy: the vicarious activity of SI may allow an automatic and unconscious transference of the sensation that another person is experiencing onto oneself, and, in turn, the empathic interpersonal sharing of somatosensations.

86. The space of the self

Elisa Canzoneri, Andrea Serino, Laboratory of Cognitive Neuroscience, Center for Neuroprosthetics, EPFL, Lausanne, Switzerland

The experience of our embodied self is not limited to the physical constraints of our body, but it extends into the space where the body interacts with the environment and with other people, i.e. within the peripersonal space (PPS). While previous studies conceived PPS as a low-level sensory-motor interface for hand-objects interaction, in this talk we propose that the human brain builds a global representation of PPS around the whole body as a primary extension of self experience in space. To support this view, we will first show how a whole-body PPS, centred at trunk, exists, which also incorporates body parts specific PPSs around the hand and the face. We will then demonstrate that if we induce a spatial shift in the experienced location of the self, by manipulating multisensory bodily inputs as during the Full Body Illusion, the whole body PPS congruently shifts from the location of the physical body to that of the experienced self. Finally, we will present new data suggesting that such experimentally induced shift in self-location and PPS representation affects not only low-level sensory processing, but also high-level cognition, such as semantic processing and social cognition. Taken together, these findings will suggest a close relationship between the extent of PPS representation and self-consciousness.

87. Bodily Sense and Sensibility: Anosognosia and Asomatognosia

Aikaterini (Katerina) Fotopoulou, Psychology and Language Sciences Division, University College London (UCL), London, United Kingdom

According to studies in cognitive neuroscience, primary sensorimotor signals are integrated and re-represented in various levels of the neurocognitive hierarchy to form a number of neurocognitively distinct bodily representations, including unconscious and conscious facets of the bodily self such as body agency, ownership and awareness. However, the precise mechanisms by which bodily signals are integrated and re-mapped in the brain, as well as the relation between bottom-up and top-down factors in each of these hierarchical levels remain unknown. In this talk, I will discuss empirical studies on neuropsychiatric disorders of body awareness, including anosognosia for hemiplegia and somatoparaphrenia following right hemisphere stroke. Specifically, we have applied a number of neuroimaging and experimental paradigms in which simple psychophysical 'tricks' are used to systematically manipulate sensorimotor signals, promote their integration, or generate conflicts and illusions, and hence study their role in body awareness. Our results highlight that these disorders can be described as different aberrations of a core antagonism between bottom-up sensory and emotional signals, and top-down motor and higher-order signals at different hierarchical levels. I will particularly focus on some unique, motor planning, spatial and social cognition deficits that deprive patients from the means to update their perception of certain sensory states. I will further highlight the unique role of 2nd-person perspective and socio-affective signals in such updating and ultimately body awareness.

88. Interoceptive and sensorimotor mechanisms of doubles and ghosts in neurological disease

Olaf Blanke, presented by Elisa Canzoneri, Bertarelli Chair in Cognitive Neuroprosthetics, Center for Neuroprosthetics & Brain Mind Institute, EPFL, Lausanne, Switzerland

Past work has indicated that subjective aspects of consciousness, in particular the fact that consciousness is bound to the self, is based on the integration multisensory signal integration of visual, tactile, and proprioceptive stimuli in temporo-parietal cortex. Other prominent research highlighted the importance of interoceptive (bodily) signals in the insula. I will present data that show that interoceptive (cardiac) signals are integrated with exteroceptive multisensory signals and that they are powerful modulators of bodily self-consciousness recruiting insular cortex, highlighting insights obtained in neurological patients with illusory own body perceptions (heautoscopy, feeling-of-a presence). These findings show that bodily self-consciousness is based on the integration of exteroceptive-interoceptive bodily signals within key regions in insular and temporo-parietal cortex.

Symposium

89. Neuropsychology education and training around the world: A call for a global competency framework

Organizer: Ann D.Watts

This presentation will provide an overview of neuropsychological education and training in North America, the UK, Australia, Europe, and sub-Saharan Africa. As will be evident levels of education and training differ around the world and in many respects reflect the level of development of neuropsychology in different regions of the globe. In an age of rapid globalisation and the increased internationalisation of neuropsychology, such differences serve as barriers to the mobility of neuropsychologists between countries and continents. There is thus a need for a global framework of core competencies for neuropsychology to enhance mobility, as well as to facilitate the development of education and training protocols in countries, primarily in the developing world, where neuropsychology is poorly developed and its value as a basic and applied science is not appreciated. International and regional learned societies such as INS and FENS are well poised to initiate and lead the process of developing a global competency framework for neuropsychology. The presentations will be followed by a discussion of the way forward for this important initiative.

90. Neuropsychology specialization training models in Europe

Laura Hokkanen, University of Helsinki, Finland

The specialist training models in Europe are heterogeneous. Despite efforts to find a common European reference, such as The European Qualifications Framework (EQF), the accreditation and certification models differ. The university degree system in most EU countries follows the so-called Bologna model, but the specialist degrees have not been fully integrated into the third cycle. Within psychology, the EuroPsy diploma acts as the qualification standard for master's level and some specialization areas. A common description of the specialist training within neuropsychology however is lacking.

The neuropsychology specialist training programs in some countries are linked to universities and either tied to a university degree (doctoral or equivalent) or offered as a separate certificate / diploma with varied lengths of study. In other countries the programs are organized by local professional societies or other organizations, offered as continuing education. The training programs in Europe also have different requirements regarding practical training. Most students entering the programs in Finland or elsewhere in Scandinavia have a position within the health care sector where supervised practice can be arranged. Students who are in PhD programs fully engaged in research have less opportunity for practical training.

