

Abstracts Presented at the International Neuropsychological Society, the Swiss Neuropsychological Society (SVNP) and the German Neuropsychological Society (GNP) Meeting Zurich

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WEDNESDAY AFTERNOON, JULY 26, 2006

Symposium 1/3:00-4:30 PM

Using Neuropsychological, qEEG and SPECT Data to Direct Pharmacological and Neurosurgical Treatment in Refractory Psychiatric Disorders

Host: Angelos Halaris

M. PRIMEAU, C. BLODGETT DYCUS. Neuropsychological Evaluation as a Means to Direct Psychiatric Intervention.

Question: When is a psychiatrist like a blind man touching an elephant? Answer: When the patient has a refractory psychiatric disorder. Treatment targeted to a presenting symptom, such as depression, may not be working because the patient's condition is neuropsychiatrically complex, "a different animal." One way to shine a brighter light on the patient's illness is to utilize neuropsychological assessment. Patients with prominent mood or behavioral symptoms may in fact have a primary dysfunction of neurocognitive networks, due to developmental or acquired injury, that helps account for their presenting symptoms and indicates a different course of treatment. Neuropsychological evaluation of refractory psychiatric patients is helpful to both the patient and the referring psychiatrist for several reasons. First, it allows for a detailed analysis of behavioral symptoms, inclusive of mood, personality, and cognitive abnormalities, which may not be evident on psychiatric exam. Additionally, a neuropsychological assessment quantifies behavior, which is important in order to evaluate changes with treatment and over time. Neuropsychological test protocols for this patient population will be outlined. In addition, research investigating neuropsychological abnormalities on the Rey Complex Figure in a group of diverse psychiatric patients will be presented. The argument will be made that patient characterization incorporating the neurocognitive profile, in combination with neurophysiological and neuroanatomical abnormalities, will permit the clinician to see the big picture and utilize more effective treatment than the traditional nosology and interview-based diagnosis would suggest.

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L. KONOPKA. Functional Neuroimaging, qEEG and SPECT, as a Means to Direct Psychiatric Intervention.

The use of quantitative analytical tools in neuropsychiatry is becoming more routine. These tools include neuroimaging as well as neurobehavioral analysis and testing. Each individual modality has inherent strengths and weaknesses, and no one tool is sufficient to

characterize pathology in patients with complex neuropsychiatric presentations. This part of the symposium will focus on providing specific examples of convergence in the data of diverse modalities in the clinical care of refractory psychiatric patients. In our laboratories, we utilize a combination of tools in order to obtain converging data as related to specific symptom clusters. We routinely use a combination of qEEG, evoked potentials, brain SPECT/PET, MRI/CT, and objective behavioral evaluation focusing on cognitive processes as well as mood regulation. We developed a technique whereby we combine qEEG with SPECT/PET, which captures brain electrical activity as well as perfusion/metabolism, and correlate these profiles to structural features defined by MRI/CT. We have found that in many cases individual assessment modalities would not have sufficed for appropriate interpretation of the data. Examples of diagnostic results, treatment decisions, and clinical outcomes will illustrate this principle.

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T. POPRAWSKI. Psychopharmacological Intervention Based on Neurological Investigations.

Psychiatrists working with patients responding poorly to treatment will reach a fork in the road: should they try polypharmacy and megapharmacy, risking iatrogenic impairment, or put aside the DSM and re-diagnose? In this part of the symposium, selected cases originally presenting with major depression, aggression, bipolar disorder, substance abuse, sociopathic behavior, or posttraumatic stress disorder will be discussed to illustrate the use of the interdisciplinary neurobehavioral work-up in guiding decisions about pharmacotherapy. Results of qEEG, SPECT, and/or neuropsychological evaluations in these patients identified CNS dysfunction that altered the case conceptualization and prompted trials of medications, such as psychostimulants, anticonvulsants, and vasodilating agents, that proved to be more efficacious than standard care for their presenting symptoms.

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D. ANDERSON. Future Directions in Neurosurgical Intervention, Vagal Nerve Stimulation and Deep Brain Stimulation, for Psychiatric Patients.

The neurosurgical intervention of deep brain stimulation may improve behavioral symptoms such as essential tremor by imposing electrical fields that modulate neural activity. This is accomplished by implanting electrodes into specific targets in the brain and controlling current to those targets by means of an impulse generator. This same method can be applied to other symptoms of neuronal dysregulation, like those found in refractory psychiatric patients. Current research is

investigating stimulation of the anterior limb of the internal capsule and the nucleus accumbens as a means of the treating symptoms of obsessive-compulsive disorder and major depression. This presentation will address the issues of patient selection for neurosurgical intervention, the mechanism of action of this approach, the preliminary outcomes in the patient series, and the multidisciplinary collaboration needed for this approach to treating refractory psychiatric patients. Future research will include methods that more specifically determine which patients would benefit from this novel intervention based on characterization of CNS functioning as well as on severity of psychosocial impairment.

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Symposium 2/3:00-4:30 p.m.

Clinical Rehabilitation Research: Challenges and Guidelines

Host: Ronald Ruff

R. RUFF. Methodological Challenges in Rehabilitation Research and Potential Solutions.

The aim of this presentation is to address the following four questions: (1) How can the treatment effects be separated from spontaneous recovery? A conflict can emerge between the clinical need to introduce treatment in the early stages and the traditional research design of waiting for the healing process to plateau before introducing cognitive remediation. The difficulty of determining the optimal time for intervention (early, middle, and late) will be discussed in the context of juxtaposing single case design with group multiple baseline design. (2) What is an acceptable control group? Although single case designs serve their purpose, optimal scientific validity is best achieved with control groups. The multiple trade-offs of control groups will be discussed, e.g., No Contact Control; Standard of Care; Active Control; Alternate Treatment Control. (3) How can we standardize treatments while also attempting to tailor the treatment to the patient's individual needs? This represents a significant challenge, since research protocols must determine the efficacy of a standardized intervention. A number of different levels of standardization will be discussed. (4) What is a good outcome? Discipline-based vs. patient-based expectations will be discussed. Finally, four levels of generalization will be introduced that range from treatment-specific gains to functional gains in daily life.

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L. SPINA. Outcome Measurement: Secondary and Tertiary Levels of Generalization.

The measurement of generalization of cognitive interventions to neuropsychological measures in research is a task often required of neuropsychologists. The need for these levels of generalization in relationship to the intervention and to other outcome measures will be addressed. Some of the difficulties that neuropsychologists are often faced with in choosing appropriate neuropsychological test(s) include issues related to expected results versus exploratory analyses, numbers of tests to use, sensitivity to improvement, test-retest reliability and practice effects, the relationship of the neuropsychological tests to the intervention and to the population being studied. Measures of mood, social functioning, activities of daily living and quality of life are often an essential but unmeasured

part of an intervention outcome. In many cases where such psychosocial measures are used, they are often inappropriate for the study, thereby impeding positive findings. As with cognitive measures, psychosocial measures need to be considered in terms of specific hypotheses of their relationship to the intervention, and special attention needs to be paid to the population under study. Considerations in choosing neuropsychological and psychosocial measures in cognitive intervention studies will be discussed with use of examples.

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Paper Session 1/3:00-4:30 p.m.

Attention

Chair: Peter Brugger

I.A. HEBER, J.T. VALVODA, T. KUHLEN, & B. FIMM. Differential Effects of Low Arousal on Overt and Covert Orienting in Virtual Space

Alertness and visuo-spatial attention are controlled by overlapping neural networks and interact on a functional level. Symptoms of neglect might be a consequence of lesions of either of them and can be reduced by alertness training. In healthy subjects, individual differences in alertness state or general capacity can modulate pseudoneglect. Since visuo-spatial asymmetries in neglect patients might be limited to either peripersonal or extrapersonal space, thus showing the respective dissociation of dorsal and ventral processing in the brain, we assessed both the influence of the level of arousal as well as the spatial depth of the stimuli on the distribution of visuo-spatial attention in healthy subjects. 20 male adults performed an overt and a covert orienting task in a Virtual-Reality-environment at four points in time (9 p.m., 1 a.m., 5 a.m. and 9 a.m.) during 26 hours of wakefulness. Stimuli were presented in peripersonal and extrapersonal virtual space to assess spatial attention within different planes of depth. Our results indicate a dissociation between overt and covert orienting of attention concerning the impact of a low arousal level. Covert orienting to left-sided incorrectly cued stimuli was significantly slowed in both planes of depth (with a slight emphasis on extrapersonal space) with maximally reduced arousal. However, no spatial asymmetry was observed in either depth for overt orienting. Thus, the specific mechanism of covert reorienting seems to be modulated by the alertness network, whereas spatial aspects of overt orienting remain unaffected.

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R.CK. CHAN, Y. WANG, Y.Y. DENG, C. ZHANG, Z.L. DOU. Multitasking Performance in Patients with Neurological Disorders: A Study of Three Sets of Ecologically Valid Tests.

Objective: Most recently, some ecologically valid tests of multitasking have been developed from the theoretical model of Supervisory Attentional System, namely the Six Elements Test (Shallice & Burgess, 1991), the Hotel Test (Manly et al., 2002), and the Greenwich Test (Burgess et al., 2000). Preliminary studies using principal component analysis (Chan et al., 2005) and confirmatory factor analysis (Chan et al. 2006) have demonstrated that these three tests are actually capturing different components of multitasking performance in healthy volunteers: intentionality, strategy allocation, prospective memory and planning, memory and learning, and monitoring. However, no research has been conducted to explore the clinical utility of these factor scores in clinical sample. This study aimed to examine the multitasking performances in a group of

patients with neurological disorders. Method: The Six Elements Test, Hotel Test, and Greenwich Test were administered to 25 patients with brain lesions and 25 demographically matched healthy controls. Results: Patients showed remarkably poorer performance than the controls in intentionality, strategy allocation, prospective memory & planning, memory & learning. Patients with lesions in different brain areas also showed a differential profile of multitasking performance. In particular, patients with frontal lobe lesions demonstrated significantly worse performance in memory and learning, and monitoring components than those with posterior lobe lesions. Conclusions: The preliminary findings suggest that these three multitasking tests demonstrate impressive sensitivity to differentiate patients from healthy controls. The factor scores derived from these tests could further discriminate patients with different lobes lesions.

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J. ROSSMUELLER, V. KRAUSE, S. GOALSZEWSKI, & V. HOEMBERG. Combined Electrophysiological Stimulation and Visual-Exploration Therapy in Unilateral Spatial Neglect: Therapeutic Implications.

Therapeutic interventions aiming at reduction of neglect symptoms include afferent electrophysiological stimulation via transcutaneous nerve stimulation (TENS), visual exploration training (VIS EX) and exposure to slowly moving stimuli that are thought to facilitate attentional directing responses to the left hemisphere (optokinetic stimulation, OKS). Recent studies imply that respective interventions result in considerable reduction of neglect symptoms. However, the remission of neglect symptoms is rarely complete and residual deficits undermine independence in ADL. Further, the application of TENS-stimulation is limited when the training candidate reports aversive sensations resulting from the above-threshold current intensity. The MESH-Glove may represent an alternative to overcome this problem: It allows the activation of the sensory cortex through application of subthreshold current intensities to the contralateral hand. Starting with the hypothesis that activation of perilesional tissue via MESH-Glove may induce beneficial effects on neglect symptoms and that combination of therapeutic techniques may bear additional positive effects on visuo-spatial neglect, we contrasted combined electrophysiological and visual-explorative therapy using TENS+VIS EX+OKS (n=10) vs. MESH+VIS EX+OKS (n=10). Both therapeutic interventions significantly decreased inattention to the left hemisphere in our patients suffering from right-hemisphere cerebrovascular accidents and the improvement in both experimental groups was higher than in our control patients who received VIS EX+OKS (n=5) without additional electrophysiological stimulation. We thus feel encouraged to favour MESH-Glove-stimulation in the treatment of neglect because of the potentiality to stimulate with currents below the threshold of subjective detectability.

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S. REPPERMUND, J. ZIHL, S. LUCAE, S. HORTSMANN, S. KLOIBER, F. HOLLSBOER, M. ISING. HPA System and Cognitive Functions in Depression: Is there a Relationship?

In depressed subjects, alterations in the hypothalamo-pituitary-adrenocortical (HPA) system are consistent neurobiological findings. It has been shown that subjects with an increased HPA activity after remission have an elevated risk for relapse. Depression is also frequently accompanied by cognitive impairments which may predict the course of depression. Aim of the present study was to investigate the relationship between the HPA system and cognitive functions in subjects with depression. We want to find out whether cognitive functions and the HPA activity have predictive value for the course of depression. We measured HPA activity in 75 depressed inpatients by the combined dexamethasone(DEX)/corticotropin-releasing hormone(CRH) test and assessed cognitive functions on admission and at discharge. Cognitive impairments were present in all neuropsychological tasks both on admission and at discharge although

depressive symptoms were significantly reduced. Selective attention performance was correlated with cortisol response at discharge, and treatment induced changes of cortisol response were correlated with improvements in selective attention. Information processing speed was associated with depression level. Changes in cortisol responses and improvement in short-term memory were only found for remitted subjects. Most correlations between cortisol responses and cognition were found in subjects without remission. The association between cortisol responses and cognitive functions is not just an artefact due to depressive symptoms. Cortisol levels are associated with cognitive performance that can be dissociated from processing speed, which is correlated to depressive symptoms. We suggest a relationship between the HPA system and cognitive functions with differences for remitted and non-remitted patients.

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C. FLAHERTY-CRAIG, A. WOLGREN, Z. SIMMONS, & M. KOTHARI. Disruptions in Cognition and Personality in Adult-Onset Myotonic Dystrophy Type-1.

This study examined the relationship between acquired cognitive and personality change in adult-onset Myotonic Dystrophy Type 1(DM-1), and disease related disruptions to pituitary functioning. We hypothesized that disruptions to the pituitary-hypothalamic-cingulate network would lead to disruptions in anterior cingulate regulatory processes, resulting in impairments in visuospatial processing and personality. DM-1 is known to be associated with pituitary dysfunction, cognitive impairments and changes in personality, including apathy and avoidance. Subjects included 10 adult-onset DM-1 subjects, 7 with pituitary dysfunction associated diabetes. Cognitive evaluation included COGNISTAT and RBANS sub-tests of visuospatial processing and the Stroop test of visual attention/interference. IQ was estimated by the NART and TONI. Mood was assessed by the POMS. Personality was evaluated with the SCIDS-II. IQ scores were compared by a t-test. Group differences were evaluated by Mann-Whitney U tests. Verbal IQ (M=110.3) was significantly higher than non-verbal IQ (M=82.7) (p<.0001). Significant differences were seen between non-diabetic and diabetic groups for POMS Tension-Anxiety (p<.016), and Vigor-Activity (p<.028) traits, SCID-II schizotypal (p<.035) and schizoid (p=.051) traits, non-verbal intelligence (p<.022), Stroop Interference (p=.071), and visual delayed recognition recall (p<.022). Current findings support the contention that symptoms of cognitive impairment and personality change in adult-onset DM-1 relate to disruption in the pituitary-hypothalamic-cingulate pathway, with consequent disruption to visual attention/perception and emotional temper. The juxtaposition of these changes results in alteration of personality, characterized by diminished attentional self-monitoring and emotional withdrawal. This has relevance to patient care, as management with stimulant medication could result in greater motivation to comply with treatment recommendations.

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Paper Session 2/ 3:00-4:30 p.m.

Memory I

Chair: Katharina Henke

T. EDGINTON, A. JANSARI & C. HASLAM. Retrograde Affective Memory Loss: An Investigation of a Non-Selective

Emotional Autobiographical Memory Impairment Post-Right Temporal Lobe Craniotomy.

Impaired recollection of emotional autobiographical memories has been associated with temporal lobe damage (Buchanan et al, 2005). Jansari et al (2005) have also shown that even when some patients do recall autobiographical memories, they can be devoid of emotionality. The impairments therefore tend to be highly selective and specific suggesting functional dissociations between the underlying cognitive architecture that supports generation, representation and perception of emotion. We report the case of a 34 year-old patient with severe post-morbid emotional memory deficits following a right temporal craniotomy to remove a benign haemangioma. Autobiographical memory was assessed using the standard AMI and the more sophisticated JWALK (Jansari and Ward, 2005) to specifically investigate the emotional components of memory recollections associated with personal autobiographical life knowledge. In addition, a Flashbulb Memory test, assessing recollection for public events, was administered which further fractionated recall into factual, emotional and autobiographical components. Results confirmed a general deficit in emotional memory recollection. This was in stark contrast with normal identification of emotional expression and perception of affective prosody on the TASIT (McDonald et al, 2003) the Facial Emotion Test and the Adult Eyes Test (Baron-Cohen et al, 2001). We discuss the bearings these findings have on our understanding of autobiographical and emotional memory processes.

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P. KLAAS, R. BUSCH, J. HAUT, A. MCGILL, R. NAUGLE, I. NAJM, & W. BINGAMAN. Faces and Spaces: An Examination of Memory for Faces and Spatial Locations in Patients Undergoing Anterior Temporal Lobectomy.

Chiaravalloti (2004) examined nonverbal memory in adult patients with medically intractable epilepsy before and approximately three weeks after anterior temporal lobectomy (ATL) to determine if right (R) and left (L) mesial structures process different types of nonverbal information. The RATL group demonstrated lower scores than the LATL group before and after surgery on a face memory measure but not a test of spatial location. Further, the LATL group demonstrated improvement in face memory following surgery, but the RATL group did not. The current study investigated nonverbal memory as assessed by the Spatial Span and Faces subtests of the WMS-III among 206 adults prior to and approximately 7 months after LATL or RATL. There were no demographic differences between the groups. The RATL group had significantly lower scores than the LATL group on the Faces subtest before and after surgery. Differences between the groups on Spatial Span were not significant at either test administration. Both groups demonstrated small gains in performance on both subtests post-operatively; however, examination of postsurgical changes using Reliable Change Indices indicated that none of those changes exceeded improvements expected due to practice effect. Like the Chiaravalloti study, the results of this study suggest that face recognition is mediated by the right temporal lobe whereas spatial location is not clearly lateralized. However, this study did not demonstrate changes on memory subtests after surgery beyond those expected due to practice effect perhaps due to the longer test-retest interval among subjects during this study.

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M. MIYAHARA, J. GLASS. Metamemory, Ageing, and Dementia of Alzheimer Type.