Because of these differences a proposal has been put forward to the European Federation of Psychologists' Associations (EFPA) General Assembly to establish a European task force with the mission of collecting systematic information on current training models and the required competencies in neuropsychology.

91. Neuropsychology Training in the United States

Kathleen Y. Haaland, Departments of Psychiatry & Behavioral Sciences and Neurology, University of New Mexico, Albuquerque, NM, USA

The predoctoral and postdoctoral requirements for clinical neuropsychology training in the United States will be reviewed (Bieliauskas & Mark, In Press). The requirements are largely derived from the Houston Conference (Hannay, et al., 1998) and are now being informed by the American Psychological Association's recent delineation of foundational and functional competencies across psychology specialties (Kaslow, 2004; Kaslow et al., 2004). While several psychology and medical specialties have delineated entry level competencies, such delineation for clinical neuropsychology is not yet available but is likely to be derived from the Houston Conference guidelines. In the United States, the American Psychological Association has accredited predoctoral, internship, and postdoctoral training programs in clinical psychology for many years and have just begun to provide accreditation of clinical neuropsychology specialization at the predoctoral and postdoctoral level. Board certification in clinical neuropsychology (<https://www.theabcn.org> from the American Board of Clinical Neuropsychology, a specialty board under the American Board of Professional Psychology, which includes 15 specialties in psychology) is considered the most rigorous demonstration of competence in clinical neuropsychology in the United States and their requirements will be summarized.

92. Neuropsychology education and training in Sub-Saharan Africa

Ann D. Watts, Entabeni Hopsital, Durban, South Africa

Historically neuropsychology education and training has generally evolved in English-speaking Southern African countries, such as South Africa, Zimbabwe and Zambia, all of which have nationally determined levels of competency for psychology, national regulatory/licencing bodies and legislation that protects the title of psychologist and defines psychological acts. Neuropsychology is subsumed within these bodies. This contrasts with the majority of other countries in Africa. Although most African universities are statutory creations, enjoy autonomy, and receive public funding, psychology, and hence neuropsychology, tends to be a lower priority confronted as these institutions are with issues such as poverty, disease, natural disasters, and civil wars. Certain countries, such as Ghana, are however starting to develop neuropsychology training programmes. These are generally being developed by neuropsychologists who have trained in the UK or North America. As such there is considerable variability in the levels and competencies required for the training of neuropsychologists where it does exist on the continent. The benchmarking of core competencies for the training of neuropsychologists would thus assist many of these countries with the developing neuropsychology training programmes. This would in turn facilitate the development of the discipline, increase its visibility, and help establish its importance for serving individuals with brain/behaviour problems in Sub-Saharan Africa, as well as improve the mobility of neuropsychologists within the continent. The status of neuropsychology education and training models in Ghana, South Africa and Zambia will be outlined within this context.

93. The dual competency model of training in clinical neuropsychology in the United Kingdom.

Robin Morris, Department of Psychology, King's College Institute of Psychiatry, Psychology and Neurosciences, UK.

Specialist training in clinical neuropsychology has evolved out of clinical psychology training to suit the needs of neuropsychology practice in the UK National Health service, where competency in clinical psychology is seen as important in relation to meeting the needs of patients who are being assessed, treated and managed within a multidisciplinary context. For example, this has strengthened the development of neuropsychological approaches to rehabilitation, taking into account the broader context of the patient.

Professional competency in clinical neuropsychology is currently accredited through the joint status of being registered as a clinical psychologist by the UK Health and Care Professional Council and as a neuropsychologist on the British Psychological Society Division of Neuropsychology specialist register of neuropsychologists.

In the UK there is a recent move to broaden training in neuropsychology applied to clinical fields by having different routes to clinical training via professions other than clinical psychology beyond educational psychology. Whilst this will widen access to clinical neuropsychological practice by those without clinical psychology qualification this has been controversial because of the dual competency skill base is thought to increase the efficacy of clinical neuropsychology overall; however, it is seen as having an advantage for applied neuropsychology in other professions such as forensic psychology, where neuropsychology expertise will be enhanced.

94. Australian models of training in Clinical Neuropsychology

Jennie Ponsford, Professor of Neuropsychology, Monash University, Melbourne, Australia.

Whilst many countries require a qualification in Clinical Psychology before undertaking training in Clinical Neuropsychology, in Australia, training in Clinical Neuropsychology may occur as an alternative to training in Clinical Psychology (with overlapping components), commencing after a four year honours degree in psychology. Training may be undertaken in Masters, Masters/PhD or Doctor of Psychology in Clinical Neuropsychology programs. Each incorporates intensive coursework over two years, a substantial research project, at doctoral standard for the doctoral degrees, and 1000 or 1500 hours of clinical placements for the Masters and Doctoral qualifications respectively. All courses must adhere to strictly prescribed accreditation standards, overseen by the Australian Health Practitioner Regulation Agency. These standards prescribe a comprehensive range of subjects and teaching hours on each topic, focused on building core competencies, staffing ratios including clinical neuropsychologists, and offerings of placement opportunities in a range of settings with supervision by appropriately qualified and experienced supervisors, who must comply with rigorous training standards. Following completion of the degree, graduates must practise under supervision for one or two years, depending on the level of their training. Universities face many challenges, including competition in selection of students, the high costs of training, growing demand from hospitals for payment for placements and government pressure to train more students at Masters level to meet workforce demands cost-effectively. This is at odds with the ever increasing knowledge base and scope of disorders with which Clinical Neuropsychology trainees must become competent and the scientist practitioner model of training provided within a doctorate.

Paper session

Attention, language and learning in children

Chair Pirkko Nieminen

95. Efficacy of Neuropsychological Multimodal Group Intervention (EXAT) on Attention problems and Social Adjustment

Rantanen, Kati, University of Tampere, School of Social Sciences, Psychology Clinic, Tampere University Hospital, Dept. of Pediatrics

Vierikko, Elina Psychology Clinic, School of Social Sciences and Humanities, University of Tampere

Objective: Deficits in attention and executive functions are frequently met in children with developmental deficits or neurological condition. Neuropsychological group intervention EXAT was developed for these children at the Psychology Clinic of the University of Tampere. The highly structured EXAT intervention includes children's group, parent training and teacher consultation. The aim was to study efficacy of the EXAT intervention on attention problems and social adjustment in children with deficits in executive function and attention.

Participants and methods: Ninety 6-15 year-old children with deficits in attention and executive functions (based on diagnosis and/or neuropsychological assessment) attending the EXAT intervention between 2006-2013 participated in the study. Parents and teachers completed the Conners' Rating Scale –Revised before and after the intervention. Parents assessed social adjustment with the Strengths and Difficulties Questionnaire (SDQ). In statistical analysis, nonparametric tests were used.

Results: After intervention, parents reported significant changes in both inattention ($p < .01$) and hyperactivity ($p < .01$). Social adjustment problems, such as anxiety ($p < .05$), emotional lability ($p < .05$), and conduct problems ($p < .05$) decreased. Teachers reported decrease in hyperactivity and impulsivity ($p < .05$), oppositional behavior ($p < .05$) and emotional lability ($p < .05$) but no significant change was reported in inattention.

Conclusion: The multimodal group intervention EXAT has positive effects on both attention and social adjustment in children with deficits in attention and executive functions. Further studies are needed in different clinical groups, e.g. in children with neurological condition and those with developmental disorders.

96. Attention/Executive Functions and Memory/Learning in 3- to 11-year-old Children: An International Comparison

Rosenqvist, J.E. University of Helsinki

Lahti-Nuuttila, P. University of Helsinki

Urgesi, C. University of Udine

Holdnack, J. Pearson Assessments

Kemp, S.L. University of Missouri

Laasonen, M. University of Helsinki and Helsinki University Central Hospital

Objective: Previous studies have outlined the development of neurocognitive functions and, at the same time, underlined the cultural sensitivity of the assessment methods. This calls upon studies exploring similarities and differences in neurocognitive development between countries and languages. We aimed to investigate how performance in areas of attention/executive functioning as well as visual and verbal memory functions differed between children from Finland, Italy, and the USA.

Participants and methods: The 2228 participants were 3- to 11-year-old children from the USA (n = 900), Italy (n = 637), and Finland (n = 691), who participated in the standardizations of the NEPSY-II in each country. We compared and outlined the cross-sectionally assessed development of the NEPSY-II domains Attention/Executive Functioning and Memory/Learning between the countries.

Results: The development differed significantly between the three countries for subtests within the Attention/Executive Functioning and Memory/Learning domains of the NEPSY-II. Some subtests were easier overall in one country than in the others and, for some subtests, the developmental curve accelerated and decelerated differently between the countries. Post-hoc tests were used to examine the differences between the countries for each age group, respectively.

Conclusion: The present study confirmed that attentional and memory functions in general develop with age. However, the differences between the countries that occurred in the present study indicate that culture and language may influence the development of these functions. These results emphasize the need for an international perspective in developmental studies and have implications for clinicians assessing children in international settings.

97. HelSLI: The Helsinki Longitudinal SLI study

Laasonen, Marja Department of Phoniatics, HUCH

Smolander, Sini Department of Phoniatics, HUCH

Arkkila, Eva Department of Phoniatics, HUCH

Objective: Specific language impairment (SLI) is a developmental disorder comprising the largest disability group in pre-school-aged children. At the moment, the specific etiological factors leading to SLI are not known and even the typical linguistic features appear to vary by language. We present here a project that investigates SLI at the etiological, cognitive, and behavioral levels of analysis and aims to make reliable prediction and early identification of the difficulties possible across different languages.

Participants and methods: Our research team consists of internationally recognized experts in language disabilities, genetics, electrophysiology, bilingualism, temperament, memory and learning as well as application of new media technologies. In the Helsinki Longitudinal SLI study (HelSLI) at the Helsinki University Central Hospital (<http://tiny.cc/helsli>), we will study and follow up to 300 3–6-year-old children with SLI and their 200 typically developing controls. Five subprojects study how the child's psychological characteristics and environment influence developmental language difficulties and how the child's well-being is affected by SLI, the characteristics of SLI in monolingual versus bilingual children, nonlinguistic correlates of developmental language difficulties, electrophysiological markers for SLI in individuals, and the role of genetic risk factors in SLI.

Results and conclusions: The main aim of the project is to increase our understanding of the multiple interactive risk and protective factors that affect the developing heterogeneous profile of SLI, including factors affecting literacy development. Further, this knowledge is used to develop new intervention schemes to better target not only the symptoms but also the etiological factors underlying the language difficulties.

98. What is the role of rapid automatized naming in learning disabilities?

Heikkilä, R. T. Niilo Mäki Institute

Objective: It is agreed that rapid automatized naming (RAN) is associated with reading and reading disabilities, but the evidence for the association between RAN and math disabilities and attention deficits is inconsistent. The objective of this presentation is to clarify the role of RAN in the field of learning disabilities and attention deficits.

Participants and methods: The participants of the study consisted of two clinical samples (n = 193 and n = 205; 1st to 6th grade) with comorbid problems in reading, math, and attention. The association between RAN and learning difficulties was explored with ROC analysis, logistic regression, analysis of variance, and Khi-square analysis to investigate if RAN had a unique connection to different learning difficulties when the comorbidity of these deficits was taken into account.