This study tested the metamemory deficit hypothesis for age-related decline of working memory for hand movements by examining spontaneously recruitment and instructional effects of verbal labelling strategy in 20 patients diagnosed with mild to moderate dementia of Alzheimer's type, 20 young university students, and 20 healthy older adults. Although all university students formed verbal labels spontaneously, 11% of the Alzheimer patients and 18% of the healthy

older adults did so. After the verbal labelling instruction, both Alzheimer patients and the healthy older adults equally improved the memory capacity, and no group interaction was observed. The students also benefited from the instruction slightly, but not as much as the Alzheimer patients and the healthy older adults. These results lent support to the metamemory deficit hypothesis in that the central executive functions of monitoring the memory process and recruiting the mnemonic strategy decline in consequence of ageing and dementia of Alzheimer type. However, there was no significant interaction between age group and instruction treatment, suggesting the need for further investigation into factors other than verbal labels.

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R. D. NAIR, & N. B. LINCOLN. A Comparison of the Effectiveness of Two Types of Cognitive Rehabilitation Strategies for Memory Deficits Following Brain Damage: A Single Blind, Randomised Control Trial.

Memory difficulties are common following traumatic brain injury (TBI), stroke, or multiple sclerosis (MS). There is inconclusive evidence of the effectiveness of cognitive rehabilitation strategies due to a paucity of well conducted randomised controlled trials (RCTs). However, cautiously positive results have been reported with single-case designs and small group studies. Objective: To compare the effectiveness of a "high-tech" (use of internal and external memory aids) and a "low-tech" (use of internal memory aids) cognitive rehabilitation programme for memory problems following TBI, MS, and Stroke, using a single-blind, RCT; with a control group to address issues of spontaneous recovery. Methods: Participants with memory problems were referred from local hospitals and rehabilitation centres. Language skills, executive and memory functions, mood, and ADL were assessed at baseline. Participants with Overall Profile scores of 0, 1, or 2 on the RBMT-E were randomly allocated (in blocks of four) to a "high-tech", "low-tech", or control group by an independent randomisation centre. The rehabilitation programme consisted of 10 weekly sessions, each of 1.5h duration. Follow-up assessments were carried out at 5 and 7 months post-randomisation by an assessor, blind to group allocation. Independent assessors also undertook time-sampling of the group process and a feedback interview with participants. Results: 44 participants were assessed at baseline. 28 have completed the group sessions, and 12 are due to complete the programme in May 2006. Groups did not significantly differ in age, premorbid IQ, and mood. Results comparing the treatment groups and control group at follow-up will be presented.

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M. C. CHEUNG, A. S. CHAN, & Y. C. HO. Pre-Activating the Mesial Temporal Lobe Facilitates Learning.

Objective: To study the effects of temporary increases in blood oxygen level activated by the novel picture encoding task (NPET) on subsequent learning in normal subjects and patients with temporal lobe epilepsy (TLE). Methods: Thirty healthy, right-handed individuals and 18 pre-operative patients with TLE (14 left, 4 right) were recruited. Two groups were matched in age, level of education and gender. Before the scanning, we evaluated the verbal memory of each subject using the Hong Kong List Learning Test. During fMRI, a block design with three epoch cycles was employed and each cycle consisted of a 20-second NPET and a 20-second visual fixation task. After fMRI, each subject undertook 2 minutes of the NPET outside the scanner and their memory was assessed using another word list that consisted of 20 two-character Chinese words. Results: The level of blood oxygen level-dependent (BOLD) signals in the mesial temporal lobe associated with the NPET predicted subsequent performance on episodic memory for normal controls and patients with temporal lobe epilepsy, after controlling for their baseline memory performance. In addition, patients demonstrated significantly greater improvement on this subsequent memory test than normal

controls after engaging in the NPET but the performance returned to impaired range after one year. Conclusion: Though the improvement was transient, the present study provided a neuro-physiological evidence to support our previous hypothesis that if a specific region of the brain is activated by a particular cognitive task, that brain region will be more ready for cognitive tasks that immediately follow.

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Symposium 3/ 5:00 – 6:30 p.m.

Neuropsychology and Neurobiology of Schizophrenia

Host: Kristina Fast

E.S. HARALANOVA. Interactions between Affect and Cognition in Paranoid Schizophrenia: The Role of Psychosis.

OBJECTIVE: Although both emotional dysregulation and cognitive dysfunctions in schizophrenia are well documented, the interactions between them remain unclear. The aim of the study was a comparison between schizophrenic patients and healthy controls, based on their cognitive evaluation of emotional arousal (EA) and the effect of EA on recognition memory performance (RMP). **METHOD:** 30 patients with paranoid schizophrenia (15 psychotic and 15 post-psychotic) and 30 matched healthy controls performed two tasks: 1) Picture-viewing task: 40 affect-laden pictures of different social situations were presented randomly and the subjects had to rate each picture, according to the EA level it provoked. 2) Immediate recognition task: the 40 target pictures were intermixed with 40 new ones. **RESULTS:** Both schizophrenic groups differed significantly from the control group in terms of higher EA for the neutral pictures and higher overall EA for the whole set of pictures irrespective of affective category; as well as in terms of worse overall RMP, and greater number of misses for pictures rated as low-arousing. The psychotic patients differed significantly from both the post-psychotic patients and the healthy controls in terms of higher EA for the neutral and positive pictures; as well as in terms of greater number of misses for pictures rated as highly arousing. The main finding was that cognitive dysfunctions interact with emotional dysregulation and vice-versa, especially during psychosis. **CONCLUSION:** The study provided measures for abnormal interactions between affect and cognition, discriminating psychotic from post-psychotic patients, as well as both schizophrenic subgroups from the healthy controls.

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J. DAUMANN. Deficient Inhibition of Return (IOR) in Unmedicated Patients with Schizophrenia, but not in Patients in Risk for Psychosis.

Background: Previous studies reported delayed or overall deficient Inhibition of Return (IOR) in medicated patients with schizophrenia. This deficit may represent a trait or vulnerability marker of psychosis. However, neuroleptics may have contributed to the deficit reported. We studied orienting of attention in unmedicated patients with schizophrenia and in risk populations. **Methods:** A covert orienting of attention task with peripheral non-predictive cues and two SOAs (100ms, 800ms without and with cue-back manipulation) was administered to 20 unmedicated patients with schizophrenia (SCH), 29 subjects in a prodromal stage of psychosis (PRODR), 30 first-degree relatives (REL), and 50 healthy controls (CON) divided in a younger CON group which was matched for age with the SCH and PRODR group and an older CON group which was matched for age with the REL group. **Results:** ANOVA for validity effects (RTInv-

RTval) revealed no main effect of group, yet an interaction SOA x group ($p=0.006$). Subsequent one-way ANOVAs for the three validity effects yielded a significant effect of group only for the validity effect with the 800ms SOA reflecting IOR ($p=0.045$). In post-hoc tests SCH differed from most other groups (SCH vs. PRODR, REL, CONyoung, and CONold). **Conclusions:** The results are in line with an impairment of IOR in unmedicated SCH, but not in risk populations. The impairment was subtle and reinstated by a cue back manipulation which favors the development of IOR. Deficient IOR in SCH is not secondary to medications. It is associated with psychosis per se, but not with vulnerability for psychosis.

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B.B. QUEDNOW. Neuropsychological and Electrophysiological Risk Indicators in Presumed Prodromal Stages of Schizophrenia.

Neuropsychological impairments and electrophysiological alterations are frequent in schizophrenic patients and subjects genetically at risk for schizophrenia. We test whether similar changes indicating vulnerability are present in subjects suffering from symptoms typical for prodromal stages of schizophrenia, and whether these changes are predictive for later disease.

In the early recognition and intervention program of the German Research Network on Schizophrenia, subjects in a putative early prodromal stage (defined by the presence of basic symptoms, Klosterkoetter et al. 2001) or in a putative late prodromal stage (defined by attenuated positive symptoms or by brief occurrences of psychotic symptoms) undergo neuropsychological and electrophysiological assessments. As compared to healthy matched controls, late prodromals have significantly inferior verbal memory, verbal fluency, visual motor skills, and working memory. Impairments are qualitatively similar, but less pronounced in subjects in an early prodromal stage, with deficits of immediate verbal memory, verbal fluency and visuomotor performance being significant. In early prodromals, aspects of cognitive performance are related to the occurrence of psychotic symptoms during follow-up. Moreover, early prodromals as well as late prodromals show a sensorimotor gating deficit measured via prepulse inhibition of the acoustic startle response. In contrast, startle reactivity and habituation decreased only with increasing proximity to presumed onset of schizophrenia. In agreement with genetic high-risk studies, these results indicate that neuropsychological and electrophysiological deviations are present well before the onset of schizophrenia and can validate and improve psychopathological risk assessment. Funded by the German Federal Ministry for Education and Research (BMBF; grant 01 GI 9934).

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S. KARCH. Integration of Temporal and Spatial Aspects of Attentional Processes in Schizophrenic Patients.

Schizophrenia is characterised by marked disturbances of attention and information processing. Patients often have difficulty focusing on relevant and avoiding distraction by irrelevant information. It is assumed that these deficits might be the consequence of functional and anatomical variations especially in frontal and temporo-parietal brain regions and their interaction respectively. We simultaneously recorded ERP and functional MRI data to examine brain regions which are important for attentional processes and examined differences in the intensity of neuronal activity as well as temporal aspects of neuronal participation in schizophrenics and healthy controls. The study comprises 14 patients with schizophrenia and 14 age matched controls with no known history of neurological or psychiatric disorder. The subjects performed an oddball task requiring responses to infrequent tones presented in a series of frequent tones of a different pitch. MR imaging was performed at 1.5 T Siemens Sonata scanner (EPI sequence; 12 slices; TR/TE: 3000/53 ms). EEG signals were recorded with an MR-compatible amplifier (61 channels;

international 10/10 system). The EEG recordings produced the expected positive deflection after the presentation of infrequent stimuli in normal controls and a reduced reactivity in schizophrenics. Concerning functional MRI task execution was associated with BOLD activations in the thalamus as well as temporo-parietal and frontal brain regions, especially the anterior cingulate cortex, SMA and insula. In patients comparable brain regions were activated but to a significant lesser extent indicating pathological processes in a widespread network of brain regions. Further analysis will determine the temporal characteristics of the brain regions mentioned.

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K. FINKE. Parameter-Based Assessment of Attentional Components in Schizophrenic Patients.

Disturbances of selective attention are core symptoms of schizophrenia and are closely related to the patients' clinical and functional impairments. In addition, after remission from clinical symptoms a subgroup of patients still shows cognitive deficits, which are potential markers for a higher relapse risk. An approach based on Bundesen's "theory of visual attention" (TVA) provides a mathematically explicitly formalised model of selective attention that can be applied by using experimental tasks, whole and partial report, which share highly consistent presentation- and response conditions. In this way, four aspects of selective attention can be measured independently: perceptual processing speed, working memory storage capacity, spatial distribution of attention, and top-down control. We studied post-psychotic schizophrenic patients and matched control subjects with the TVA-based paradigms to get a quantitative description of the four subcomponents of selective attention and to relate these to different symptom subtypes. Furthermore, the analysis of separate components was related to neuropsychological test performance, in order to study the contribution of impaired basic attention mechanisms to more complex functions.

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Symposium 4/5:00 – 6:30 p.m.

Neuropsychology of "Paranormal Belief"

Host: Peter Brugger

S. PARK. Syndromes of Schizotypy and the Dopamine System.

While much is known about the neural correlates of positive, negative, and "disorganized" symptoms in schizophrenia, the cortical and subcortical contributions to the corresponding schizotypal personality in healthy individuals remain largely unexplored. The cardinal features of positive syndrome of schizotypy are perceptual aberration and magical ideation. Although the extent of the paranormal ideation is mild in healthy schizotypal individuals, they show working memory deficits that have been suggested to be an endophenotypic marker for schizophrenia, and working memory is mediated by the dopamine (DA) system. We examined DA D2 receptor levels in healthy individuals using PET with [18 F]-fallypride, a potent D2 ligand, which allows examination of both cortical and subcortical DA receptor binding. We also assessed schizotypy using the Schizotypal Personality Questionnaire (SPQ). Patterns of correlations between D2 receptor levels and the positive syndrome (perceptual aberrations, referential ideas and magical thinking) were rather different from those obtained from negative syndromes (social withdrawal, constricted affect), with little overlap. Positive syndrome was correlated with D2 receptor levels in the basal

ganglia, insula, and lateral thalamus bilaterally. Increased negative syndrome, however, was associated with increased D2 receptor binding in the left medial temporal cortex. These findings provide clear support that even mild, "paranormal" ideation is correlated with characteristic distribution and functioning of the dopamine D2 receptors.

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B. FOLLEY. Right Hemisphere Creativity: Modulation by Paranormal Belief.

We investigated creative thinking process in relation to hemispheric laterality and schizotypy in two studies using behavioral and near-infrared optical imaging methods. In Study 1, a novel "alternate uses" task that required subjects to generate "uses" for conventional and ambiguous objects, was employed to assess divergent thinking ability in schizophrenia patients, individuals with magical ideation (psychometrically-ascertained schizotypes) and healthy controls. In Study 2, prefrontal activity in the same groups was measured using near infrared optical tomography (NIROT) while subjects were engaged in divergent thinking and control tasks. Behavioral data from both studies indicated that schizotypes had enhanced divergent thinking, while schizophrenic and normal control subjects showed similar performance overall. NIROT data showed that although divergent thinking activated the prefrontal cortex (PFC) bilaterally, the right PFC specifically contributed to the enhanced creative thinking in schizotypes compared to the other two groups. These results suggest that schizotypes show enhanced creative ability. In addition, our data indicate that creative thinking robustly recruits bilateral PFC, but that the right PFC may be preferentially recruited in schizotypes to provide enhanced creative ability. These data suggest that the anomalous cerebral lateralization observed in psychotic and psychoses-prone populations may have an adaptive use.

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C. MOHR. Hemispatial Attention and Magical Ideation.

Psychosis-associated deficits of spatial attention have been related to both left hemisphere and right hemisphere impairment. To disentangle illness-related effects and effects secondary to psychiatric disorder (e.g., medication, hospitalization), we investigated hemispatial attention in healthy volunteers as a function of "magical ideation", i.e. a healthy analogue of delusional ideas of reference. Findings from a variety of paradigms (line bisection, veering and turning behavior, eye movement analyses, among others) point to a relative overrepresentation of the left side of body and space in individuals with pronounced magical thinking. Although compatible with left hemisphere dysfunction, these convergent results are better interpreted as "positive symptoms" of a secondary overcompensation by the right hemisphere.

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Paper Session 3/5:00 – 6:30 p.m.

Developmental Neuropsychology

Chair: Paula Tallal

C. OTTO-MORRIS, B. SCHMAUCH, E. THIESSEN, G.

CARLSSON, U. STEPHANI & A. CLAASS. Neuropsychological

Outcome of a Northern German Cohort with Very and Extremely Low Birth Weight at Primary School Level.

Neurological and developmental problems of children born very preterm have been studied extensively (e.g. Marlow et al 2005). Anderson et al (2005) showed impairments in neuropsychological functioning in this group. In a northern German cohort study, 133 preterms (65,84% of all survivors) with a birthweight below 1501g were followed-up. They were examined regarding the neuropsychological outcome at primary-school level and its relation to neurological impairment. Data on schooling and measures of IQ, verbal learning and recognition, short and long term visuoconstructive and verbal memory, attention, reaction time and impulsivity were obtained (94,74% of the group). Nonparametric analysis showed highly significant ($p < .01$) better short term verbal memory, long term visuoconstructive memory and IQ for the age- and sex matched and at term delivered controlgroup (60 of 68 controls so far) in comparison to preterms without ($n = 85$) and with ($n = 41$) identified neurological impairment (Intracranial haemorrhage I-IV, periventricular leucomalacia, seizures, CP). The controls achieved better results ($p < .05$) on verbal learning and recognition tasks than the preterms. Preterm boys showed more impulsivity than preterm girls, SES was positively correlated with IQ and short term verbal memory in this group. Logistic regression analysis confirmed that prematurity is significantly related to short term verbal memory and IQ and will be applied again when the data collection is completed. These preliminary findings show a different outcome for preterms and controls in IQ and verbal memory. However attention parameters were non-significant. Unexpectedly the results were not related to neurological impairment but only to prematurity.

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A.S. CHAN, Y.C. HO & M.C. CHEUNG. MindBody Exercise Program Improved the Behavior and Memory in Children.

Mind-body exercise is a type of traditional Chinese exercise that focuses on training the coherence of body and mind by performing each movement relaxingly and smoothly. Recent studies have suggested that this type of exercise have positive effect on improving the mood and memory of elderly, but little is known about its effect on children. Thus, the present study evaluated the effects of mind/body exercise on a group of primary school children by randomly assigning them to the experimental (mind-body exercise) and control groups (tutorial class). For each group, a total of forty 30-minute sessions were held after school. The children's behavioral performance and memory were measured before and after the program. Results indicated that children in the experimental group showed significant reduced symptom on the Global and Internal Scales on the CBCL-TRF as reported by their teachers, who were blind to the experimental design. Specifically, the children demonstrated fewer inattentive and withdrawal problems after practicing the mind/body exercise. In addition, by using clinically validated verbal memory test, the children in the experimental group showed greater improvement in their learning ability. The present results suggest that mind-body exercise seems to be effective in improving the behavioral problems and learning in children.

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E. TALBOT & A. STARZA-SMITH. Encephalitis in Childhood: Specific Patterns of Impairment and their Implications for Service Provision and Rehabilitation Pathways.

Encephalitis-related acquired brain injury (ABI) in childhood and adolescence can have significant neuropsychological implications, often presenting complex and severe life-long cognitive impairments and psycho-social disability. Childhood encephalitis continues to be a clinical area of limited investigation and expertise, the majority of

research focusing on encephalitis across age ranges or encompassed within research into ABI. The illness can be difficult to diagnose in children and residual impairment can vary due to factors such as age of onset, duration of illness and timeliness of treatment. With temporal and orbito-frontal lobes often implicated children who survive encephalitis can suffer deep memory and personality problems, affecting their entire developmental trajectory and impacting on future adult independence. We present the case of a nine-year-old child with post-encephalitis brain damage acquired at six years of age. Encephalitis-specific patterns of neuropsychological and psychological impairment are demonstrated, such as severe memory deficits and compromised executive function. Consequent implications for education, prognosis and family support are discussed, particularly in view of consequences of frontal brain damage impacting on development, behaviour and new learning. Data from serial neuropsychological assessments are presented, including WISC-IVUK, D-KEFS, CMS, Draw-a-Person Test, clearly identifying very specific neuropsychological deficits. The results are discussed with reference to the spectrum of severity of encephalitis seen in a UK Regional Paediatric Neuropsychology Service. Informed by the National Service Framework (NSF) for Children we highlight intervention and support needs of families and children with post-encephalitis ABI and consider individual differences in these complex profiles to create patient-centred approaches to rehabilitation.

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R. DOB, J. KENARDY, V. ANDERSON, N. PACHANA, & R. LE BROQUE. Effects of Post Traumatic Stress Symptomatology on Information Processing of Children with Traumatic Brain Injury.

It has been shown that exposure to motor vehicle accidents, falls, or sports injuries may lead to the development of posttraumatic stress disorder (PTSD). It has also been established that PTSD may impact on information processing. A large number of children sustain a traumatic brain injury (TBI) each year due to a variety of causes. Cognitive sequelae of TBI such as impaired working memory, impaired attention, and fatigue have now been well-documented. However, the interaction between neurogenic sequelae of the TBI and information processing deficits with a functional origin such as PTSD has been minimally explored. This paper will present the prevalence of PTSD symptomatology in a sample of 80 children (aged 6 – 14) who sustained a TBI three months prior to assessment with the Clinician Administered PTSD Scale for Children and Adolescents (CAPS-CA). It will explore the relationship between symptoms from the three PTSD symptoms clusters (reexperiencing, avoidance and hyperarousal) and neuropsychological outcomes such as working memory (e.g., digit span) and attention skills (e.g., selected subtest of the Test of Everyday Attention for Children). In presenting the findings, reference will be made to literature suggesting that information processing is impaired in (adult) subjects with PTSD. This poses the question of a cumulative effect of PTSD symptomatology and traditional neuropsychological deficits on information processing capacity of children with TBI. Potential implications of this added effect on rehabilitation efforts will be discussed.

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Paper Session 4/5:00 – 6:30 p.m.

Aging

Chair: Siegfried Gauggel

J. HASSENSTAB, M. REUGER & A. CONVIT. Problems in Glucose Regulation, Short of Diabetes, are Associated with Decreased Verbal Memory Performance in Normal Middle-Aged Adults.

Epidemiological and experimental studies suggest links between impaired glucose tolerance and memory. This study, unlike any published study to date, assessed cognitive performance in 2 groups of nondiabetic, nondemented middle-aged adults stratified by level of glycated hemoglobin A (HbA1C), a highly reliable indicator of glucose control over a 2-3 month period. 43 participants (Aged 63.6 ± 7.8 years) with a mean HbA1C level of $5.8 \pm 0.40\%$ were compared with a group of 49 participants (Aged 61.2 ± 8.2 years) with a mean HbA1C level of $5.1 \pm 0.28\%$ on various tests of neurocognitive functioning. There were no group differences in age, education, gender, IQ, and MMSE score (all p 's $> .10$). Individuals with higher HbA1C exhibited decreased performance on several verbal memory tasks, including immediate and delayed recall on paired associates tasks from the Guild Memory Test and the WMS-R (all p 's $< .05$), and decreased learning ($p = .016$), immediate free recall ($p = .009$) and immediate cued recall ($p = .04$) on the CVLT. There were no significant differences on nonverbal memory or on other tests of cognitive performance, although some measures of attention and executive function showed trends. Our results suggest a pattern of predominantly verbal memory deficits characteristic of medial temporal lobe dysfunction. The hippocampus is very vulnerable to any type of damage. Perhaps impairments in glucose regulation, sufficient to increase HbA1C, act on this vulnerability to explain our effects. Future studies should directly examine hippocampal integrity and memory performance in middle age adults with pre-diabetes.

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V. STAMENOVA, S. E. BLACK, M. MASELLIS, E. A. ROY. Pantomime and Imitation of Transitive and Intransitive Gestures in Corticobasal Degeneration.

Limb apraxia is a common symptom in Corticobasal degeneration (CBD). To examine the nature of limb apraxia in CBD, eight CBD patients were asked to perform gestures to pantomime and imitation of transitive and intransitive gestures. To assess their conceptual knowledge of gestures, patients identified transitive gestures by naming them. The composite score for each task was standardized relative to the performance of an age matched control group. Except one patient (mildly impaired), no patients were impaired on action naming. A 2(task) x 2(gesture) repeated measures ANOVA revealed main effects of gesture and task, but no interaction between the two. On transitive gestures, patients performed worse on imitation (-7.02 SDs) than pantomime (-3.3 SDs) showing impairment on both tasks relative to controls ($\bar{X} - 2$ SDs of Control Mean). On intransitive gestures, patients again performed worse on imitation (2.07 SDs) than pantomime (-0.44 SDs); however, they were marginally impaired only on imitation with pantomime scores within normal limits. CBD patients showed greater deficits in transitive than intransitive gestures, which suggests distinct neural networks are involved in the control of the two gestures types. Impairments in both pantomime and imitation of transitive gestures point toward deficits in the final stages of the execution of movement. However, the finding that imitation was more affected than pantomime and the fact that knowledge of gestures was spared suggests that CBD patients have more trouble with the translation of visual gestural information into movement, rather than the ability to process and understand visually presented gestures.

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M. KUNZ, V. MYLIUS, U. HEMMETER, K. SCHEPELMANN, S. LAUTENBACHER. Pain Experience in Demented Patients: Experimental Evidence.

Clinical studies, suggesting a less frequent pain report in patients with dementia, have raised the question whether pain perception changes across the course of dementia. The aim of the present study was to investigate the impact of dementia on pain perception and pain communication. 20 demented patients (with Alzheimer and vascular dementia) and 40 aged matched healthy controls were investigated for their subjective (category scale), facial (FACS), autonomic (heart rate) and motor (nociceptive flexion reflex) responses to mechanically and electrically induced pain. No group differences with regard to self-report ratings were found (though dementia interfered substantially with the subjects' ability to provide self-report). In contrast, facial responses to pain were significantly increased in demented patients (this increase was not due to an unspecific enhancement of facial responses). We also found group differences regarding the nociceptive flexion reflex, with demented patients showing a significantly reduced reflex threshold. Heart rate responses did not differ between groups. The increased facial expression of pain as well as the decreased nociceptive flexion reflex threshold point to increased pain sensitivity in demented patients. The limited ability to provide self-report ratings in demented patients points out that the assessment of self-report seems to be an insufficient pain assessment tool for this patient group. The facial expression of pain on the other hand (being unimpaired in demented patients) might be an alternative pain assessment tool for the subjective pain experience even in patients with severe dementia, where self-report is lacking.

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F. MEISTER, J. v. SICARD, T. MEINDL, C. BORN, M. REISER, R. ENGEL, K. FAST. Episodic Memory and Active Suppression: The Effects of Aging on the Neuropsychological Functioning of Control Processes.

The ability to decide deliberately which event or thought is worth to be remembered or can be forgotten alternatively is a basic foundation of regulating one's memory. Active suppression is a part of this self-regulative functioning. Within a so-called think/no-think paradigm (subjects have either to remember or to suppress former studied words) a network model of memory control (Anderson & Green, 2001; Anderson et al., 2004) has been developed: the dorsolateral prefrontal cortex seems to play a crucial role in controlling the hippocampus while retrieving neutral material. On behavioural level they found out that words that should be remembered during the think/no-think phase are better stored in memory than words that should be suppressed. In an own pilot-study we adapted this paradigm and compared the behavioural data of 15 younger (mean age 26,2 years) and 15 older healthy adults (mean age 65,9 years). We found a significant suppression effect in both groups and a general age-related memory decrease with an outstanding significant age-related effect of suppression. These results indicated that the ability to suppress increases in aging. To further investigate this suppression effect we measured the brain activation of young (19-30 years) and older (>55 years) healthy subjects with functional magnetic resonance imaging (fMRI) while completing the think/no-think paradigm. The activation pattern found in this paradigm is presented and discussed with regard to the behavioural and neuropsychological data as well as the underlying networks in suppression as proposed by Anderson et al. (2004) and the general neural substructures of aging.

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THURSDAY MORNING, JULY 27, 2006

Poster Session A/9:00-12:30 a.m.

B. LONG, E. ANDERSON, L. GUIDOTTI, E. YOUNG, H. AKIL, V. WEINGBURG, J. LOPEZ, S. RIBEIRO, J. ZUBIETA, S. LAGENECKER. Factors Involved in Memory Impairment in Depression.

Studies of memory deficits in depression have been contradictory, with some reporting memory deficits, and others reporting no objective memory difficulties. Treatment status, age, severity, and effort have been proposed explanations for these opposing findings. This study addresses the impact of depression severity and recruitment group upon memory performance on the California Verbal Learning Test (CVLT-II). Confirmed treatment resistant depression patients (TRD, N=17) were recruited through the TRD Clinic. Non-TRD depressed patients (CDP, N=46) and healthy control participants (HC, N=52) were recruited for comparison. Seven of nine indices on the CVLT-II were significant when comparing recruitment groups. The TRD group performed significantly worse than the HC and non-TRD groups after controlling for age and education (p 's <.001). The CDP and HC groups did not differ on any memory measures (p 's >.22). A further analysis of memory performance by severity was conducted using the Personality Assessment Inventory (PAI) and Hamilton Rating Scale for Depression (HRSD), creating HC (HRSD <5, PAI <60, N=52), Mild (HRSD 6-14, PAI 60-70, N=14), Moderate (HRSD 15-18, PAI 71-80, N=17), and Severe (HRSD >19, PAI >80, N=26) groups. Six of nine indices on the CVLT-II were significantly different by severity groups, after controlling for age and education. The Moderate group was typically worse than other groups. The Severe group performed worse than the Mild and HC groups on some indices. Age and education were significant covariates in each MANOVA. The results indicate that treatment status, age, severity, and education are important in understanding memory impairment in depression.

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ZAI-TING YEH. False Memory in Clinical Depression.

The study explored with a false memory paradigm whether there exists mood-congruent model (MCM) bias in subjects with depressive disorder. 32 patients suffering from a major depressive episode (DSM-IV criteria) and 30 matched age and education normal control subjects participated in this study. Following the presentation of a list of positive, negative and neutral association items in the learning phase, subjects were asked to give a yes/no response in the recognition phase. They were also asked to rate the 81 recognition items with emotional valence scores. The results failed to show the existence of MCM bias. The group with depression had more liberal criteria for negative information and more conservative criteria for positive information. The results also showed that when compared with the normal group, the subjects in the group with depressive disorder perceived the positive items as less positive. It is suggested that emotional memory intensity are changed by the subject's mood. However, more research is needed to explore this phenomenon.

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M. BALCONI. A Comparative Analysis between Event-Related Oscillations and Event-Related Potentials in Emotional Face Recognition.

Recent electroencephalographic studies have supported the hypothesis that the process of emotional facial-expression recognition starts very

early in the brain after stimulus onset by approximately 180 ms. Some authors studied ERP correlates associated with face processing. An early negative deflection (N2) of higher amplitude was revealed for arousing facial stimuli in comparison with neutral facial stimuli. In addition, motivational significance of a facial expression may result in phasic changes of motivated attention, indexed by frequency band variations. Nevertheless, actually it remains an open question whether it is possible to assign a single brain operation or psychological function for emotion decoding to a certain type of oscillatory activity. In the present study we emphasized the importance of distributed oscillatory networks in a specific frequency range (between 1 and 12 Hz) and inside a known time interval (200 ms latency). Secondly, actually no other study has exhaustively explored the relationship between event-related potentials (ERPs) and event-related oscillations (EROs). Twenty one adults looked at emotional (sad, happy, fearful) or neutral faces. The results demonstrated that an emotional face elicited a negative peak at approximately 230 ms. Moreover EEG results showed that motivational significance of face can modulate the amplitude of EEG specifically for theta and delta. Regression analysis showed that theta oscillations mainly effect as oscillation activity at the N2 latency. Thus, this frequency band variation could represent a complex set of cognitive processes whereby selective attention becomes focused on an emotional-relevant stimulus. Finally, a superimposition of different oscillatory responses is supposed.

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C.C.CANDIDO DE OLIVEIRA, SCHEUER & S. SCIVOLETTO. Autobiographic and Semantic Memory of a Group of Brazilian Adolescents and Drug Users.

Psychiatric disorders in infancy and in adolescence can compromise the access to memory of facts and events occurred during these periods. The main purpose of this study was to investigate autobiographic and semantic memory of a group of adolescents drug users and a control group of adolescents non-users. Twenty five boys took part of each group, ages between 13 and 17. Two questionnaires were applied: Kihlstrom & Schachter (1995) for semantic memory and Borriani et al (1989) for autobiographic memory. Results pointed significant difference in autobiographic memory between both groups not observed for semantic memory. The drug users group had more difficulties to access autobiographic memory ($p=0.00205$), meanwhile responses were similar for semantic memory ($p=0.057$). These results could be related to personal lives, social and affective histories experienced by these adolescents drug users.

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M. CONROY, A. TAYLOR, S. MEARES, K. PFAELLI, & J. BATCHELOR. Effects of Narcotic Analgesics on Learning & Memory Following Trauma: Implications for Assessment of Post-traumatic Amnesia and Rehabilitation.

Background: An amnesic interval in a trauma patient on narcotic analgesics may reflect the effects of medication rather than underlying brain damage. The present study sought to determine whether narcotic analgesics when prescribed following trauma can result in either amnesia or a measurable impairment of learning and retention. Method: We recruited 46 trauma patients aged 18-65 who were receiving narcotic analgesics. Subjects were administered the Westmead Selective Reminding Test (SRT) to assess the effect of analgesics on learning. Twenty-two subjects were also administered the Westmead PTA scale to determine whether analgesics produce deficits similar to those observed in brain injured patients whilst in

PTA. Results: Twenty-seven percent of patients on narcotic analgesics failed to achieve perfect scores on the Westmead PTA scale. There was a significant difference in analgesia dose between patients classified as being in PTA and those that achieved perfect scores on the Westmead PTA scale ($p = 0.039$). The analgesic group performed significantly worse than the normative sample on the SRT ($p = 0.001$); however, their performance was significantly better than brain injured patients ($p < 0.001$). Conclusions: A high proportion of patients on analgesics failed to meet the demands of the Westmead PTA scale. In addition, administration of large doses of narcotic analgesics in patients following trauma produced measurable deficits in new learning and memory. These findings suggest a need to re-examine the assessment of post traumatic amnesia and highlight the importance of considering the effect of medication on neuropsychological performance.

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C. STAUB, A. ZAHN, O. BRÄNDL, M.-C. HEPP-RAYMOND, F. MAST. Rehabilitation of Procedural Memory in Patients with Obstructive Sleep Apnea Syndrome.

BACKGROUND: Sleep disorders impair not only cognitive functions resulting in a high accident rate, but also motor skills. Attention and consolidation of the declarative memory are also impaired in patients with obstructive sleep apnea syndrome (OSAS). To what extent the consolidation of the procedural memory is impaired, is scarcely examined up to now. **OBJECTIVE:** This study assesses the procedural compared to the declarative memory and attention capacity of patients with OSAS and the effect of therapy with continuous positive airway pressure (CPAP). **METHODS:** Healthy control individuals and patients with OSAS performed attention, declarative and procedural memory tests with immediate retrieval in the evening and the next morning, testing overnight consolidation. **RESULTS:** The OSAS patients were worse than the controls in the attention ($p < 0.009$), the declarative and procedural ($p < 0.009$) memory tests. After one month of CPAP therapy, the patients still yielded worse results than the healthy controls. However, significant results were only found in the attention ($p < 0.05$), but not in the memory tests. **CONCLUSIONS:** The results suggest that OSAS patients have not only attention and declarative memory deficits, but also procedural memory impairments. Their behavior was clumsier during the learning session. The accident rate of OSAS patients is probably high not only due to attention deficit, but may be also related to impaired procedural memory performance. The CPAP therapy improved cognitive functions and motor skills, and specifically the overnight memory consolidation.

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C. STAUB, M. SCHÄRER, A. FREI, U. HÜRLIMANN, M.-C. HEPP-REYMOND. Probability Guessing in Healthy Persons and Patients with Brain Damage: Guessing, Searching, or Statistical Knowledge?

In a probability-guessing experiment, subjects have to predict which of at least 2 possibilities will occur next. If the distribution of the 2 possibilities is unequal, most correct answers can be reached, when the more frequent possibility is always chosen. This behavior is called "maximizing." However, "searching matching" the frequency to previous occurrences is said to be the typical strategy. Experiments with 2 split-brain and 5 patients with unilateral brain lesion suggested that the left frontal cortex is responsible for the matching behavior. This study examined the following hypotheses: (1) "Searching matching" is the typical human behavior. (2) This strategy is carried out by the left hemisphere. Sixteen healthy participants and 37 patients with brain lesion (10 left frontal, 11 right frontal, 8 bilateral frontal, 8 not frontal) guessed during 5 blocks of 100 trials which of 2 possibilities will occur next. Red (80%) and blue (20%) squares appeared randomly on the computer screen. Healthy participants did not generally match, but all 9 with and 2 without statistical knowledge maximized. The healthy participants showed not

only the 2 mentioned strategies, but also "imitation matching" and "chance behavior." The patients showed all 4 strategies, and additionally "perseveration maximizing." Patients with statistical education did not preferentially show "maximizing." No significant correlations were found between strategies and localization of the lesion. Both hypotheses can be rejected by counter evidence. Further experiments are needed to understand the controversial findings.

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R. LERMER, N. S. GRYSCHOK, T. MEINDL, K. LATSCHA, M. REISER, R. R. ENGEL & K. FAST. A Neurofunctional Study Concerning Cognitive Performances in Policemen with and without Trauma.

Traumatic events such as natural disasters, wars, sexual assaults, violence or severe accidents can cause posttraumatic stress disorder (PTSD). They might entail physical as well as psychological changes. Traumatic events are often associated with a deterioration of performance in memory. In numerous studies memory deficits have been found in patients with a PTSD which were associated with a reduced hippocampal volume. However, not all studies were equally consistent in their findings neither about trauma and memory deterioration nor about trauma and reduced hippocampal volume. For this reason the goal of the current study was to investigate the role of the hippocampus. We used functional neuroimaging (fMRI) to examine the hippocampal activation during an associative learning paradigm. The paradigm which was adapted from Henke et al. (2003) consists of two encoding conditions and one recall condition. In the encoding condition 24 face-profession pairs are presented. In the recall condition, subjects are instructed to recall the previously presented faces and their associated professions by evoking the professional category. Additionally we examined cognitive functioning, i.e. memory, attention, executive functions and estimated intellectual potential. Since policemen, due to their professional everyday life, are especially exposed to potentially traumatizing events, we focused our interest on this occupational group. Therefore we compared traumatized and non-traumatized policemen. As expected no differences have been found between the two groups in the neuropsychological assessment for the cognitive domains. However brain activity differed slightly for traumatized and non-traumatized policemen during the associative learning paradigm.

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Y. NAKAGAWA, M. OTSUKI, N. NAKAYAMA, M. KITAGAWA, & H. SAITO. Amnesia Following Focal Lesion of the Right Substantia Innominata and Stria Terminalis.