Results: The results for both samples showed that RAN was specifically associated with reading disabilities, especially when defined by reading fluency, and did not show any unique connection to math disabilities or to attention deficits.

Conclusions: The results of these studies strengthen the role of RAN as a skill underlying reading disabilities, especially when reading is characterized by dysfluent reading. While comorbid learning problems are common in clinical samples and should be acknowledged in the assessment and intervention, slow RAN seems to indicate deficits specific to reading.

Symposium

99. Cognition in Parkinson's disease: new evidence about reward processing, memory and time

Organizer: Elisa Di Rosa, Department of General Psychology, University of Padua (Italy)

Parkinson's disease (PD) is clearly associated with the development of cognitive and behavioural problems. The most part of these deficits may actually be the manifestation of an underlying executive dysfunction, which has been considered the most important cognitive impairment in this disease. However, PD patients manifest also cognitive deficits related to other cognitive domains like episodic memory, time perception and reward processing. Even if these disorders have been traditionally linked to PD neural basis, i.e. the progressive dopaminergic depletion in fronto-striatal circuits, recent literature is exploring the role of dopaminergic drugs in the development of cognitive and behavioural deficits in PD. Dopamine replacement therapy in fact, while restores PD motor deficits, may both improve and impair some cognitive functions. The talks will present investigations on cognitive deficits in PD patients, exploring the role of pharmacological treatment in their development. We will focus on reward processing, evaluating both behavioural and electrophysiological indices of feedback evaluation impairments. We also will address the role of both reward processing impairment and dopaminergic medication in episodic memory disorders. Finally, we will focus on time processing impairment, presenting new evidence about both electrophysiological and behavioural data about the effect of dopaminergic medication on this deficit. Actions of these behavioural and cognitive changes for rehabilitation will also be discussed.

100. Decision making and dopaminergic system: electrophysiological indices of reward processing in Parkinson's disease patients

Sami Schiff, Department of Medicine, University of Padua (Italy)

Objective: Recent researches reported behavioural and emotional impairment in Parkinson's disease (PD), even in the earliest stages. This impairment affects also decision-making and learning processes. The Iowa Gambling Task (IGT) is commonly used to examine the decision-making capacity. The purpose of the present study was to investigate the neural correlates of feedback evaluation in the decision-making process into a learning context, using IGT and event-related potentials (ERPs) in a group of non-demented medicated PD patients.

Participants and methods: Fifteen non demented PD patients and 15 healthy controls were recruited for the study. Both groups underwent the computerized IGT during electroencephalography (EEG) registration. To analyse ERPs, continuous EEG data were epoched within a time-window starting 1000 ms before and ending 1000 ms after feedback presentation and averaged separately for positive (i.e. win condition) and negative (i.e. loss condition) feedbacks.

Results: While controls demonstrated a correct feedback evaluation, PD patients did not show any learning, selecting more disadvantageous decks even in the last part of task. Furthermore, ERPs results revealed that controls showed a significant difference ($p < .05$) in ERPs morphology recorded after the win and the loss conditions, suggesting that positive and negative feedbacks were differently evaluated and processed. PD patients showed a different pattern: their ERPs morphology was the same for positive and negative feedback.

Conclusions: PD patients show an incorrect evaluation of context-relevant outcomes and this could explain cognitive and behavioural problems related to impulse control disorder.

101. Impact of reward and retention interval on episodic memory disorder in nondementing idiopathic Parkinson's disease.

Nicky Edelstyn, School of Psychology, Keele University, UK.

Objective: Studies of healthy elderly populations, in which there is a loss of dopamine neurons as part of normal aging, suggest that activation of the dopaminergic midbrain-hippocampal loop controls the persistence of episodic memories beyond 4-6 hours. This finding implies that in Parkinson's Disease (PD), episodic memory disorder will be more severe when assessed after 6 hours as compared to shorter retention intervals. The same dopaminergic midbrain also plays a central role in reward processing, raising the possibility that reward may have a facilitatory effect on PD memory disorder.

Participants and Methods: Both predictions were examined in the same cohort of medicated PD and demographically-matched healthy volunteers (HVs) using a yes/no verbal recognition memory test with 2 conditions. In the first condition, 50 memoranda were viewed at study, and acquisition of episodic memories was assessed at test following a 30 minutes retention interval. Condition 2 took place 24 hours later, and repeated the test phase only. The memoranda comprised 25 living and 25 non-living targets. An equal number of living and non-living distractors were presented at test. Participants were informed at study that accurate recognition of items from the living category only at test would earn financial reward. Estimates of item recognition, familiarity and subjective recollection of episodic details were collected.

Results and Conclusions: The findings will be discussed in relation to current assumptions about the nature and extent of episodic memory disorder in PD. The implications for memory assessment and rehabilitation will also be addressed.

102. A phase IV, randomised controlled crossover trial of the effects of ropinirole and pramipexole on episodic memory in idiopathic, nondementing, Parkinson's Disease.

Thomas Shepherd, School of Psychology, Keele University, UK

Objectives: A selective deficit in the recollection of episodic detail is frequently reported in Parkinson's Disease (PD). Previously, this deficit has been attributed to the dopaminergic dysregulation of prefrontal-dependent strategic memory processes. However, neuroimaging advancements suggest dopamine dysregulation of hippocampal-dependent memory processes may also be implicated. We explore the potential role for D2 receptors, by comparing pramipexole (which has a strong binding affinity for d3 subreceptors, less so for d2/d4) and ropinirole (which has a more broad spectrum affinity for d2/d3/d4 subreceptors) in a single blind, randomised controlled, crossover trial - funded by the National Institute for Health Research, Research for Patient Benefit (NIHR RfPB) Programme.

Participants and Methods: Patients were randomly allocated to one of two treatment arms. In treatment arm 1, patients were medicated with pramipexole for 6 weeks before completed two separate testing sessions; one in a medicated state ('ON') and another after a period of withdrawal reflecting 4 elimination half-lives of their medication ('OFF'). Patients then switched to ropinirole for 6 weeks before completing ON and OFF medication testing sessions. In treatment arm two patients started on ropinirole before switching to pramipexole. The order of the ON and OFF-medication testing sessions were counterbalanced across treatment arms. Episodic memory was assessed in each of the 4 sessions using matched versions of a two stage response, remember/know recognition task.

Results and Conclusions: The effects pramipexole and ropinirole have on episodic memory will be discussed. The wider implications for the clinical and dopaminergic management of PD will also be addressed.

103. Time processing in Parkinson disease

Patrizia Bisiacchi, Department of General Psychology, University of Padua (Italy)

Objectives: In two different experimental tasks we aimed at investigating 1) the time course of time discrimination by ERPs measurements and 2) the sense of agency in PD through the presence of Intentional binding (IB)

Participants and Methods: Task1: A time discrimination task was presented to PD patients and controls. Participants were asked to compare the duration of two successively presented pairs of visual stimuli; the first stimulus could last either 500 or 1500 ms, the second stimulus could have duration 30% shorter or longer than the standard one. At the same time ERPs were registered. Task 2: IB was assessed in PD patients and controls. Participants were asked to observe a stream of unpredictable consonants at the center of a screen in order to detect the letter displayed when a given event of interest (i.e., either a voluntary action or a sound) occurred.

Results: Task 1: ERPs results suggest that the on-line comparison process between the two durations, reflected by the CNV trend, was impaired in patients with Parkinson's disease and support the presence of a deficit of memory for time in such clinical population. Task 2: PD patients demonstrated a significant reduction of IB suggesting difficulties in integrating motor information with acoustic one in time.

Conclusions: Detailed mechanistic understanding of the neural circuits involved in perceptual timing in PD could lead to a greater understanding of the cognitive symptoms of PD and to targeted therapies for this difficult clinical problem.

Symposium

104. ADHD and intervention

Organizer: Fensbo, Lotte Section manager, Pedagogical-Psychological Counselling, Pedagogical Department, Århus

The talks will focus on the rationale and method in the interventions and illustrate preliminary results. In addition inform of the challenges experienced, conducting research in this area. And the strategies parents learn about the nature of ADHD and how to manage their child's behaviour through positive interaction and games that engage children's attention, encourage their patience and increase their concentration and self-regulation.

Social and personal costs with ADHD – in the society and for the individual by Anne-Mette Lange, Clinical Psychologist, Research Department, Center for Child & Adolescent Psychiatry, Aarhus University Hospital, Denmark.

Early intervention for ADHD: Training parents and teachers of 3-8 year old children with ADHD-difficulties by Marie Louise Rimestad*, Ph.d fellow, Institute of Psychology, University of Aarhus, Denmark

Treatment for young children with ADHD: The principles of the New Forest Parenting Programme by Anne-Mette Lange, Clinical Psychologist, Research Department, Center for Child & Adolescent Psychiatry, Aarhus University Hospital, Denmark.

105. Social and personal costs with ADHD – in the society and for the individual

Anne-Mette Lange, Clinical Psychologist, Research Department, Center for Child & Adolescent Psychiatry, Aarhus University Hospital, Denmark.

ADHD is associated with enormous costs to society and to the individual. This talk presents results from a large study based on extensive data from the Danish personal registers. The study has calculated the personal and social costs of untreated ADHD in adults, and shows that ADHD has significant and negative impacts on areas such as health care, the criminal justice system, education, the labour market and personal income. It will be argued that these costs are unnecessarily high and recommendations for future areas of intervention will be highlighted.

106. Early intervention for ADHD: Training parents and teachers of 3-8 year old children with ADHD-difficulties.

Marie Louise Rimestad, Ph.d fellow, Institute of Psychology, University of Aarhus, Denmark

Objective: Children diagnosed with ADHD often encounter difficulties early in life. Previous studies have established the effectiveness of parent training in reducing disruptive behaviour at home in preschool children but that the improvement rarely generalizes to other areas. Little is known of the effect of combining early intervention in both home and day care. This study investigates the effects of targeting the difficulties both at home and in day care or school.

Participants: Parents of children aged 3-8 years with ADHD-related difficulties self-refer to Center for ADHD, which is a non-profit LEGO-funded organisation specialized in early intervention for inattentive, hyperactive, impulsive and disruptive behaviour. Teachers and kindergarten caretakers of the participating children are invited to participate.

Interventions: Parent training is conducted with The Incredible Years parent training programme specifically targeting ADHD difficulties with duration of 18 weeks. Kindergarten and primary school teachers participate in a course of four days consisting of the core principles of the parent training programme.

The talk will mainly focus on the rationale for and core mechanisms in the interventions in addition to the challenges both in treating early onset ADHD as well as conducting research in this area.

107. Treatment for young children with ADHD: The principles of the New Forest Parenting Programme.

Anne-Mette Lange, Clinical Psychologist, Research Department, Center for Child & Adolescent Psychiatry, Aarhus University Hospital, Denmark.

International treatment guidelines recommend parent training as a first line treatment for ADHD in preschool children. The New Forest Parenting Programme (NFPP) is an evidence based treatment specifically developed to target ADHD symptoms and associated behaviours in young children with ADHD. The programme is developed in the United Kingdom by some of the world's leading ADHD experts and tested in randomised controlled trials (RCT).

In an attempt to develop and implement evidence based treatments for young children with ADHD in Danish Child and Adolescent Mental Health Services, the NFPP has been tested in a large RCT in Denmark over the past three years.