In case of amnesia with hippocampal lesion (HL), both the content and the context of episodes in daily activity could be profoundly impaired. On the other hand, in case of amnesia with basal forebrain lesion (BFL) by the operation of un-ruptured aneurysm of anterior communicating artery, it is said that the context of episodes profoundly impaired with content relatively preserved. However, there are few clinical reports of reverse pattern; impaired content but preserved context. We investigated the symptom of a patient with focal lesion in the component of the right basal forebrain, showing peculiar pattern of memory impairments. The patient, a 60-year-old right-handed man with un-ruptured aneurysm of anterior communicating artery, was operated for clipping without apparent complications. The next day of the operation, however, he suffered from small bleeding in the right Substantia innominata (SI) and Stria terminalis (ST), which was located in more lateral and posterior to the lesion of the operation. After two months, neurological and neuropsychological examinations, evaluating frontal functions (BADS, go no-go test, etc) and memory (RBMT, WMS-R, Event test, etc) were performed. As results, the symptom can be exclusively attributed to memory impairments, having two characteristics. One is an impairment of working memory, not to keep dual instructions simultaneously. The other is relative preservation of contexts as

compared with contents, which pattern was different from amnesic syndromes with HL and BFL of the operation. It may indicate that right SI or ST is involved in sustaining the content of episodes, independent of the context.

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D. SEIWALD, A. ISCHEBECK, C. KREMSER, T. TRIEB, M. SCHOCKE & T. BENKE. Evaluating Individual Medial Temporal Lobe Function with fMRI Using a Face-Name Encoding Paradigm.

The medial temporal lobe (MTL) is known to be critical for declarative memory. However, the exact contribution of several MTL structures to associative memory processes is still under debate. Different neurological disorders associated with malfunctions of the MTL can cause impairments of associative memory encoding. The investigation of individual memory function with a non-invasive method such as functional magnetic resonance imaging (fMRI) is therefore of great interest to clinicians. We selected and tested a face-name encoding paradigm with regard to its applicability for individual memory assessment using fMRI with 16 healthy volunteers. The applied paradigm showed robust activation of the posterior hippocampus bilaterally on group level. Also, the left amygdala and the left ventrolateral frontal cortex were found to be activated, as well as areas within the frontal, parietal and occipital association cortices. In contrast, no activation of the parahippocampal gyrus was observed. To assess reliable hippocampal activation on the level of individual subjects a region of interest (ROI) analysis was conducted. However, no reliable pattern of hippocampal or parahippocampal activation could be observed on the individual subject's level. This indicates that the applied encoding task is applicable for the investigation of episodic memory processes within the MTL on group level but not suitable for diagnostics of patients' MTL function.

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M. L. SILVA, & A. SUNDERLAND. Preserved Memory Skills and their Potential Use in Rehabilitation.

There is extensive evidence to suggest that even extremely impaired patients, such as those with severe amnesia or with Alzheimer's disease, may still retain some learning and memory abilities, which can be of potential use in rehabilitation. Recognition memory seems to be relatively preserved, when compared to free-recall, in different types of patients, and it can be divided into two main aspects: recollection and familiarity. These components may be differently impaired after a brain insult. Both medial temporal lobe (MTL) and frontal lobe (FL) structures seem to contribute to recognition memory. FL areas affect more recollection than familiarity, whereas familiarity is less likely to be affected by MTL dysfunction than recollection. These insights into preserved aspects of memory have as yet had little impact on clinical practice and rehabilitation. A recent meta-analysis (Kessels, and de Haan, 2003), which investigated the evidence for treatment effects of techniques based on intact implicit learning in amnesic patients, included two methods: the errorless learning and the method of vanishing cues. The authors concluded that only the former strategy produces significant treatment effects in this group of patients. Some of the important goals for applied research in this area include (1) the further understanding of how recollection and familiarity are processed and their respective neural substrates (e.g. studies with epileptic patients); (2) the development of new rehabilitation strategies, which would focus on the preserved mnemonic skills of patients with a certain condition, e.g. Alzheimer's disease, where feelings of familiarity may be particularly useful.

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M. MORALES, J.I. SAÑUDO, F. PEÑA, MC MONTERO, EF SANCHEZ. Speed Processing and Memory Impairment.

Cognitive aging is characterized by performance decrements in many higher cognitive functions such as memory. Several theories of cognitive aging may be distinguished: 1) theories suggesting a common cause for sensory and cognitive decline in old age; 2) theories emphasizing the integrative function of executive control and 3) theories focusing on cognitive resources. In the present study, data of 300 adults (55-80 years) were used to investigate relationships between speed processing, executive processes and memory impairment. A multiple regression statistic approach was used. Results showed speed changes explained differences in memory impairment

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R. SAUR & T. LEYHE. Development of a New Famous Events Test for Exploring Episodic Memory in Patients with Dementia.

In patients with Alzheimer's Dementia (AD) and amnesic mild cognitive impairment (MCI) disorders of episodic memory are one of the most apparent symptoms. Episodic memory refers to the ability to remember personally experienced past events. So far there exist only a few standardized neuropsychological tests to investigate disorders of episodic memory for past events. One approach is to confront patients with famous events and to ask to remember some facts about them. We decided to develop a test to investigate the ability to retrieve famous events and context information about the situation when taking notice of the events. We collected famous events for 5 decades beginning from 1945 and ending in 2005. We confronted healthy subjects older than 60 years of age with catchwords of these events. We asked them not only to decide, whether they can remember an event and tell when it happened but also whether they can recollect contextual information about the situation in which they have noticed the event for the first time. Furthermore, subjects were asked to rate subjective emotional impact and valence of the events. A preliminary analysis of the results demonstrates that the subjective emotional impact of an event has a significant influence on the quality of memory. The construction of the test will allow us to get information about the Ribot's law (time gradient of memory loss) and to investigate the emotional influence on encoding and remembering famous events. A comparative study of patients with AD, MCI and healthy subjects is planned.

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J. FISH, H. EMSLIE, J. J. EVANS, T. MANLY & B. A. WILSON. Further Investigations into the NeuroPage System for Memory and Planning Disorders.

Previous studies have demonstrated the effectiveness of a paging system in the amelioration of problems associated with memory impairment and executive dysfunction (Wilson et al 1997, 2001, 2005). In these studies, people with memory or planning problems were randomly assigned to pager-first (group A) or waitlist-first (group B) conditions. Completion of target behaviours was monitored over a two week baseline period (Time 1), followed by either introduction of the pager for group A, or further baseline period for group B (Time 2), followed by either removal of the pager for group A, or introduction of the pager for group B (Time 3). Here, we examine patterns of response to the paging system according to aetiology, and the moderation of these effects by factors such as age and cognitive functioning. Though all groups show benefits following the introduction of the pager, there are differences in maintenance of said benefits, with larger decreases in completion of target behaviours following removal of the pager for the CVA group than for the TBI group, who overall show maintenance of the pager-related gains. We also examined relationships between baseline performance and neuropsychological test scores, and found that measures of everyday memory and executive functioning had a significant relationship to

the real-life measure, demonstrating the validity of the measures used in predicting problems with everyday functioning.

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L. WATERSTON, J. HASSENSTAB, & L. BURTON. The Relationship of Temporal Lobe Abnormality to Verbal Fluency, Verbal Passage Recall, and Face Recognition Memory.

Many studies indicate that left temporal lobe abnormality is associated with verbal memory deficits, and that right temporal abnormality is associated with visual spatial memory deficits. Most studies report data on only one or two measures of memory subtypes. The present study evaluated 36 epileptic patients with temporal lobe or other brain abnormality on a wide variety of memory tests, including recognition and recall of words and verbal passages, and recognition of faces and recall of visual designs, as well as a verbal fluency test. The data indicate that the Wechsler Logical Memory subtest was clearly associated with left temporal lobe abnormality ($p = .026$), and that the Warrington Face Recognition Memory Test was the only visual spatial test to be clearly associated with temporal lobe abnormality ($p = .001$). In addition, weaker verbal fluency was associated with left temporal lobe abnormality ($p = .045$).

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I.K. PENNER, M. KOBEL, & K. OPWIS. BrainStim - a Recently Developed Tool to Train Different Aspects of Working Memory and to Induce Behavioural and Functional Alterations in the CNS.

Irrespective of the underlying primary disease, cognitive impairment imposes negative effects on patients' quality of life. Thus, besides medical therapies there is clear need for cognitive intervention methods. In this concern, international gold-standards including general criteria for cognitive interventions, precise definition of primary outcome measures, training tools and training procedures as well as the determination of the optimal training interval to improve specific cognitive functions are missing. As a result, treatment effects within and between patient groups are not comparable to each other. We therefore developed a new computerized tool to train specific aspects of working memory such as visual-spatial-, verbal- and cognitive load features. The efficacy of this tool and the optimal interval (distributed vs concentrated training) will now be evaluated on different groups of patients and on healthy control subjects. Patients with Parkinson, Multiple Sclerosis (MS) and Alzheimer's Disease will be included in the study as these groups are known to be highly affected by cognitive impairment. Healthy old and young people will participate as control subjects. After the evaluation of the tool, functional imaging will be chosen as an objective method to visualize changes in the CNS induced by the training. A recently published pilot study by our group on mildly and severely impaired MS patients showed clear changes in brain activation patterns when pre- and post-training results were compared. These findings suggest that patients can benefit from cognitive training irrespective of the degree of impairment and that functional plasticity can be enhanced by neuropsychological intervention.

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K. GUTBROD, C. KROUZEL, H. HOFER, R. MÜRI, W. PERRIG & R. PTAK. Decision-Making in Amnesia: Do Advantageous Decisions Require Conscious Knowledge of Previous Behavioural Choices?

Previous work has suggested that participants make advantageous decisions in the Iowa gambling task (IGT) before knowing the advantageous strategy (Bechara et al., 1997). This hypothesis predicts that a behavioural preference for advantageous choices could be acquired in the absence of explicit memory. We measured behavioural

performance and skin conductance responses (SCRs) in 5 patients with dense amnesia following damage to the basal forebrain and orbitofrontal cortex, 6 amnesic patients with damage to the medial temporal lobe or the diencephalon, and eight control subjects performing the IGT. Across 100 trials healthy participants acquired a preference for advantageous choices and generated large SCRs to high levels of punishment. Although their anticipatory SCRs to disadvantageous choices were larger than to advantageous choices, this dissociation occurred much later than the behavioural preference for advantageous alternatives. In contrast, though exhibiting discriminatory autonomic SCRs to different levels of reinforcement, 10 of 11 amnesic patients performed randomly in the task and did not show differential anticipatory SCRs to advantageous and disadvantageous choices. Further, the magnitude of anticipatory SCRs did not correlate with behavioural performance. These results suggest that learning to decide advantageously in the IGT depends on the memory of previous reinforcements encountered in the task, a capacity requiring intact explicit memory.

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L. BECK, A. HEUSINGER, M. BÖCKER, H. NIEMANN, & S. GAUGGEL. Comparison of Two Computerized Attention Performance Tests in a Sample of Brain Injury Patients.

Objectives – The purpose of the present study was to determine the relationship between two computerized attention test batteries (i.e., the Attention Network Test, ANT, and the Test for Attentional Performance, TAP) and a rating scale for the assessment of attention impairments (Questionnaire about Attention, FAS). Methods – Fifty-seven brain-damaged patients with different aetiologies performed the ANT as well as the corresponding subtests of the TAP and filled out the FAS. A staff rating of the FAS was also carried out. Results – Correlation between ANT measures (difference scores) and corresponding TAP measures were low. However, considering the means of corresponding ANT and TAP conditions, significant correlations ($r = .54 - .68$) can be reported for alerting and orienting subtests as well as overall reaction time. Comparing condition means of the two attention tests with reported symptoms in the FAS revealed significant correlations for ANT ($r = .62 - .70$) and TAP ($r = .55 - .86$). Again correlations between ANT or TAP measures (difference scores) and FAS were low. Conclusions – Results indicate that ANT and TAP are comparable regarding overall reaction time and means of corresponding conditions. Furthermore, there was a substantial association between staff- and patient ratings of attention impairments and the computerized attention tests scores supporting the validity of the computer tests. However, results are only valid for condition means and not for difference scores.

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N.M. SCHNIDER, B.W. VINES, G. SCHLAUG. Cathodal tDCS over Left Supramarginal Gyrus Blocks Pitch-Memory Performance.

Neuroimaging studies have implicated the left supramarginal gyrus (SMG) in short-term memory processing for pitch information [Gaab et al., 2003]. The present study investigated the role of the left SMG in short-term pitch memory by comparing the effects of applying cathodal transcranial direct current stimulation (tDCS) and sham tDCS to this area. The task -stimuli were 39 sequences of six or seven sine-wave tones, presented in a randomized order for each run. Participants were asked to indicate whether the first and last tones in a sequence were the same or different, by pressing one of two mouse buttons. All participants underwent 20 minutes of 1.2 mA cathodal tDCS, delivered by a constant current stimulator, and of sham stimulation (counterbalanced ordering). The active electrode was placed over TP3 of the international 10-20 EEG system, corresponding to the left SMG. The reference electrode was secured over the contralateral supraorbital area. For sham stimulation, the current was allowed to ramp up over the first 30 seconds before being reduced to zero for the

remaining time. We found a significant difference in accuracy between the effects of sham and of cathodal stimulation over left SMG in 11 adults, with a two-tailed p -value of 0.016. We posit that the presumed reduction in excitability in SMG, induced by cathodal tDCS, disrupted the contribution of SMG to pitch-memory processing. These results provide further support for the involvement of SMG in short-term pitch memory, and for the potential of cathodal tDCS to block functionally-relevant brain activity.

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O. INOZEMTSEVA, E. MATUTE & J. JUÁREZ. Long-Term Glucocorticoid Treatment can Alter Declarative and Working Verbal Memory in Congenital Adrenal Hyperplasia (CAH) Patients.

The aim of this study was to assess the declarative and working verbal memory in 10 CAH girls, aged 6 to 16 years, undergoing long-term treatment with cortisol, since they may be exposed to an excess of glucocorticoids due to the difficulties involved in mimicking the rhythm of cortisol production. This group was matched to control girls (CG) by age, school grade and school type. Full IQ showed no differences between groups. The TOMAL and a Working Verbal Memory test (WMT) were used. The WMT includes three tasks: in the first task, subjects counted the vowels in each one of a series of words; in the second, they were offered three words and had to identify the one that belonged to the semantic category of a fourth word; while in the third, subjects had to both count vowels and identify the semantic category. In the TOMAL, CAH girls showed significantly lower scores in composite, verbal, nonverbal, learning and associative recall indexes and in selective word recall, visual sequential memory and memory for delayed tasks using stories. In the WMT, the CAH group underperformed CG in the semantic category identification part of the third task, but with no significant differences in reaction time. These findings suggest that CAH patients present declarative memory and working verbal memory difficulties that may be related to long-term cortisol treatment. However, their physiological condition could also be of concern. Other factors, such as the verbal difficulties of CAH patients, may also influence their performance on memory tests.

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T. SILBERG & E. VAKIL. What Defines "Target" versus "Context" Information?

The facilitation of target memory due to correspondence of context in learning and in test is known as the "context effect" (CE). Even memory-impaired neurological patients and aging individuals with deficits in direct source recollection, benefit from context reinstatement in remembering. There are inconsistent findings regarding this effect, probably due to different definitions and different testing conditions used. These differences influence the emergence and magnitude of the CE. In the present study we examined the influence of different learning instructions on the processing of stimuli presented as target or as context information. More specifically, we tested the difference between context learning and pair association learning (PAL), the difference between memory and attention instructions, and the effect of different levels of processing (deep vs. shallow) on each of the instructions conditions. The findings revealed a different CE profile when target information was specifically instructed to be remembered, compared to the same level of encoding with attention instructions. The findings indicated that memory instructions disturbed the formation of a specific association between target and context information, in contrast to attention instructions, which distributed the familiarity effect on recognition. In addition we found that a classical context learning paradigm resulted in higher hit rates and less FA, compared to a PAL paradigm. These results highlight the importance of defining specific

processes used in the memory-context literature, and how different definitions and testing conditions increase or decrease the likelihood of the CE to be revealed.

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A. T. BIVETTI, D. HEINEMANN, T. WENDLER, R. VON WARTBURG, K. GUTBROD, R. MÜRI, W. PERRIG. Show Me the Way! Examination of Visual Spatial Memory.

Contrasting the large number of examination methods for the neuropsychological examination of verbal memory functions, there are only few "nonverbal" examination methods. Previous studies that investigated visual-spatial mnemonic performances point out that visual spatial memory is built up in different ways, depending on the task design. Therefore, two long-term memory tasks, presented on the very same visual spatial quasi-naturalistic template, were developed. As such, these tasks hardly allow patients to solve them through verbalisation. The two long-term memory versions were studied: a) a task during which patients had to learn spatial locations and b) another task that required patients to learn a route. It is a fact that patients with spatial neglect typically show difficulties in mental representation. Therefore, common visual spatial diagnostics and learning, recall and recognition performances of healthy subjects and patients with spatial neglect were studied. Preliminary results show that 1) the formation of spatial representations depends strongly on the task design in both groups and 2) neglect patients show particular difficulties in route learning. Moreover, visual spatial working memory was studied by using the very same visual spatial template and stimuli: a) spatial locations and b) part of a route. The working memory performances of healthy subjects and patients with frontal or parietal lesions clearly point out that the working memory requirements differ between the maintaining of spatial locations and the maintaining of an integrated spatial representation.

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S. SAUTTER, S. MACCIOCCHI, & J. DENMAN. A Brain Fitness Telehealth Memory Clinic.

Telecommunications may be a viable option worthy of exploration for the purpose of broadening clinical practice as well as availability of services for neuropsychology assessment and treatment. A prior study of 99 participants examined the efficacy of a doubly-multivariate analysis of variance performed on two measures: experience and knowledge using both a pre-test and post-test of the initial interview and exit interview. Experience represented the participant's reaction to the video equipment; knowledge represented the participant's ability to receive education about brain health and fitness during the interview. It was hypothesized that there would be no between-group differences on knowledge and satisfaction but differences on experience. Three conditions formed the between-subjects IV: experimental, control, and sham. All three groups received a neuropsychological interview followed by assessment from a test technician. The experimental group was interviewed via teleconferencing equipment, while the other two were face to face. The within-subjects IV treated multivariately is the pre-test and post-test. $N=34$ for the experimental, $N=34$ for the control group, and $N=31$ for the sham group. Results of evaluation of assumptions of doubly-multivariate analysis of variance were satisfactory. No significant effect was found on condition by time interaction, multivariate $F(2, 95) = .41, p > .05$. Neither knowledge nor experience scores were significantly influenced by condition. This current project presents in detail the demographics, and scores from the Repeatable Battery Assessing Neuropsychological Status, Green's Memory Concerns Inventory, Green's Medical Symptom Validity Test, and Temporal Orientation Test with clock drawing on normal older adults. Correspondence: *Scott W. Sautter, Dr., Regent University, School of Psychology, 101 North Lynnhaven Road, 23452, Virginia, US. E-mail: DrSautter@TheMemoryClinic.com*

S.R. SCHWEINBERGER, D. ROBERTSON, & J.M. KAUFMANN. Hearing Facial Identities: Audiovisual Integration in the Recognition of Familiar People.