This talk will briefly introduce the Danish trial and focus on the presentation of the core principles behind the NFPP and the strategies parents learn about the nature of ADHD and how to manage their child's behaviour through positive interaction and games that engage children's attention, encourage their patience and increase their concentration and self-regulation.

Symposium

108. Prefrontal adaptive functions in neurological disorders; impact on outcome and effects of neuropsychological and neurosurgical treatment

Organizer: Spikman, JM RUG

Executive functions and social cognition are prefrontally regulated brain functions that are crucial for the ability to adapt behavior to complex social and task situations. Many neurological disorders, for instance severe Traumatic Brain Injury (TBI), Parkinson's disease (PD) and subarachnoid hemorrhage (SAH) are known to affect prefrontal areas or the brain circuits of which these areas are part of. Consequently, deficits in executive functions and social cognition can be expected, which are known to have a negative impact on daily life functioning. The present symposium focuses on the implications of these adaptive deficits for recovery and outcome, the extent to which these deficits can be target of neuropsychological treatment or the extent to which neurosurgical treatments might affect adaptive functions negatively or positively. The symposium will be introduced and reviewed by the chair, Joke Spikman.

Speakers.

1. Joke Spikman: Introduction; Frontal damage in relation to impairments in social cognition and executive function after TBI; consequences for behavior and outcome.
2. Anne Buunk: Executive deficits and prediction of outcome in patients with angiographically negative SAH or neurosurgically treated aneurysmal SAH
3. Marleen Gerritsen; Effects of deep brain stimulation of either globus pallidus (Gpi) or subthalamic nucleus (STN) on social cognition in Parkinson's disease
4. Thialda Vlagsma: ReSET (Strategic Executive Training); Effectiveness of a cognitive rehabilitation program for executive dysfunctioning in patients with Parkinson's Disease.
5. Marjon Westerhof-Evers: Effectiveness of a social cognition treatment (T-ScEmo) in patients with moderate to severe TBI

109. Frontal damage in relation to impairments in social cognition and executive function after TBI; consequences for behavior and outcome

Spikman, JM RUG

Timmerman, ME RUG

van der Naalt, J UMCG

Objective: Frontal lesions are common after serious TBI. In a range of studies from our research group, relations were found between frontal damage, deficits in frontal adaptive functions (executive functions and emotion recognition), behavioral changes and worse outcome. I will give an overview of these findings and present a recent study in which we investigated whether the presence of frontal abnormalities on CT on admission has predictive value for behavioral changes in the long term.

Participants and methods: Data of all patients with moderate to severe TBI admitted to the UMC Groningen between 2000 and 2010 were prospectively collected. Five to ten years later patients and their proxies were sent a questionnaire asking for behavioral or affective changes. 186 patients returned the questionnaire; they did not differ from non-responders regarding mean GCS score or age.

Results: A principal components analysis on the proxy answers revealed two factors, representing behavioral and affective changes. A single item: "getting angry more often" loaded equally on both factors and was analyzed separately. Patients were divided into two comparable (regarding GCS and age) groups, based on having CT frontal abnormalities (n=78) or not (n=108). The groups did not differ on the Affectscores, but the frontal group was significantly more often Angry and had significantly higher Behavioral scores than the non-frontal group.

Conclusions: Early indications of frontal damage have predictive value for the long term. Patients with frontal abnormalities had significantly more behavioural problems many years post-injury whereas affective problems were equally present in both groups.

110. Executive deficits and prediction of outcome in patients with angiographically negative SAH or neurosurgically treated aneurysmal SAH.

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Objective: Executive functions are crucial for adapting behavior to complex situations and are therefore likely to determine impaired daily functioning after subarachnoid hemorrhage (SAH). This study aims to investigate the presence of executive deficits and its predictive value on long-term return to work (RTW) after SAH. To assess the possible influence of neurosurgical treatment, differences between angiographically negative SAH (anSAH) and neurosurgically treated aneurysmal SAH (aSAH) are examined.

Participants and methods: 22 anSAH patients (mean age 53.4) and 59 aSAH patients (mean age 53) were investigated. Executive functions were examined using the Zoo Map, Trail Making Test (TMT), Letter Fluency, and Dysexecutive Questionnaire (DEX, including proxy version). The Role Resumption List (RRL) was used to assess RTW. Between-group comparisons were made using Mann-Whitney and independent t-tests.

Results: 45.5% of anSAH patients and 66.1% of aSAH patients reported incomplete RTW. Impaired performances on the Zoo Map, TMT and Fluency were found in respectively 54.5%, 4.5%, and 10.5% of anSAH patients and 62.7%, 15.8%, and 18.6% of aSAH patients. No significant differences in cognitive impairments were found between aSAH and anSAH patients. Considering the anSAH patient group, higher DEX and DEX Proxy scores were found in patients with incomplete RTW ($p < 0.05$).

Conclusions: Work resumption is seriously affected after aSAH and anSAH. Furthermore, executive deficits are present in this group, with more executive complaints in anSAH patients who report incomplete RTW. A more detailed analysis of these preliminary results will be performed to describe the predictive value of executive deficits on RTW.

111. Effects of deep brain stimulation of either GPi or STN on social cognition in Parkinson's disease

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Objective: The recognition of facial emotional expression is an important aspect of social cognition and plays a crucial role in social behavior. There is evidence for impaired emotion recognition in patients with Parkinson's disease, although results are inconsistent. Bilateral deep brain stimulation (DBS), of either GPi or STN, is common treatment in Parkinson's disease. Some studies showed that DBS-GPi has less negative side effects on cognition than DBS-STN, but to our knowledge no studies are available on the effect of DBS-GPi on emotion recognition. Comparing the effects of DBS-STN versus DBS-GPi on emotion recognition is the main focus of this study.

Participants and methods: This study is part of the larger NSTAPS-study, comparing the effects of DBS-STN versus DBS-GPi. Basic emotion recognition was tested in 114 controls and in 106 patients pre- and one year post- surgery, using the FEEST.

Results: Pre-operative the patients were less capable of recognizing the emotions Disgust, Fear, Anger and Sadness than control subjects. Pre- and post-operative the FEEST total score did not differ for the DBS-STN compared to DBS-GPi group. However, over time the GPi-group worsened on the FEEST scores while the STN-group did not.

Conclusions: In the present study we demonstrated a significant impact of Parkinson's disease on facial emotion recognition. Moreover, the influence of the DBS was not the same for patients with DBS-GPi and DBS-STN. Results suggest that DBS-GPi has a stronger negative effect on emotion recognition than DBS-STN, in contrast with literature suggesting a favorable cognitive outcome for DBS-GPi.

112. ReSET (Strategic Executive Training); Effectiveness of a cognitive rehabilitation program for executive dysfunctioning in patients with Parkinson's Disease

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Objective: Impairments in executive functions (EF) are predominant in Parkinson's Disease (PD). In contrast to patients with acquired brain injury (ABI), neuropsychological rehabilitation programs are not routinely offered to PD patients. Spikman et al. have showed that in ABI patients strategic executive training leads to more improvement in daily life executive functioning than a computer training. Therefore, we studied whether strategic executive training (ReSET) is also effective in PD patients.

Participants and methods: 43 PD patients were randomly assigned to either the experimental Strategic Executive Training (ReSET) (n=23) or Cogniplus (n=20), a computer training for aspects of attention. In both conditions patients set 3 individual goals that were related to executive functioning in daily life. Neuropsychological assessment was administered at baseline, 1-2 weeks and 3-5 months post treatment. Primary outcome measure: DEX questionnaire. Secondary outcome measures: goal improvement, PDQ-39 and BADS.

Results: 1-2 Weeks post treatment patients in both conditions showed improvement on the DEX questionnaire and executive goals, however the ReSET group showed more improvement. In both groups no differences were found between baseline and post treatment on the PDQ-39 and BADS. Results of the follow-up measurement are currently being analyzed.

Conclusions: Results show that cognitive rehabilitation of executive dysfunctions in general seems to be beneficial for PD patients, with some indications that strategy training is more effective than computer training. Future analyses are focusing on studying long term effects and answering the question which specific group of PD patients benefit most from cognitive rehabilitation of executive dysfunctions.

113. Effectiveness of a social cognition treatment (T-ScEmo) in patients with moderate to severe TBI

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Objective: Social dysfunction is frequently noted after moderate to severe traumatic brain injury (TBI). Social cognition (SC) refers to those brain processes involved in emotion processing, the evaluation of others' mental state and the response to social input. SC deficits manifest themselves as socially inadequate, disinhibited or indifferent behavior, which impairs the ability to maintain relationships, return to work and participate in society. A randomized controlled trial was conducted to evaluate the effectiveness of the Treatment of Social cognition and Emotion regulation (T-ScEmo), combining emotion processing, affect and theory of mind training and behavioral therapy.

Participants and methods: Sixty TBI patients, age 18-68 years, were randomly assigned to either the experimental treatment T-ScEmo, or the control treatment CogniPlus, which is a computerized attention training. Both groups received 20 1-hour individual sessions. Several outcome variables were assessed at pre, post-, and 3-5 months follow up, analyzed statistically with a repeated measures design.

Results: The T-ScEmo group demonstrated a significantly greater improvement than the CogniPlus group in the following areas (a) emotion recognition, (b) social role resumption, (c) overall role resumption (with respect to work, social relations, leisure activities and mobility), and (d) ratings on treatment goals. Moreover, the T-ScEmo group reported significantly higher scores on treatment satisfaction.

Conclusions: We conclude that T-ScEmo has resulted in a significantly greater improvement than CogniPlus in emotion recognition and social functioning in daily life, lasting at least up to 5 months post-treatment.

Paper session

Neglect, pseudoneglect and anosognosia

Chair, Mervi Jehkonen

114. The affective modulation of motor awareness in anosognosia for hemiplegia: Behavioural and lesion evidence

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Objective: The possible role of emotion in anosognosia for hemiplegia (AHP; i.e., denial of motor deficits following stroke), has long been debated between psychodynamic and neurocognitive theories; however, only a handful of case studies have focused on this topic. Therefore, the precise role of emotion in AHP requires further empirical investigation. We aimed to investigate how negative and positive emotions influence motor awareness in AHP. Using lesion overlay and voxel-based lesion-symptom mapping, we also investigated the brain lesions associated with AHP and motor awareness during the experimental task.

Participants and methods: Positive and negative emotions were induced under carefully-controlled experimental conditions in right-hemisphere stroke patients with AHP (n = 11) and controls with clinically normal awareness (n = 10). Changes in awareness were measured.

Results: Induction of negative emotion resulted in a significant improvement of motor awareness in AHP patients compared to controls. Positive emotion induction did not produce a significant change in awareness. Anatomical areas commonly damaged in AHP included the right-hemisphere motor and sensory cortices, the inferior frontal cortex, and the insula. Additionally, the insula, putamen and anterior periventricular white matter were associated with less awareness change following negative emotion induction.

Conclusions: Motor unawareness and the observed lack of negative emotions about one's disabilities cannot be adequately explained by either purely motivational or neurocognitive accounts. We propose an integrative account in which insular and striatal lesions result in weak interoceptive and motivational signals, which lead to faulty inferences about the self.