While audiovisual integration is well-known in speech perception (McGurk & MacDonald, 1976; *Nature*, 264, 746-8), faces and speech are also informative with respect to speaker recognition. Neuroimaging studies also demonstrate that observing silent articulating faces activates areas in the auditory cortex (Calvert et al., *Science*, 276, 593-6). More recently, it was shown that voices of familiar people activate the fusiform face area in a task that emphasizes speaker recognition (von Kriegstein et al., 2005, *Journal of Cognitive Neuroscience*, 17, 367-76). However, audiovisual integration in the recognition of familiar people has never been demonstrated. Here we show systematic benefits and costs for the recognition of familiar voices when these are combined with time-synchronized articulating faces, of corresponding or noncorresponding speaker identity respectively. These effects were seen for familiar voices but not for unfamiliar voices, suggesting that they depend on the previous creation of a multimodal representation of a person's identity. Moreover, the effects were reduced or eliminated when voices were combined with the same faces presented as static pictures, demonstrating that the effects do not simply reflect the use of facial identity as a "cue" for voice recognition. This is the first direct evidence for audiovisual integration in person recognition. Correspondence: *Stefan R. Schweinberger, Prof., Friedrich-Schiller-University Jena, Department of General Psychology, Am Steiger 3, 07743 Thuringia, D. E-mail: stefan.schweinberger@uni-jena.de*

G.J. CHELUNE & R. LANGE. Memory Profiles Among Patients with Relapsing Remitting Multiple Sclerosis.

Memory difficulties are common among patients with multiple sclerosis (MS). However, there is considerable controversy whether these problems are primarily related to difficulties with acquisition, retrieval or storage. Our aim was to determine whether MS patients tend to cluster into a specific pattern of strengths and weaknesses on memory tasks or had multiple patterns of performance. Participants consisted of 378 patients with clinically definite relapsing-remitting MS referred for comprehensive neuropsychological evaluation and who had complete Wechsler Memory Scale-III data. Females outnumbered males 3:1; however, there were no sex differences in age ($M=43.8$), education ($M=13.9$), or duration of symptoms ($M=8.9$). Identification of cluster patterns was based on the two-step (i.e., hierarchical and k-means analyses of ipsative scores) procedure described by Lange et al. (2002). Nine verbal memory scores were considered: Logical Memory and Verbal Paired Associates immediate and delayed scores, Auditory Delayed Recognition, and Word List Immediate, Total, Delayed, and Recognition scores. Results revealed considerable variability in memory patterns as 5 distinct clusters emerged with 61 to 98 patients in each cluster. Cluster-1 patients manifested poor cued-recall but good recognition-memory; Cluster-2 had circumscribed difficulties with prose-recall; Cluster-3 patients had specific difficulties with learning and recall on Word Lists whereas Cluster-4 had difficulties with only the acquisition trials of Word Lists; and Cluster-5 showed a relative strength on the Word Lists but mild difficulties with prose-recall and recognition-memory. These results suggest multiple memory dysfunction phenotypes among MS patients, which are likely to vary depending on the distribution and severity of MS plaques.

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A. R. LOPEZ-ROLON, G. WALSER, E. TRINKA, T. BENKE & M. DELAZER (1). The Recall of Proper and Common Names as well as Numbers by Unilateral Temporal Lobe Patients.

We examined 31 unilateral temporal lobe epilepsy (TLE) patients of comparable age, education and intelligence with a neuropsychological test battery that included a modified German version of the California Verbal Learning Test (MGT), and three other tests that evaluated verbal and non-verbal learning, namely the Non-verbal learning test (NVLT), the Verbal Learning Test (VLT) and the Visual and Verbal

Learning Test (VVM). The verbal learning section of the VVM has three subtests that examine the retrieval of proper names, numbers and types of companies respectively. The performance of right and left TLE patients in the MGT, the NVLT and the VLT did not differ. A comparison of the scores from the proper-name and number subtest of the VVM showed no difference between subtests, but rendered left TLE patients as having significantly lower scores than right TLE patients. These results will be discussed within the frame of previous findings in the literature on difficulties encountered by TLE patients in proper name recall; and on dissociations between numbers and other semantic domains. We believe that although our results are still preliminary they underscore the need to investigate numerical episodic memory further in healthy and brain damaged persons.

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A. MARYNIAK. Deficits of Emotional and Social Functioning in Children with a Cerebellar Lesion.

Cerebellum has been associated with motor control, but more recent studies have extended its contribution to other functions, such as modulation of emotions, behavioral organization or language. In children, cerebellar lesions are relatively frequent and some are due to neoplasms, so it's important question about development of children after surgery of the cerebellum tumors. 66 patients who underwent surgery for cerebellar astrocytoma pilocyticum from 1994 to 2002 at the Department of Neurosurgery The Children's Memorial Health Institute were counted in the study. Parents of all children filled in an inquiry, answering the questions about children's linguistic functioning, emotion regulation and ability to initiate, organize and efficient realization of various activities. In the psychological examination different tests were used according to the child's age and abilities. The intellectual function of most children (86%) was found to be normal. The disturbances of initiative and realization activity most often were observed (77%). Problems in affect regulation were often noticed too (65%) and were characterized by disinhibition, impulsivity, and irritability. Communication disorders, such as problems in speech initiation and carrying on a conversation were noticed in these children (46%). Disturbances in nonverbal contact were also observed. Children with cerebellar lesion often suffer setbacks and helplessness in social relationships. As a result, that children who have recovered from a cerebellar tumor, are incapable of normal functioning in the social environment. Such difficulties may seriously endanger the development of children with cerebellar lesions.

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J.C. ARANGO, N. MERRITT, J. BALZANO, G. VOELBEL, F. CUETOS, J. DELUCA. The Usefulness of the Generation Effect to Improve Memory and Learning in Hispanics.

The effectiveness of cognitive rehabilitation interventions for Hispanics is not frequently studied and not well understood. Most of the rehabilitation programs and techniques currently employed to improve learning and memory have been designed for Caucasian Americans and tested in ethnically homogenous samples. The generation effect occurs when people demonstrate better memory of the material that they have self-produced compared to material that is simply presented. This study aims to (1) examine whether self-generation will improve learning and memory in Hispanics and (2) determine the influence of the level of acculturation on the potential generation effect in Hispanics. Sixteen low acculturated and 25 high acculturated healthy Hispanics were presented 32 individual sentences on separate pages. Subjects were required to remember the last word in each sentence. Target words were presented both in a self-generated and provided condition for each subject. Recall and recognition of the words were examined immediately, after a 30-minute delay, and at one week. At each evaluation point, Hispanics

remembered significantly more words that they self-generated compared to words they simply read ($p < 0.001$). Overtime, the number of words remembered significantly decreased ($p < 0.001$). Acculturation level did not moderate the effect of condition on number of words remembered at each time point ($p = 0.107$ €0.725). The self-generation technique effectively improves learning and memory in Hispanics regardless of level of acculturation. Future studies of the cognitive rehabilitation of Hispanics with brain injury should incorporate this technique in order to determine its clinical utility.

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L. HAMILTON, Y. SUCHY & G.J. CHELUNE. The Association between Depression and Executive Functioning in a Group of Patients with Multiple Sclerosis, Relapsing Remitting Type.

Objective: Frontal-lobe functioning is largely responsible for executive and behavioral control. In a number of populations, frontal-lobe dysfunction has also been found to be significantly linked to depression. The purpose of this study was to examine whether the same association between depression and frontal-lobe functioning would be found in patients with Multiple Sclerosis (MS), or whether depression was better explained by other variables, such as physical disability, general cognitive disability, or demographic variables. Method: A group of 226 Relapsing Remitting MS (RRMS) patients were given a neuropsychological battery containing tasks designed to measure both frontal and general cognitive functioning. Patients were also assessed for mood using the PAI depression subscales. Results: Results suggest that both physiologic ($t = 2.20$, $p < .05$) and affective ($t = 2.09$, $p < .05$) symptoms of depression were predicted by level of physical disability. Additionally, marital status predicted affective symptoms of depression ($t = -2.8$, $p < .05$). Cognitive symptoms of depression was predicted by level of education ($t = 2.00$, $p < .05$)

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T. HAID, S. DITTRICH, E. GAMPER, M. KOFLER, E. QUIRBACH, L. SALTUARI. Normative Data for Diagnosing Visual Neglect with a New Screening-Test: Cats Test.

Patients with visual neglect demonstrate typical limitations in visual exploration: ipsilesional start of exploration, contralesional omission, and often spatially disorganised exploratory patterns. The authors developed and standardised a simple clinical test, the "Cats Test": 240 silhouettes (dogs, houses, cats, aeroplanes, clocks, etc.) are scattered on a DIN A4 sheet of paper (width 29,7 cm, height 21 cm). The target stimuli, 24 cats, are located only on either the left and right 40% of the page, 12 per side; diverting silhouettes render the search more difficult. For standardisation, the authors tested 90 self-reportedly healthy volunteers (27-85 years of age, 50% > 67 years). The number and positions of omissions, position of the first four cats crossed out, and exploration time were recorded. The subjects omitted a maximum of five targets (48% omitted none, 98% omitted at most three); a maximum of three targets were overlooked on either side of the page, the difference between left- and right-sided omissions never exceeded three cats; 87% of the subjects crossed out at least one of the first four targets on the left half of the page. Correlation of age with the number of omissions was low ($r = .221$; $p = .036$). Time of exploration onset did not correlate significantly with age and number of omissions. The Cats Test is a short standardised test for the diagnosis of visual neglect, useful especially for the elderly patients. Test forms, information, and statistical data are obtainable free of charge by e-mail (thomas.haid@tilak.at).

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T. ROIG ROVIRA, N. PICO AZANZA, R. SANCHEZ-CARRION ABASCAL, A. GARCIA MOLINA, A. ENSENAT CANTALLOPS, M. BERNABEU GUITART. Attention and Information Processing in Moderate and Severe Traumatic Brain Injury.

Introduction. Attentional impairment following traumatic brain injury (TBI) are important in themselves in terms of the direct effects they can have on other cognitive functions and rehabilitation process, persists across time and affecting social reinsertion and return to work. Objective. 1) Describe which attentional processes are more commonly affected in moderate and severe TBI related to TBI severity and time since injury. 2) Identify which neuropsychological tests show more sensibility to detect attentional deficits. Patients and Methods. One group of 64 patients with moderate to severe TBI and a control group of 32 spinal cord injury patients. Both groups received neurorehabilitation treatment in Hospital de Neurorehabilitació Institut Guttmann. Attentional functions were assessed by: Digit span, Mental tracking, Stroop Test, Trail Making Test, TAS, and PASAT. Results. All subtypes of attention were affected in our sample of TBI: sustained, selective, divided and information processing speed. Posttraumatic amnesia (PTA) duration was related with performance in information processing and selective and divided attention, detected by digit span, TMT and PASAT. Longer time since injury correlates with better information processing and selective and sustained attention. Stroop Test (except interference index $p > 0.05$), Mental tracking backwards and PASAT discriminates better between TBI and control group ($p < 0.001$). Conclusions. In moderate to severe TBI all subtypes of attention were impaired. Within severity measures PTA duration and time since injury correlate with attentional deficit whereas Glasgow Coma Scale (GCS) doesn't. In our study, Stroop Test, Mental tracking and PASAT were the most sensitive tools to detect attentional deficits.

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T. ROIG ROVIRA, N. PICO AZANZA, R. SANCHEZ-CARRION ABASCAL, A. GARCIA MOLINA, A. ENSENAT CANTALLOPS, M. BERNABEU GUITART. Decision-Making Impairment in Moderate-Severe Traumatic Brain Injured Patients.

Introduction: Patients with moderate or severe traumatic brain injury (TBI) can show impairment in decision-making processes. The Iowa Gambling Task (IGT) has become a widely employed neuropsychological research tool to investigate decision-making by simulating real-life decision-making in terms of uncertainty, reward, and punishment. Objective: Investigate decision-making in patients with moderate or severe TBI during performance of the IGT, and study patient's conscious knowledge of the task's reinforcement contingencies (reward/punishment schedule). Patients and Methods: Forty patients with moderate or severe TBI and thirty healthy volunteers participated in the study. Decision-making was evaluated using a computerized version of the IGT. After completing the task, participants' conscious knowledge of the task was tested. Results: The number of disadvantageous choices for each subject was significantly higher in the TBI patients group than in the control group. IGT score differences were observed among TBI patients in relation to conscious knowledge of the task. The patients with conscious knowledge of the task's reinforcement contingencies showed better performance, while the patients with scarce conscious knowledge presented worse performance. Conclusions: Moderate or severe TBI patients show deficits in decision-making. The results suggest that TBI patients' conscious knowledge of task-inherent reinforcement contingencies have a direct relationship with performance on the IGT

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A. GARCIA MOLINA, L. NIETO VINYALS, R. SANCHEZ-CARRION, A. ENSENAT CANTALLOPS, N. PICO AZANZA, M. BERNABEU GUITART. Reality Orientation Therapy Group:

a Pilot Study of Posttraumatic Amnesia Rehabilitation Following Severe TBI.

Introduction. When emerging from coma, after severe traumatic brain injury (TBI), usually it is followed by post-traumatic amnesia (PTA), period of time between brain injury and progressive recovery of the capacity to store and recall new information. PTA is a transitory state characterized by confusion and disorientation, with important memory impairments. **Objective.** Describe a Reality Orientation Therapy in a group of TBI patients with PTA. **Patients and Methods.** Four male subjects who suffered a severe TBI, admitted to neurorehabilitation treatment in Institute Guttmann, formed Orientation Therapy Group. Mean age 28.25 and average time since injury of 165 days (range: 109 - 195 days). All patients had Galveston Orientation and Amnesia Test (GOAT) scored below 75. Reality Orientation Therapy consisted in 2-week 1-hour group sessions for 4 months. **Results.** Orientation and awareness of each patient are described. During Reality Orientation Therapy all patients showed general improvement in orientation, mainly on person orientation, followed by space orientation. Temporal orientation only improved in two patients whereas the other two remained disoriented. **Conclusions.** These preliminary findings suggest that Reality Orientation Therapy, in a small group, reduces disorientation, providing support for the efficacy of this therapy towards the treatment of this deficit. Improving orientation helps to decrease PTA duration and may facilitate patient's neurorehabilitation process. Further research is necessary to support this pilot study.

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K. LIDZBA, M. STAUDT, M. WILKE, I. KRÄGELO -MANN, W. GRODD. Cerebellar Activation in Right-Hemispheric Language Dominance Following Early Left-Sided Brain Lesions.

Introduction: The developing brain can compensate early left-hemispheric lesions by reorganization of language function to the right hemisphere. Recent research has highlighted cerebellar involvement not only in sensorimotor control but also in cognitive and language functions. Especially language production and verbal working memory tasks apparently depend on the right cerebellar hemisphere. In adults, recovery from stroke-induced aphasia can be associated with a shift of language activation from the left to the right cerebral, and from the right to the left cerebellar hemisphere. **Methods:** We analyzed fMRI data of a language production task for six adult patients with pre- or perinatally acquired lesions of the left cerebral hemisphere and subsequent right-hemispheric language organization, and compared it with data of healthy controls. **Results:** In both groups, activation was found in the posterio-lateral area of the cerebellar hemisphere. Similar to their mirror-reverse cerebral language organization pattern, patients showed left- instead of right-hemispheric cerebellar activation. Lateralization of cerebral and cerebellar activity correlated strongly in both groups. **Discussion:** In early left-hemispheric brain lesions, the representation of language areas is shifted in the hemispheres of cerebral cortex as well as in lateral cerebellum. In analogy to the recruitment of right-hemispheric homologues to classical language areas, in these patients the cerebellar activation mirrored that of the controls as well. Taken into account that none of the patients suffered an infratentorial lesion, these findings emphasize that the reorganization process initiated by an early unilateral brain lesion is not restricted to the cortical network but involves also the cerebellum.

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B. HAUER & A. QUIRBACH. On the Economy and Effectiveness of Prism Adaptation as Therapy for Unilateral Neglect.

Rossetti et al. (1998) describe adaptation to a prismatic shift of 10° to the right as an effective and restorative treatment of neglect. Since then, the short- and long-term effectiveness of this treatment has been validated. The aim of the present investigation is to evaluate the effects of varying duration and intensity of treatment. 18 patients with

left visuospatial neglect were divided into three roughly equivalent groups of six patients each. Group 1 received one daily session, group 2 two daily sessions and group 3 no treatment. The two treated groups received prism therapy over a period of ten days. The treatment sessions all involved pointing at 90 presented items wearing prismatic goggles over an unlimited time-span. Each patient was furthermore assessed using standard tests for the visual and the representational neglect before the treatment, after 5 and after 10 days of treatment. We expected to find a correlation between intensity and duration of therapy and the decrease of neglect. At the end of the treatment period, all three groups showed significant improvement. A tentative evaluation of the results with 15 out of 18 patients, however, showed no significant effects of duration or intensity of therapy. Furthermore, neither of the treated groups differed from the untreated group. Thus, the present results do not support prism adaptation as an effective treatment of visuospatial neglect. The main cause of improvement in our sample appears to be a spontaneous recovery.

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T.A. SCHWEIZER, A. FEINSTEIN, B. LEVINE, S. KATERJI, & D.T. STUSS. Isolating Information Processing Impairments in Patients with Mild and Severe Traumatic Brain Injury.

Many day to day activities require us to manage multiple tasks concurrently with demands that can change continually. Traumatic brain injury (TBI) is known to impair information processing abilities. What is less known is how TBI specifically affects information processing and if these deficits pervade across the range of injury severities. We employed a dual-task procedure known as the psychological refractory period to investigate the effect of TBI on information processing. In this paradigm independent choice-responses are required to two sequential stimuli (tone identification task followed by a letter verification task) that are presented at various delays between the tasks. Sixteen patients were tested with either mild TBI (n=8) or severe TBI (n=8) and their performance was compared to a group of non-brain damaged participants (n=8). Results revealed that patients with severe TBI performed task 2 more slowly compared to patients with mild TBI and controls at the three shortest delays between the tasks (50, 200 and 500 ms). At the longest delay (1600ms), the reaction time (RT) of the groups did not differ. This pattern of task 2 RT indicates that chronic, severe TBI significantly impairs (slows) the central, cognitive stage of information processing. Patients with mild TBI had normal RT performance, despite this they made significantly more errors compared to healthy controls. Our findings suggest that patients with chronic TBI can have significant impairments to the cognitive stage of information processing irrespective of injury severity. These results have important implications for the development of future rehabilitation interventions.