115. Multi-modal and multi-target environments hamper contralesional processing after both right and left hemisphere stroke

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Objective: After a unilateral stroke the processing of the contralesional space might become difficult if not impossible. We aimed to study, in an acute stroke population, the deficits of contralesional spatial processing induced by the need to perform a dual task (visual or auditory). Moreover, we measured performance changes determined by the need to process a target presented in the ipsilesional space.

Participants and methods: Thirty stroke patients (right and left hemisphere damaged) were tested in the first week from lesion onset. Both classic neglect paper-and-pencil tasks and a specifically designed computer-based task were administered. Computer-based tasks encompassed the mere detection (single-task) of lateralized targets (target presented left, right or simultaneously) or the coupling of target detection with a second response to a visual or auditory feature (dual-task).

Results: Computer-based tasks detected neglect and extinction more sensitively than classical clinical tests in this acute stroke population. Both dual-tasking and bilateral target presentation had a significant detrimental effect on the processing of the contralesional space. Also the performance of some patients affected by a left hemispheric stroke was deficient under cognitive load/bilateral target conditions.

Conclusions: Already from the acute phase attention-demanding computer-based tasks allow a much more sensitive assessment of spatial deficits than classic paper and pencil tests for neglect. The severity of contralesional extinction found in the bilateral target condition under dual-tasking confirms that the more relevant objects have to be processed, the worst patients' performance becomes.

116. The association of neglect-related rightward orienting bias on visual reasoning abilities – a one-year follow-up

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Objective: The aim was to find out the association of neglect-related rightward orienting bias on visual reasoning during a one-year follow-up after right hemisphere (RH) infarct.

Methods: The study included 25 patients with first-ever RH infarct and 50 healthy subjects (H). The patients were divided into two groups according to whether they showed rightward orienting bias (N+; n=16) or not (N-; n=9) at acute phase. Rightward orienting bias was assessed with the three Behavioral Inattention Test cancellation tasks and visual reasoning using the Picture Completion task from the WAIS-R at the acute phase and at six and 12 months. The differences in rightward orienting bias and visual reasoning were compared between the three groups at each time-point. The changes in these symptoms during the follow-up were analysed within the patient groups.

Results: The N+ group performed poorer than the N- group in visual reasoning at the acute phase, but then recovered and no longer differed at follow-ups. Also the rightward orienting bias of the N+ group recovered partly during the follow-up, but still differed from the performance of the H group at 12 months. In addition, at 12 months the N+ group spent more time on visual reasoning when the stimuli located on the left. This was not seen in the N- group.

Conclusions: Rightward orienting bias is associated with poorer visual reasoning at acute phase of stroke. Rightward orienting bias partly recovers during the year poststroke, but still occurs in most patients at 12 months and is then associated with slower reasoning time for left-sided stimuli.

117. The request of dangerous actions improves awareness in anosognosia for hemiplegia

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Anosognosia for hemiplegia (AHP) is a multifaceted syndrome where implicit residual forms of awareness may be spared (Cocchini et al., 2010; Fotopoulou et al., 2010). Among these, emergent awareness has been described as the increasing of verbal acknowledgment of deficits after attempting to act (Moro et al., 2011; 2013). Due to the well-known effects of dangerous stimuli in body representations (Haggard et al., 2013; Anelli et al., 2013; Romano et al., 2014) we investigated whether the request to perform potentially dangerous actions may influence patients' awareness.

14 hemiplegic patients (5 AHP and 9 controls) were asked to judge their proficiency in performing potential dangerous and non-dangerous actions. Judgements were asked: before, during (emergent) and after (post-error) their attempts to act (Liker scale: 1=bad to 10=good).

The two groups' awareness of motor deficits (patient-physiotherapist discrepancy in judgements) significantly differed ($Z=-2,867$, $p=0.004$).

In addition, AHP's judgements improved during the task ($\chi^2_{(2)}=9.57$, $p=0.008$). Although, general awareness for dangerous is better than for not dangerous actions ($Z=-2,02$, $p=0,04$), they both influence awareness; showing changes in emergent awareness for normal ($Z= -2.03$, $p=0.04$) and in post-error awareness for dangerous actions ($Z= -2,02$, $p=0.04$) by respect to pre-action statements. HP group did not report fluctuations in awareness ($\chi^2_{(2)}=2,31$, $p> 0.05$). But in dangerous actions they declared better their difficulties ($Z=-2,547$, $p=0.01$) and they recognized difficulties in post-error judgements ($Z= -2.20$, $p=0.02$). These results confirm the role of emergent awareness and bring evidence of emotional stimuli in improving anosognosia for hemiplegia.

118. Pseudoneglect in the tactile, visual and auditory modalities in older and younger adults.

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Young adults often allocate more attention to the left-hand side of space when making spatial judgements, a bias known as pseudoneglect which can also occur for mental representation. The lifespan pattern of this representational bias is, presently, unknown. In the current study a group of young and a group of older adults conducted three spatial bisection tasks: a touch-driven tactile rod bisection task in the absence of vision, an eyes-open visuospatial line bisection task and a mental number line bisection task where participants were asked to listen to a pair of numbers and respond with the numerical midpoint between the pair. Results showed that both younger and older groups demonstrated evidence of pseudoneglect (leftward biases) in the visual, tactile and auditory modalities and that the magnitude of pseudoneglect for each group was influenced by physical or mentally represented starting side (start left versus start right) and stimulus length. As the tactile and the number line tasks involve mental representation, this study represents the first exploration of pseudoneglect of mental representations in older adults. The results are consistent with the notion that pseudoneglect is a result of a right hemisphere attentional orienting process that is maintained in older adulthood. This pattern is difficult to reconcile with some current models of cognitive ageing which suggest that asymmetrical patterns of hemispheric activity decline in older age.