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V.SERRONE, Th. GÖHRINGER, A.DANEK. Recognition of Emotional Facial Expression in Acute Stroke Patients with Unilateral Lesion.

Facial expressions are important for social interaction and communication. The possible dominance of the right hemisphere in facial emotion recognition is disputed. This study tested the hypothesis that acute stroke patients are impaired in the recognition of six basic facial expressions (anger, disgust, fear, sadness, happiness, and surprise). We also examined whether facial expression recognition depends on gender, cognitive status and visual attention and how it may relate to recognition of objects and faces as such. In particular we wanted to test whether right hemisphere damaged patients would recognize basic emotions markedly worse than left damaged patients. We examined 26 patients (19 male, 7 female), 15 with a right and 11 with a left hemisphere first ever stroke, using the following tests: MMST, TAP (Subtest: Neglect), Hooper Visual Organisation Test (VOT), and a test for the learning and recognition of faces (Philipp & Danek 2004). To investigate the recognition of

facial expressions, we used the Facial Expression of Emotion Stimuli and Test (FEEST, Ekman 60). We found that the patients were impaired in negative emotions and, in particular in the recognition of disgust and fear. Gender, cognitive status, visual attention, object and face recognition as well as the side of infarction did not influence the recognition of facial expressions. The results suggest that acute stroke patients are particularly impaired to recognize negative facial expressions. Stroke rehabilitation has to take into consideration the possibility of "emotional training", to improve the ability to recognize facial expressions and to communicate.

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S.J. HUANG, C.C. YANG, M.S. HUA, Y.K. TU, J.Y. TSAUO. One-month Quality of Life in Patients with Mild Traumatic Brain Injury: The Role of Dizziness.

Background and Objective: The quality of life (QoL) is an important measurement of clinical outcomes in patients with traumatic brain injury (TBI). However, few studies have investigated the QoL in mild TBI (mTBI) patients within one month post-injury. The present study thus attempted to examine mTBI patients' one-month QoL and further to determine whether some risk factors (such as the post-concussion symptoms) adversely affected the QoL. **Methods:** This was a cross-sectional study of 40 mTBI patients. The PCS checklist was used to identify PCS, and the Glasgow Outcome Scale - Extended were used to investigate clinical outcomes. In addition, the WHOQOL-BREF was used to evaluate the QoL. All patients were evaluated at one month after the injury. **Results:** Dizziness was the most reported PCS in mTBI patients, who recovered well at one month post-injury. Furthermore, mTBI patients with intracranial lesions had better QoL, while the more dizziness mTBI patients had, the poorer outcomes revealed on the QoL. **Conclusions:** Dizziness is the most prominent symptom adversely affecting patients' QoL. Thus, it is vital for clinicians to pay more attention to mTBI patients' dizziness when patients re-visited the clinic at one month post-injury.

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J. COCKBURN, C. COLLIN, L.J. TRANTER. Identifying Cognitive Impairment after First Minor Stroke.

Background: A first minor stroke or TIA carries substantial risk of major stroke within one month but is otherwise assumed to have little lasting effect on motor or cognitive function. Patients are rarely given more than a basic cognitive screening assessment and may not be admitted to hospital. However, clinicians report that some patients present several months post-incident with complaints of persistent slowness, fatigue or poor memory. **Design and methods:** Pilot study to investigate feasibility of identifying cognitive impairments early after minor stroke. Administration of a comprehensive neuropsychological assessment one month post-incident, together with questionnaires on general health, mood, fatigue and ADL. 10 patients, age range 52-85 (mean 66.5 years), discharged from Stroke ward within 7 days of minor stroke. Re-assessment with shortened battery six months post-stroke. **Results (1st assessment):** 10/10 MMSE scores within normal range 10/10 WASI 4-form scores within normal range. 5/10 impaired delayed logical memory (WMS-R) 6/10 impaired DSST (WAIS-R) 6/10 impaired Phonological fluency 7/10 impaired TEA dual-task decrement. No apparent association between cognitive performance and self-reported well-being but some association between fatigue and mood. **Re-assessment:** 3 participants to date. TEA dual-task decrement and DSST scores remain impaired. Improvements in delayed story recall and self-reported mood. **Conclusions:** Impairments of speed of information processing and divided attention can be detected one month after first minor stroke, despite normal general cognitive function, and may persist until six months.

However, little association was noted between cognitive impairment and self-reported mood and well-being.

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A. FORMAN, P. VESEY & N. BAJAJ. Adult Onset Familial Normal Pressure Hydrocephalus: Neuropsychological Profile of Monozygotic Twins.

Background: There are few cases of adult onset familial normal pressure hydrocephalus (NPH) reported in the literature but the rarity of the disease makes coincidence unlikely. Female monozygotic twins presenting with the NPH triad of symptoms were assessed on a neuropsychological test battery. The aims were to determine whether the neuropsychological evidence could support the differential diagnosis of adult onset NPH whilst contributing to a further understanding of the neuropsychological profile of adult NPH. **Materials and Methods:** Both twins were assessed on neuropsychological tests of pre-morbid IQ, language, attention, speed of processing, frontal executive, visual-perceptual and memory function. Social and medical history was noted by interviews with the twins and a review of the medical records. **Results:** Twin 1 showed mild expressive language difficulties and speed of processing impairments especially on more complex tests of executive function. Her good memory results were discrepant from her experiences of daily living. Twin 2 showed impairment on tests of immediate recall and speed of processing shown by difficulties on tests on executive function. **Conclusions:** The twins performed worst on tests of executive function which is consistent with other studies. An impaired speed of processing could be contributing to difficulty with more complex tasks. This could also contribute to their experience of poor memory by either affecting encoding or efficient retrieval of information.

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F. FISHER & T. MATYAS. Efficient and Informative Measurement of Somatosensory Abnormality Following Stroke: Direct Scaling of Punctate Pressure.

Somatosensory loss following stroke impacts adversely on conscious experience, quality of life, safety, motor performance and rehabilitation. Quantitative assessment is preferable, but has been based on indirect scaling procedures that only evaluate detection or discrimination thresholds. Psychophysical direct scaling methods based on cross-modality matching are theoretically less laborious, assess variable and systematic changes independently and can describe performance over the entire stimulus range. This method, however, has not been investigated in stroke samples. We therefore obtained psychophysical functions for Semmes-Weinstein monofilaments using visual analogue scales in 40 stroke-impaired participants and 31 healthy controls. The most common patterns of abnormality among our stroke sample were increased variable error and a systematic attenuation of subjective intensity over the entire stimulus range. Attenuation restricted to lower intensity stimuli was observed less frequently, while attenuation restricted to high intensity stimuli was observed in a single case. One case exhibited bilateral hypersensitivity across the stimulus range. These observations will be discussed in relation to neurological data extracted from medical histories (i.e. lesion site and stroke type), and current neural coding hypotheses of the somatosensory system. Direct scaling seems to be a practicable measure applicable for a substantial subgroup of brain damaged individuals. This method appears capable of providing interesting insights into somatosensory abnormalities.

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E. GIOGKARAKI, C. POTAGAS, & C. SFAGOS. The Stroop Effect in Subtypes of Multiple Sclerosis.

The purpose of this pilot study was to investigate if it were completion time alterations, rather than Stroop errors that occurred in all MS subtypes. A 5-color Stroop version was administered to 101 patients with clinically defined MS (relapse-remitting (RR)=61, primary progressive (PP)= 20, secondary-progressive (SP)= 20) and to 40 healthy control participants. It was a brief Stroop version in order to avoid the effect of fatigue. We obtained 4 scores (3 completion times: reading words of colors, naming colors, incongruent word-color condition; and the number of errors in the incongruent condition). There was no significant difference in MMSE score between the MS subgroups. Some demographic variables (age, gender, years of education) were used as covariates. The multivariate analyses of variance indicate that the completion time is significantly longer for all the MS groups compared to control participants, in both reading

and incongruent conditions. In the color naming condition, only the RR and SP groups performed significantly worse than the control group. However, the number of errors was significantly more than the control's group only for the PP group. Performances in Stroop measures were not significantly associated with illness duration, age of onset or depression, but were significantly correlated with physical disability. In conclusion, the RR and SP groups seem that they have completion time alterations rather than errors in the Stroop. However, the PP's performance let us propose the hypothesis of a response inhibition deficit.

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THURSDAY AFTERNOON, JULY 27, 2006

Symposium 5/ 1:00-2:30 p.m.

The Multifaceted Means of Emotional Expression

Host: **Sonja A. Kotz & Dorothea Weniger**

S. A. KOTZ. Representation and Processing of Emotional Prosody: Neuroimaging and Patient Evidence.

Emotional expression is part of daily communication. Our understanding of the neural bases of emotion processing in general and emotional prosody in particular has majorly advanced through extensive clinical data as well as recent neuroimaging evidence. The picture that emerges substantiates a differentiated contribution of bilateral brain areas to a multi-step analysis of emotional prosodic processing. This calls into question a classical right hemispheric representation hypothesis. The current talk will focus on both clinical and fMRI evidence in support of the proposed multi-step model of emotional prosodic processing.

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M. MEYER. To What Extent Does "Emotional Prosody" Reflect Emotional Involvement?

A plethora of clinical and neuroimaging research has investigated the neural underpinnings of emotional prosody so far. Even though the majority of studies points to a dominant role of right hemispheric regions the precise role the two hemispheres play in emotional prosody is still an open issue. A review of the present literature suggests that a composition of the "subcortical hypothesis" (Cancianere & Kertesz, 1989, Sidtis & Van Lancker 2003, Pell et al. 2006) and the "differential cue" hypothesis (Pell 2006, Van Lancker & Sidtis 1992) reasonably well come up to the data at hand. More elaborately, the combination of the two confluent theories denotes the basal ganglia and distinct regions along the left perisylvian cortex as governing emotional prosody. Surprisingly, brain sites which constitute the limbic system traditionally being associated with emotional processing are not considered by the aforementioned theories. Nor do present neuroimaging studies report a robust correspondence between receptive and expressive aspects of emotional prosody and the limbic system. Accordingly, this presentation addresses the concern to what extent present research on emotional prosody, that is the acoustic encoding and decoding of various emotional states and moods in spoken language utterances, reliably taps the neural substrates of emotional experience. Based upon recent neuroimaging studies that emphasize a particular sensitivity of right peri-sylvian areas to vocal and slowly modulating

acoustic cues it is reasoned that brain responses collected from these brain sites are more likely to reflect complex processing of acoustic cues and vocal timbre rather than mirroring participants' emotional involvement.

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M. D. PELL. Deficits in the Vocal Communication of Emotion Following Brain Damage.

The ability to interpret the intended emotional meaning of speech prosody is susceptible to different forms of brain damage, such as stroke and Parkinson's disease. These deficits act as a marked social barrier for many adults with acquired brain damage, limiting opportunities for successful interpersonal communication and expression. For several decades, clinical research on vocal emotion processing has furnished evidence that patients with focal right hemispheric lesions, patients with focal left hemispheric lesions, and patients with subcortical (basal ganglia) pathology all display certain difficulties for understanding emotions from speech prosody. However, it is increasingly apparent that the source of vocal emotion processing deficits is likely distinct in each of these clinical populations. Based on our recent work, we will summarize data which speak to the nature of vocal emotion processing deficits in patients with lateralized cortical or subcortical neuropathology, with implications for understanding the neural system dedicated to vocal emotion processing in speech. The ability to understand discrete emotional meanings following brain damage, and the impact of vocal emotion processing deficits on the perceived social competence of brain damaged patients will also be discussed.

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A.J. CALDER. Behavioural and Neurophysiological Evidence for Separable Coding of Gaze Direction in Humans.

Neurophysiological studies with macaques have identified cells in the superior temporal sulcus (STS) that respond to particular directions of gaze. A behavioural adaptation paradigm was used to explore whether a similar functional dissociation underlies gaze perception in humans. Before adaptation, observers were accurate at discerning the direction of seen gaze (5° or 10° left or right, and direct). Adaptation to 25° leftward or rightward gaze produced a powerful illusion that caused participants to mistake gaze directed towards the adapted side as direct. This pattern held despite changes in identity, head orientation, or size between the adapting and test stimuli, demonstrating that the findings do not reflect low-level effects. A similar adaptation paradigm was used with fMRI to show that the superior temporal sulcus contains separate neuronal populations tuned to different gaze

directions. Leftward adaptation produced a graded response in the right anterior STS, with left gaze showing the least activation, followed by direct gaze, and right gaze the most; the converse pattern was found following rightward gaze adaptation, with right gaze showing the least activation and left gaze the most. These findings provide evidence of separable coding of different gaze directions in humans and are consistent with neurophysiological recording in non-primates.

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P. VUILLEUMIER. Emotional Regulation of Perception and Action.

Emotional signals can influence a wide range of perceptual and behavioral processes, especially for threat-related stimuli. Functional neuroimaging studies in healthy subjects and brain-damaged patients show that attention may be preferentially biased towards fearful relative to neutral faces, or towards angry relative to neutral voices, with enhanced activation of sensory brain regions involved in processing the corresponding stimuli (i.e., within visual or auditory cortex, respectively). Such enhancement in processing emotionally significant stimuli seem to depend on modulatory influences from amygdala operating directly on sensory cortical areas, partly independent of mechanisms of voluntary attention. In addition, recent imaging results suggest that amygdala activity may also influence motor output systems and thus contribute to attentional mechanisms underlying the interruption of current motor plans in the presence of threat signals. These data converge with animal and computational models indicating that the amygdala provides a neural system serving not only to detect the affective relevance of stimuli but also to trigger appropriate reactions.

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Symposium 6/1.00-2.30 p.m.

Neurocognitive Functions and Endophenotypes in Neuropsychiatric Disorders.

Host: Burkard Wiebel

B. WIEBEL & J. UEKERMANN. Neurocognitive Functions and Endophenotypes in Neuropsychiatric Disorders.

The symposium focuses on the discussion of neurocognitive functions in neuropsychiatric disorders and endophenotypes. The concept of state- and traitmarkers is of particular importance concerning the diagnostic and etiopathogenetic specificity. Identification of neurocognitive endophenotypes is usually based on a combination of neuropsychological tests and neurophysiological measurements. Common for the two concepts of neurocognitive markers and endophenotypes is the assumption of intermediary processes between the biological basis and symptoms of the disorder. The evidence for useful markers and endophenotypes will be discussed. Topics are the concept of endophenotypes in schizophrenia and other neuropsychiatric disorders (F.M. Reischies), novel approaches from reaction time decomposition-methods (S. Lis, C. Opgen-Rhein), the combination of frontal cortex related WCST and measures of early information processing (A. Brandt), the reliability of n-back tasks (S.Lis), executive control functions in schizophrenia and comorbid substance use disorder (P. Thoma), executive functions and theory of mind in alcoholism (J. Uekermann), novel approaches from flanker tasks and attention network testing (C. Opgen-Rhein) and context updating and behavioral inhibition processes in diverse neuropsychiatric disorders (B. Wiebel).

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F.M. REISCHIES, A. NEUHAUS

The Concept of Endophenotypes of Neuropsychiatric Diseases - Data and Models.

Endophenotype research has gained much interest in neuropsychiatry. One reason is that, because clinical symptoms are too complex to fit to genetic factors, endophenotype markers would be preferred for research. There are differences between the kind of psychiatric diseases which are investigated: a) progressive disease: For presenile Alzheimer dementia a causal sequence of genes, proteins and disorders of functional systems is already known. For example, genetic variation leads to A β -Peptide deposition in the frontal cortex and hippocampus, which has toxic effects with related neuropsychological symptoms. Endophenotype of this progressive disease serve as early marker for diagnosis. b) trait factors of psychiatric diseases: For diseases like Schizophrenia endophenotypes are looked for, i.e. parameters with a close genetic association. However for this disease several problems are to be considered. At first the relevant factors are not well known, neither the genetic variation and proteomics of Schizophrenia nor the effects on functional systems. Problems also arise because of the fact, that neuropathological findings are quite distributed in different parts of the brain. c) state effects: For acute psychiatric patients gene activation factors might be a problem for endophenotype research as well as an interaction of psychopathological symptoms. In the second part neuropsychological deficits as candidates for endophenotype of schizophrenia are presented with data on familiar association, probable association to a location of a chromosome or an identified gene association. A neuropsychological deficit, which is a potential endophenotype, might be a disorder of working memory. Psychopathological interactions with effort processes are discussed. In current research further neuropsychological differentiation of the working memory processes are investigated. They are best examined by neuropsychological deficits of schizophrenic patients with stable psychopathological status and which are not medicated - this research, however, is very rarely possible. An outlook is given on EEG and source identification by LORETA, especially findings in the middle part of the anterior cingulum by several working groups. At last a trade-off between ecological and genetical validity of neuropsychiatric findings in Schizophrenia is discussed.

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S. LIS, J. APOSTOLOPOLOS, B. GALLHO-FER, S. KRIEGER, P. KIRSCH

Do N-back Deficits Represent Working Memory Dysfunction in Schizophrenic Patients?

Dysfunctions of working memory (WM) are discussed as a possible endophenotype for schizophrenic disorders. They receive special attention because of their connection with alterations of the dorsolateral prefrontal cortex and their supposed heritability based upon family and twin studies. Although there is consent that schizophrenic patients perform poor in WM-tasks, there is still an ongoing debate whether these impairments can be linked to WM (sub-)functions or if they rather reflect other cognitive processes that are additionally required for solving these tasks. We present data from N-back tasks that demonstrate deficits of 12 neuroleptically naïve, first episode schizophrenic patients. These deficits can be traced down to impairments in elementary cognitive processes already involved in choice reaction tasks. This holds true only if patients and healthy controls apply comparable strategies to maintain task relevant information in a sensory code of WM. If the N-back task permits the selection of the appropriate response before the delay, only healthy controls but not schizophrenic patients seem to shift towards a motor coding strategy with faster reactions and a higher accuracy of task solving. A second study with 32 healthy subjects manipulated experimentally the possibility to apply a motor representational code

in N-back tasks. If motor coding was prevented, the deficits of schizophrenic patients could be simulated in healthy controls. The results suggest that depending on the features of N-back tasks the deficits of schizophrenic patients can be traced down to alterations in cognitive processing that are most likely not attributable to dysfunction in working memory.

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P. THOMA, B. WIEBEL, I. DAUM

Do Specific Profiles of Executive Dysfunction Exist in Schizophrenia with or without Comorbid Substance use Disorder, Alcoholism and Depression?

Disturbed executive control has been observed across a range of psychiatric disorders, like schizophrenia, alcoholism and depression. Executive control dysfunction may considerably impair the patients' professional achievement and their interpersonal relationships. As executive control is a multifaceted construct, different psychiatric groups might be affected by distinct patterns of impairment across executive subdomains. This, in turn could provide us with some clues about the potential existence of specific endophenotypes characterizing these disorders. The present study was aimed at assessing executive performance across different executive domains in schizophrenia, alcoholism and depression. Apart from that, a group of individuals suffering from schizophrenia and comorbid substance use disorder was included. It is now widely acknowledged that dual diagnosis patients represent a special challenge to both research and treatment services. Comorbid substance use in schizophrenia has been associated with low treatment compliance, increased risk for violent behaviour, higher relapse rates and generally poor prognosis. Studies assessing cognitive function in dually diagnosis patients are sparse and, to our knowledge, up to now, no study has specifically focused on executive control in this patient subgroup. Conventional neuropsychological and experimental measures of response inhibition, multitasking, set shifting and context updating were administered to the clinical groups as well as to a group of nonpsychiatric controls. Results will be reported and implications for research and treatment will be discussed.

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A. BRAND, E. CHKONIA, M. ROINISHVILI, M. HERZOG
Potential Endophenotypes in Schizophrenia: Executive Functioning and Early Visual Processing.

For diagnostical purposes it is important to identify the different endophenotypes underlying schizophrenia. Currently high-level as well as low-level information processing functions, eg executive functions and early visual processing, respectively, are proposed as potential endophenotypes. In our study, we investigated performance in the Wisconsin Card Sorting Test (WCST) and in a visual backward masking task ("shine through"). We tested 41 schizophrenic patients, 26 relatives, and 21 healthy controls. As expected, schizophrenic patients performed worse than relatives and controls in both tests. In the backward masking task, relatives performed worse than healthy controls – a prerequisite for an endophenotype. In the WCST, however, relatives did not differ from the controls. Moreover, within the patient group, the two variables did show only a very weak correlation ($r=0.13$; $p=0.43$). These preliminary results show that backward masking fulfills important criteria for representing an endophenotype, whereas the WCST does not.

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J. UEKERMANN, S. CHANNON, K. WINKEL, P. SCHLEBUSCH, U. TRENCKMANN, I. DAUM
Executive Processes and Theory of Mind in Alcoholism.

Studies on neuropsychological functions in alcoholism have reported a range of impairments including executive functions, which have been interpreted in the light of a specific vulnerability of the prefrontal cortex to the toxic effects of alcohol. Despite the broad data base concerning executive functions in alcoholism relatively little work has been carried out on social cognition. In the present investigation patients with alcoholism and healthy controls completed a neuropsychological test battery including executive functions and theory of mind. Analyses revealed significant executive and mentalising deficits of alcoholic patients in comparison with healthy controls. The results of the present investigation imply that alcoholics show deficits of social cognition, which may be of relevance for the treatment of alcoholism.

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Paper Session 5/ 1:00-2:30 p.m.

Memory II

Chair: Michael Kopelman

H. EMSLIE, B.A. WILSON, K. QUIRK & P. WATSON. Can School Age Children Use a Paging System to Reduce Everyday Memory and Planning Problems?

Memory and organisational problems are frequently reported in children who have sustained a traumatic brain injury or who have a developmental disorder such as dyspraxia or dyslexia. We recently demonstrated (Wilson, Emslie, Quirk, & Evans, 2001; Wilson, Emslie, Quirk, Evans, & Watson, 2005) that a paging system could reduce everyday memory and planning problems for people with non-progressive brain injury. Among the 143 patients in the 2001 study were 12 school-aged children (age range 8-16 years). Their results are reported here. In a randomised control crossover design 4 children were randomly allocated to group A and 8 to group B. Children chose their own tasks for which they needed reminders. These ranged from prompts to go to the toilet to remembering to take lunchbox or PE kit. During the 2-week baseline group A achieved 69.75% of tasks and group B 43.37%. Group A then received a pager for 7 weeks. During the last two weeks of this period group A now achieved 92.5% of tasks and group B (on the waiting list) 39.25%. Group A then returned their pagers and group B received pagers. During the last two weeks of this stage children in group A dropped back slightly but were still significantly better than during baseline (81.5%). Group B, meanwhile, were now achieving 80.12% of tasks, significantly better than during baseline. We discuss how this paging system can be used to reduce everyday memory and organisational problems of school-aged children.

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N. S. GRYSCHOK, T. MEINDL, R. ROSNER, C. BORN, M. REISER, R. R. ENGEL & K. FAST. A Neurocognitive Study on Associative Learning in Patients with Posttraumatic Stress Disorder.

Individuals with a posttraumatic stress disorder (PTSD) often report problems with memory. This subjective cognitive symptom is included in the defining diagnostic criteria for PTSD. As a result, many attempts have been made to obtain objective quantifications of memory deficits associated with PTSD. Recent studies have reported memory deficits and a reduced hippocampal volume in patients with PTSD. However very little is known about the functional role of the hippocampus in PTSD. Therefore it seems necessary to investigate the

functional integrity of the hippocampus with the assistance of memory paradigms. The goal of the current research is to use functional neuroimaging (fMRI) to investigate the hippocampal activation during an associative learning paradigm. This adapted paradigm (Henke et al., 2003) consists of two encoding conditions and a retrieval condition and has already been shown a qualified method for producing hippocampal activation in healthy subjects. During fMRI scanning participants view in the encoding condition different female faces in association with a profession. In the retrieval condition only the faces are presented and the participants have to decide whether this face belongs to a scientific or an academic profession. Additionally cognitive functioning, i. e. memory, attention, executive functions and estimated intellectual potential are examined. In our study we compare trauma-exposed subjects with PTSD and healthy control subjects to clarify whether hippocampal activation or cognitive functioning is related to PTSD. Each participant has to undergo a fMRI scanning session and an elaborated neuropsychological testbattery.

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J.BRUDER, C. VETTER, K. GROTH, A. BERALDI, & K. FAST. False Memories of Emotional and Neutral Words.

Objective: Emotional words have been shown to elicit fewer false memories (FM) than neutral words. It is hypothesized that these words facilitate item-specific processing during encoding because of their distinctiveness. Current knowledge holds that investigations of FM with emotional words has been limited to word lists that are related phonologically to a negative or neutral critical lure (CL), but has not yet been examined using semantic lists. This study aims to investigate the direction and the extent to which valence in semantic lists influences the formation of FM, using a modified version of Deese-Roediger-McDermott (DRM) paradigm. Method: 32 healthy subjects were examined with an experiment consisting of 3 phases. 1) Subjects studied 28 neutral and negative lists of converging associates; 2) this was immediately followed by free recall of these items and 3) finally, participants performed a recognition test containing neutral and negative studied list items, new list items and non-studies CL. During recognition, the subjects had to indicate whether the displayed item was “new” (new list item or CL) or “old” (studied). Results: Negative CL elicited significantly more FM than neutral CL ($p < .01$). Conclusions: the present findings add a new dimension to the current FM literature, suggesting an additional perspective for emotions in FM, and show that valence influences encoding and retrieval processes in a relational way. Results can be interpreted via spreading activation models, e.g. the activation-monitoring framework, in what activation of additional emotional networks leads to an increase in the probability of FM production.

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B.-K. DEWAR, B.A. WILSON, K. PATTERSON, & K.S. GRAHAM. Can People with Semantic Memory Deficits Re-learn Information?

There have only been a few systematic studies into the acquisition of semantic material in people with semantic memory problems. As part of a larger project to investigate reacquisition of semantic material in cases of impaired semantic memory due to both progressive (semantic dementia) and non progressive (encephalitis) aetiologies, here we report the training of two patients post encephalitis. Selecting the semantic category of famous people, we trained each subject on ten items each consisting of a photograph (e.g. of Tony Blair), the corresponding name and a semantic fact (e.g. Longest serving UK Labour Prime Minister). Semantic material was trained with a mnemonic, using errorless learning paradigms of vanishing cues and expanded rehearsal. The participants also engaged in home practice. Recall of all items was tested at the beginning of each session.

Maintenance and generalisation were assessed at the end of training. Both subjects improved relative to baseline in naming of the photographs but recall of the semantic fact was less robust. There was some evidence of subsequent maintenance of learning following cessation of practice and one but not the other participant demonstrated some generalisation to new photographs of the famous target people. Results are discussed with respect to (a) the characteristics of semantic re-learning and (b) methodological issues of treatment for person identification impairments.

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Z. RHEIN & E. VAKIL. The Effect of Sequence Complexity in the Serial Reaction Time (SRT) on Learning Rate and Transfer.

The effect of sequence complexity on the learning rate and transfer was studied with the SRT task. Three groups participated in the study. One group ($n=33$), practiced the standard fixed sequence of SRT (CBDCADBACDAB) for six blocks followed by a random block. Then they practiced a varying sequence of SRT probabilistic (Cleeremans & McClelland, 1991) where the fixed sequence is one version of it, for another six blocks followed by a random block. The second group ($n=33$) went through the same procedure but practiced first the probabilistic sequence and then the fixed sequence. The last group ($n=31$) practiced a combination of fixed and probabilistic sequence for six blocks followed by a random block. The fixed sequence was learned better than the probabilistic sequence, as indicated by the learning rate. There was no learning of the combination sequence. However, while the group that practiced the fixed sequence first and then the probabilistic one showed a cost of transfer, the second group, in contrast, gained from the transfer from probabilistic to fixed sequence.

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O. BAR-DAVID & E. VAKIL. What is Really Learned in Sequence Learning?

For many years, the serial reaction time (SRT) task has been used in the study of skill learning and specifically sequence learning. The change in reaction time (RT) from a practiced sequence to the RT in a different, random sequence was usually seen to indicate the level of sequence learning. Two experiments using SRT tried to test this assumption. In the first, 55 participants were divided into two groups. One underwent the classic paradigm in which they practiced 8 blocks of a 12-item sequence repeating 9 times for a total of 108 key-presses, and then a random block. The second practiced four blocks of random sequences, four blocks of repeated sequence and one block of random sequence. Comparing the groups revealed that although the first group showed a bigger increase of RT in the random block, there was no difference between the groups' RT in the last three sequence blocks, or in an explicit memory test (generate test) that all subjects were given. To test this even further, another 50 participants were added in two more groups: The first group practiced four sequence blocks and one random block. The second group practiced a repeating sequence for four blocks, then four more blocks of another repeating sequence and a final random block. Comparing the groups revealed that when changing to another sequence the increase in RT is significantly smaller than when changing to a random block. These findings suggest that the increase in RT may represent different components of sequence learning.

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Paper Session 6/1:00-2:30 p.m.**Dementia****Chair: Andreas Monsch/Nancy Foldi****K. FAST, A. BRÖDER & A. AIGNER. Assessing Storage and Retrieval Deficits in Patients with Mild Cognitive Impairment (MCI) and Healthy Elderly: A Multinomial Model vs. Neuropsychological Assessment.**

In common assessment of memory the parameters drawn from processes of encoding and retrieval are often confounded. Consequently, a process-related interpretation of memory impairments in neurodegenerative diseases is limited. Multinomial processing tree models can be used as a tool to determine memory deficits in clinical populations and normal aging beyond standardized measurement by separating storage and retrieval processes (Batchelder & Riefer, 1980). We focused on processes of encoding and retrieval of verbal information, using the validated multinomial measurement model of Batchelder and Riefer (1980; 1996) that allows disentangling these processes in a free recall task. 20 patients diagnosed with mild cognitive impairment (MCI), 20 young control subjects (YCG) and 20 healthy older adults (OCG) participated in the study. A 40-item word list was presented six times with interspersed free recall. Finally, a recognition test was administered. An additional comprehensive neuropsychological test battery, including the California Verbal Learning Test (CVLT), was given. The results of model based statistics reveal deficits in encoding and retrieval in MCI compared to a discrete storage deficit in OCG. The MCI-specific impairments can be explained by deficient strategic organisation during encoding. In contrast, the results of CVLT only give evidence for a storage deficit in MCI, but no further information on a pathological process of storage. The comparison of neuropsychological and model based data support the potential use of the multinomial model for early diagnosis of prodromal memory decline in dementia.

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U. LUEKEN, U. SEIDL, L. VÖLKER, E. SCHWEIGER, & J. SCHRÖDER. Development of a Short Version of the German Apathy Evaluation Scale (AES-D) Specifically Adapted for Demented Nursing Home Residents.

Apathy is among the most frequent neuropsychiatric symptoms in dementia, particularly in Alzheimer's disease. Recent studies have demonstrated that apathy is associated with poor outcome, cognitive decline, and increased caregiver distress. The Apathy Evaluation Scale (AES) has been widely employed for assessing symptoms of apathy in different patient groups. Using an authorized German translation of the AES, we investigated a large sample of demented nursing home residents (N=356) with respect to apathy and other non-cognitive symptoms. Due to the advanced cognitive deficits, data were collected from caregivers who were very familiar with the patient. However, this approach imposed limitations for several items which were obviously difficult to judge by caregivers or seemed to be inappropriate in this particular setting. It was therefore necessary to develop a shortened and adapted version of the scale. After subdividing all patients into two matched samples, the first subsample was used to identify problematic items due to defined psychometric as well as content-related criteria. The original 18-item scale was thus reduced to 10 items. This short version demonstrated favourable psychometric properties that were confirmed by cross-validation with the second sample. Correlations with the original full-length version were high ($r=0.97$ for both subsamples); the shortened scale yielded no substantial losses regarding internal consistency or construct validity (association with the apathy subscale of the Neuropsychiatric Inventory). Given this specific patient population, setting, and mode

of data collection, the short version of the German AES seems to be a valuable and time-efficient instrument for assessing apathy.

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P. BUBLAK, P. REDEL, C. SORG, & K. FINKE. Top-Down-Control and Spatial Attention in Mild Cognitive Impairment and Alzheimer's Disease: Parametric Assessment Based on a Theory of Visual Attention (TVA).

There is evidence that deficits of visual selective attention already occur at early stages of dementia. In our study, we analyzed in more detail possibly impaired mechanisms of attentional weighting in patients with mild cognitive impairment (MCI) and those with probable Alzheimer's disease (AD). To that end, we used partial report of brief letter arrays in combination with Bundesen's theory of visual attention (TVA; Bundesen, 1990). TVA provides mathematically independent and quantitative parameter estimates describing (1) task-related weighting for prioritizing relevant visual objects for processing (top-down control), and (2) the spatial distribution of attentional weights across the left and right hemi-field, respectively. Compared to an age-, gender- and education-matched healthy control group, task-related weighting was significantly lower in MCI patients, indicating a fundamental deficit in prioritizing target compared to distractor stimuli. In contrast, spatial attentional weighting was unimpaired and equally balanced across both visual hemi-fields. AD patients performed significantly different from control subjects with respect to both parameters: task-related weighting was reduced, and spatial weighting was biased to the left hemi-field. This deviation found in AD patients also differed significantly from the value found in MCI patients. The neurodegenerative progression in dementia seems to be characterized by deficits in task-related attentional weighting at early stages, and by an additional pathological leftward bias of spatial weighting at later stages. These findings will be correlated with data from MRI-based morphometric analyses and from APOE4-genotyping.

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P. REDEL, P. BUBLAK, C. SORG, & K. FINKE. Perceptual Processing Speed and Visual Working Memory Storage Capacity in Mild Cognitive Impairment and Alzheimer's Disease: Parametric Assessment Based on a Theory of Visual Attention (TVA).

Deficits of visual selective attention have been reported for both patients with mild cognitive impairment (MCI) and those with Alzheimer's disease (AD). These deficits may be related to reductions of the available processing capacity. To investigate this issue in more detail, complementary to our parallel study using partial report, here we used whole report of brief letter arrays in combination with Bundesen's theory of visual attention (TVA; Bundesen, 1990; Bundesen et al., 2005). TVA provides mathematically independent and quantitative parameter estimates describing two aspects of general processing capacity: (1) the rate of information uptake during visual processing (perceptual processing speed), and (2) the number of visual objects that can be consciously maintained in parallel (visual working memory storage capacity). We tested whole report performance in MCI patients, patients with probable AD and an age-, gender- and education-matched healthy control group. MCI patients only showed reduced perceptual processing speed compared to control subjects, while visual working memory storage capacity seemed to be unimpaired. In contrast, both components were significantly reduced in AD patients, and the processing speed was significantly lower in AD patients compared to MCI patients. Separate aspects of visual processing capacity seem to decline differentially during the neurodegenerative progression in dementia. While reductions of perceptual processing speed seem to occur already at early stages, visual working memory storage capacity may

be affected only at later stages. These findings will be related to data from MRI-morphometry and from APO-E4-genotyping.
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Symposium 7/3:00-4:30 p.m.

Neuropsychological Rehabilitation in Dementia and Mild Cognitive Impairment: Harnessing the Potential for Plasticity and Behaviour Change

Host: Linda Clare

L. CLARE. Neuropsychological Rehabilitation in Dementia and Mild Cognitive Impairment: Harnessing the Potential for Plasticity and Behaviour Change.

People with early-stage dementia and mild cognitive impairment (MCI) show the capacity for new learning and behaviour change, given appropriate support. Evidence for compensatory recruitment of neural networks supports the view that a degree of plasticity is retained. This presents important opportunities for neuropsychologically-based intervention aimed at reducing functional disability and maximizing quality of life. Such interventions may also have the potential to contribute to delaying the progression of impairment. However, these approaches are in the early stages of development. Improving the efficacy and long-term impact of neuropsychological rehabilitation interventions will require greater understanding of the neural mechanisms involved, identification of the most effective methods and techniques for supporting learning and behaviour change, and integration of these into a therapeutic programme that takes account of the person's psychological and social context. This symposium outlines some of the most important current developments in neuropsychological rehabilitation for people with early-stage dementia and MCI. These include the refinement of techniques for maximizing facilitation of memory performance, the development of individualized, goal-oriented rehabilitation approaches, the exploration of the impact of intervention on brain activation, evaluation of the effects of intervention on everyday functioning and well-being as well as on neuropsychological test performance, and the provision of out-patient and residential rehabilitation programmes. The innovative approaches described in this symposium demonstrate the application and integration of insights derived from neuroscience, neuropsychology and clinical psychology, and provide evidence for the effectiveness of the resulting interventions in reducing disability, enhancing well-being, and supporting patients and families.

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M. CROSSLEY, M. SHAW. Maximizing Memory Facilitation in Normal Aging and in Early-Stage Dementia.

Retrieval practice (i.e., spaced retrieval) during encoding is an effective strategy to enhance subsequent memory performance in normal aging and in the early stages of dementia. This study extends previous research by investigating the effects of differing amounts of retrieval practice during encoding (i.e., no practice vs single practice trial vs multiple practice trials), the effects of rich stimuli (i.e., pictures vs words), and the effects of retrieval support (e.g.,

recognition vs cued recall vs free recall) on subsequent delayed recall. Nineteen individuals in the early stages of Alzheimer Disease (AD) and 19 normal older adults completed a series of learning trials with semantically related words or pictures, presented with differing amounts of retrieval practice (i.e., no practice, single trial, multiple trials). The dependent variable was the number of target items from each semantic category recalled freely and with cueing following a 30 min delay. Similar to normal older adults, results indicate that participants with early stage AD benefit from the combined effects of maximal encoding support (i.e., multiple retrieval practice trials) and retrieval support (i.e., recognition and cued recall vs free recall). In contrast to normal older adults, individuals with AD did not show any additional benefits from exposure to enriched stimuli (i.e., pictures vs words). Together, these findings support the utility of compensatory behavioral strategies in reducing the effects of normal aging and early stage AD on memory functioning.

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L. CLARE, J. VAN PAASSCHEN, S. EVANS, C. PARKINSON, D. LINDEN, B. WOODS. Individualised, Goal-oriented Cognitive Rehabilitation in Early-Stage Alzheimer's Disease: Impact on Brain Activation, Task Performance and Well-Being.

People with early-stage Alzheimer's disease (AD) have the capacity for new episodic learning given appropriate support at encoding and retrieval, and for behaviour change based on procedural learning. It is possible that this is underpinned to some degree by compensatory recruitment of alternative neural networks. While standardized cognitive training protocols have produced few benefits for people with AD, recent research suggests that the potential for plasticity may best be harnessed through individualised, goal-oriented cognitive rehabilitation interventions aimed at enhancing everyday functioning and improving quality of life. In this presentation, five detailed single case studies of participants in a study of cognitive rehabilitation in early-stage AD are provided to illustrate (a) the process of goal-setting in cognitive rehabilitation therapy; (b) the impact of intervention on performance of cognitive tasks related to the therapy; (c) changes in brain activation during task performance following therapy; (d) the extent to which individual goals can be successfully addressed; and (e) the wider impact of therapy on well-being and quality of life. Factors influencing the progress of cognitive rehabilitation therapy include mood, coping style and level of awareness of current functioning, and the implications of this will be considered.

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G. KINSELLA, C. BURTON, E. MULLALY, E. RAND, B. ONG, E. STOREY, M. PHILLIPS. Reducing the Impact of Everyday Memory Failures: A Memory Group Intervention for Mild Cognitive Impairment.

We report on preliminary findings from a study to evaluate early intervention for developing memory difficulties in older adults diagnosed with mild cognitive impairment (MCI). The intervention comprised a six month follow-up assessment of a 5-session memory group focused on the management of everyday memory failures and involved the family, rather than just the person with MCI, in developing increased awareness of memory issues and specific strategies to prevent everyday memory failures. The memory group intervention was compared to a non-intervention waiting-list control group. 37 families (persons with MCI and family/friend participants) were allocated to either the intervention (n = 24) or the waiting list control group (n = 13). As expected there was no significant change in memory impairment indexed by performance in the clinic on neuropsychological tests. However, following intervention the results indicated that the disability of memory impairment in day to day activities reduced as the intervention group reported a significant reduction in everyday memory failures whereas the control group reported increasing memory failures. Furthermore, the intervention

group reported a significant increase in satisfaction or contentment with their memory as compared to the control group. These positive effects were supported by family reports and there was a positive trend for family strain to reduce in the intervention group. These preliminary findings provide encouraging support for the provision of early neuropsychological intervention for older adults with MCI.

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K. WERHEID, K. KUNTZ. The Selection of Individualized Therapy Goals for Cognitive Rehabilitation in Mild Cognitive Impairment and Early-Stage Alzheimer's Disease.

In recent years, improved clinical assessment and greater sensitization towards cognitive deficits have caused an increasing number of patients being diagnosed in prodromal and initial stages of dementia disorders, and consequently to a growing request for out-patient therapy. However, to date there are only few empirically evaluated out-patient therapy concepts for patients with 'Mild Cognitive Impairment' and initial Alzheimer's disease. Current research supports the view that awareness about memory deficits is still preserved in these patients, providing a basis for cognitive interventions. In most cases, the crucial problem consists in lacking capacity to transfer therapy gains into everyday life. Based on a review of recent findings, it will be argued that this problem is not sufficiently addressed by current therapy concepts and evaluation research, which have mainly focused on specific training techniques, while pursuing predefined therapy goals. To ensure transfer into real life, greater emphasis should be laid on an individualized and patient-centered selection of therapy goals. As a first step on the way, we will present a survey of patients 'at the edge' of dementia. Patients were asked to complete a questionnaire providing concrete descriptions and severity ratings of memory failures in everyday life, and to select three main therapy goals for cognitive rehabilitation. Viewed together with neuropsychological test performance, the results support the finding of largely preserved awareness. Interestingly, the selected therapy goals did not always coincide with those memory failures considered as most severe. The implications of these results for cognitive rehabilitation will be discussed.

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B. ROMERO, M. WENZ. The Impact of a Short-Term Multicomponent Residential Treatment Programme on Neuropsychiatric Symptoms in Persons with Dementia.

The impact of a short-term residential treatment programme on neuropsychiatric symptoms was evaluated in a one group pre-treatment/post-treatment and one-year follow up design. The multicomponent programme was designed to prepare patients with dementia and caregivers for life with a progressive disease (Romero & Wenz, 2001). The programme included: (1) medical treatment and intensive rehabilitation for patients, based on the concept of Self-Maintenance Therapy, and (2) an intervention programme for caregivers. We predicted that immediately after the treatment programme there would be a reduction of patients' (N = 88) neuropsychiatric symptoms, which would be stable at one year follow up. The results showed a post-treatment improvement on the global Neuropsychiatric Inventory score (Cummings et al., 1994). At follow up there was a stable long-term effect for the depression sub-score but not for other neuropsychiatric symptoms. The global NPI-score increased. Neuropsychiatric symptoms are common in dementia populations and their treatment is important because problematic behaviours are a major precipitating factor in the decision to institutionalize a dementia patient, in long-term hospitalisation and in over-medication. Reductions of these symptoms and in particular the long-term improvement of depression can be seen as beneficial for patients.

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Symposium 8/3:00-4:30 p.m.

Vision Restoration Therapy

Host: Bernhard Sabel

S. JOBKE, E. KASTEN, B.A. SABEL. Activating Blind Fields in Hemianopsics with a Massive Moving Stimulus Enhances Bisual Field Enlargements after Vision Restoration Therapy (VRT).

Background: In recent studies vision restoration therapy (VRT) was carried out with a single-point-stimulation paradigm. We now studied the question if the efficiency of the training can be increased when the entire visual field defect is stimulated by an extensive and moving spiral which is expected to activate the extrastriate pathway left intact after the cortical damage. **Methods:** 18 patients were randomly assigned to one of two groups. The "TURBO" group (n=8) received intense visual stimulation in their entire blind field using a large spiral moving centripetally at white/black bar alternating frequency of 10 Hz. This was compared to a standard VRT group (n=10). Both groups trained for about 1h/daily for a 3-months at home. **Results:** In the TURBO group stimulus detection improved from 52.4±9.9 % to 58.3±11.8 %, i.e. a 5.9 % improvement (p<0.01). The standard VRT - group improved detection performance from 51.8±14.2 % to 54.7±15.3 %, i.e. a significant increase of 2.9 % (p<0.05). Fixation performance in the TURBO group slightly declined by 5 % whereas in the conventional group it improved by 4 %. These fixation changes were unrelated to visual field enlargements. **Conclusion:** The greater improvement in the TURBO group is interpreted as an activation of extrastriate pathways which are thought to mediate "blindsight" and which by-pass the damaged visual cortex to directly innervate extrastriate visual structures. Our findings are interpreted as indirect evidence that extrastriate regions (cortical/sub-cortical) can be recruited to contribute to visual field restoration.

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J. GUDLIN, I. MUELLER, B.A. SABEL. Vision Restoration Therapy (VRT) in Glaucoma – A Small Open Study.

Background: Vision Restoration Therapy (VRT) improves visual performance in brain damaged patients after stroke and trauma (Kasten et al., Nature med. 4, 1998). It is not known if visual field defects caused by retinal lesions, such as glaucoma, also respond to treatment. The goal of the present study was to explore - for the first time - this possibility. **Methods:** Five patients with primary open angle glaucoma performed VRT for 3 months in an open pilot trial. Before and after VRT, the visual fields were measured with standardized perimetric tests and again after an additional 3-month training-free interval. Perimetric tests used were High Resolution Perimetry (HRP), 30° and 70° white/white (W/W) as well as 30° blue/yellow (B/Y) perimetry. **Results:** The average detection ability improved in HRP by 12.45% (range: 4.86 - 27.25%) and in 30° W/W perimetry by 9.15% (range: 2.14 - 27.13%) (Z=-2.023, p<0.05). In the 70° W/W perimetry which included more peripheral, non-trained areas, the average detection rate increase was 8.46 % (range: -3.1 - 28.88%), but this was not significant. In B/Y perimetry, there was only a small and insignificant improvement of 2.14% (-1.07 - 6.38%, range). After a 3-months non-training period the visual improvements remained stable. **Conclusions:** While a small patient sample does not permit general conclusions on visual field recovery after retinal lesions, the results of this pilot study suggests that VRT may improve visual field defects caused by retinal lesions. Whether VRT may

represent an effective neuropsychological intervention for glaucoma requires confirmation by a prospective, placebo-controlled, randomized, double-blind clinical trial.

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H. MAST, M. PREUSS. B.A. SABEL. Vision Restoration Therapy vs. Exploration Training in Patients with Visual Field Loss.

Purpose: Patients suffering from partial blindness following stroke or brain injury have shown to benefit from *vision restoration therapy* (VRT) which stimulates areas of residual, visual functions (Kasten et al., *Nature med.*, 1998). In previous studies we have investigated VRT with small samples. We now carried out a larger prospective, double-blind, randomized clinical trial to achieve visual field enlargements, comparing the effects of VRT with exploration training, where patients are allowed to move their eyes. **Methods:** 87 Patients with homonymous visual field defects were randomized into two experimental groups, one receiving VRT (N=61) and the other a computer based exploration training (N=26) daily for one hour over a period of six months. Visual field defects were quantified with standard, near-threshold perimetry and with super-threshold high resolution perimetry (HRP) before and after therapy. We also measured false positive errors, fixation instability, eye movements and reaction times. **Results:** We now present an interim analysis of 58 patients. VRT produced a significant enlargement of visual fields ($p<0.01$) as demonstrated both by HRP (+5.38%) and by perimetry (+5.42%) but no such significant changes were induced by exploration training (HRP: +1.94%, perimetry: +2.27%). The improvement of the VRT-group could not be attributed to eye movements, fixation instability or false positives and all measures did not co-vary with visual field enlargements. **Conclusions:** As our study is still on-going, the results should be regarded as preliminary. Nevertheless, this interim analysis confirms prior reports that VRT leads to visual field enlargements and that exploration training does not have comparable effects.

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J. ROMANO, D. SCHLUETER. Visual Field Deficits Improve after Vision Restoration Therapy (VRT): Experiences with a US Patient Population.

Purpose: Traditionally, no specific treatment is indicated for those with visual field defects after retrochiasmatic insults. In recent years, a specific stimulation paradigm to the border between the seeing and the blind field through Vision Restoration Therapy has been reported to result in perimetric improvement in some patients. We report on the experience with Vision Restoration Therapy in a US population. **Methods:** Patients with visual field defects from retrochiasmatic injury received a 6module course of Vision restoration Therapy. Suprathreshold perimetry of the central 40x50° was performed at baseline and after each module. The primary outcome was the percentage of the number of stimuli detected during this perimetric test. In addition, age, time from injury, lesion mechanism and location were recorded. **Results:** On average, the patients showed a significant and absolute improvement of stimulus detection as assessed by high resolution perimetry. Two thirds of those treated had a notable improvement due to an enlargement of the visual field. Patients without improvement after 3 months of therapy also did not benefit after 6 months. Age and time from injury did not correlate with the degree of improvement. **Conclusion:** Vision Restoration Therapy in a US population parallels the European experience. Two thirds of patients receiving VRT experience a significant improvement. Better performance at 3 modules predicts a greater chance of significant field expansion after completion of therapy. These results validate prior reports and support the notion that VRT is a useful rehabilitative intervention for some patients with visual field defects from

retrochiasmatic insults. Results in a clinical population in a US clinic replicates the German experience with VRT.

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Paper Session 7/3:00-4:30 p.m.

Brain Imaging I

Chair: Robert Fletcher

T. SUSLOW, A.V. RAUCH, P. OHRMANN, J. BAUER, & H. KUGEL. Brain Activation to Emotional Facial Expression as a Function of Coping Style: A 3 T fMRI Study.

Repression and sensitization characterize two opposite coping strategies with threatening stimuli. In the present fMRI study we examined the question whether repressors differ from sensitizers in the processing of threat-relevant social stimuli. The Mainz Coping Questionnaire was administered to 150 subjects to assess dispositional coping styles. 10 high sensitization individuals and 10 high repression individuals were selected to participate in this study (mean age: 24.9). Stimuli consisted of fearful, angry, happy, and neutral (baseline) expressions. First, subjects were presented with 30sec blocks of masked fearful, masked angry, masked happy and neutral faces. After the masked faces subjects saw 30sec blocks of unmasked faces. Participants were instructed to observe the pictures. T2* functional data were acquired at a 3 Tesla Scanner using a single shot echoplanar sequence (TR=3s, TE=30ms, $\alpha=90^\circ$). fMRI data were processed using SPM2. According to the results of a whole brain analysis repressive individuals showed stronger reactions to masked emotional expression especially in face processing cortical areas. Sensitizers exhibited enhanced activation of frontal cortical areas and parts of the basal ganglia in response to unmasked angry faces. Angry faces caused stronger activation of the precuneus and the superior occipital gyrus in repressors than in sensitizers. Repressors showed stronger responses of the frontal lobe and several face processing areas to fearful and happy faces compared to sensitizers. Repressors appear to be more responsive to fearful (ambiguously threatening) and happy (non-threatening) facial expression, whereas sensitizers demonstrate an enhanced responsivity in several prefrontal areas to angry faces (i.e. unambiguously threatening expressions).

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W. SKRANDIES. Neural Plasticity Induced by Human Perceptual Learning – Sensory Thresholds and Neurophysiological Correlates.

Sensory training induced by the presentation of sensory stimuli is followed by lowered perceptual thresholds and changes in electrical brain activity. For example, most human subjects are able to perceive 3-D information contained in dynamic random dot stimuli (dRDS) only after some practice, and there is similar perceptual learning with hyperacuity targets (vernier stimuli). We present corresponding psychophysical and electrophysiological data obtained in independent groups of young adults. Our results illustrate that passive viewing of visual targets presented near or above threshold results in about 75% of healthy subjects in an increase of discrimination performance showing that improvement is independent of attention. Learning is stimulus specific: the exact physical stimulus parameters of the learned targets are important as there is no transfer of improved performance to different stimuli. In addition, the retinal location of training targets is critical: improved performance can be demonstrated only when test stimuli are presented to the retinal areas where training occurred. When the subjects' attention is distracted by a different task

performed during training, there is still improved performance seen in the psychophysical tests, however, this occurs only after a consolidation phase of about 24 hours. Such behavioral changes are accompanied by alterations of stimulus-evoked brain activity. Major effects in the electrophysiological data are not seen with simple amplitude measurements but with the topographical pattern of activation suggesting that neural assemblies in the visual cortex are affected by sensory training. Subjects who do not improve in perception, display no such changes of electrophysiological parameters.

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M. HELDMANN, C. TEMPELMANN, H.-J. HEINZE, F. MÜNTE. Activation of the Anterior Cingulate Gyrus and Associated Subcortical Regions During Feedback Related Performance Monitoring.

The functional meaning of performance monitoring is to identify maladaptive behavior. This process is based on internal as well as on external performance related information and has its anatomical underpinning in the anterior cingulate cortex (ACC). With the advent of the reinforcement learning theory by Holroyd and Coles (2002) it is hypothesized that performance related activation of the ACC is guided by the mesolimbic dopaminergic system (MDS). We conducted an event-related fMRI study with sixteen subjects to investigate the hypothesized relationship. For identifying subcortical areas more precisely we collected magnetization transfer (MT) saturated and no MT-saturated images additionally. Subjects had to perform an Eriksen flanker task with performance related feedback, which contained the information if the given response was correct. In contrast to the standard paradigm subjects were not aware of the correct target-response mapping, rather, they had to learn the correct mapping via the feedback given after each response. Whenever the correct mapping was established, the mapping was switched without warning and subjects received feedback of being incorrect although they made a correct button press with regard to the just learned target-response relationship. Contrasting this switch related feedback against feedback conditions where the target response-relationship was correct and no switch occurred we found increased activation within the ACC. Considering the same contrast, subcortical regions, which are related to the MDS, revealed also increased activation. These results are in line with the reinforcement learning theory and will be discussed with respect to the understanding of disturbed performance monitoring in patients.

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J. ZÖLLIG, M. KLIEGEL, & R. WEST. Neural Correlates of Prospective Memory Across the Lifespan.

Prospective memory requires the formation and later realization of intentions that must be delayed over minutes, hours, or days. Behavioural studies indicate an impaired efficiency in prospective remembering in children and old adults. However, these two age groups have never been tested in one paradigm. The present study investigates the development of prospective memory across the lifespan and assesses possible age-related differences in neural processing using EEG. The applied paradigm is based on a study from West et al. (2003) where the prospective task is embedded in a semantic categorization task. A retrieve-delay specification was used in which intention execution had to be additionally postponed after cue detection. Three groups were compared: adolescents (11-13), young adults (18-25), and old adults (64-79). Behavioural results revealed the expected inverted U-shaped function with young adults having the best prospective memory performance. Analysis of error data, however, implied that different processes may have contributed to failures of prospective memory in adolescents and old adults. Whereas the poorer performance of old adults seems to be a result of difficulties in encoding of intentions and self-initiated retrieval of

prospective cues, adolescents seem to forget the content of the intention. This effect of age on prospective memory performance is supported by age-related differences in ERP-components for cue detection as well as post-retrieval monitoring processes. Source localizations of these ERP-data with sLORETA revealed different activation patterns for adolescents and old adults. Overall, our findings suggest that adolescents and old adults recruit somewhat different neural generators for prospective remembering.

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G. WOOD, H.-C. NUERK, B. GEPPERT, J. WEBER, & K. WILLMES. Numerical Procedures and Number Representations: A Parametric fMRI Study with the Number Bisection Task.

We examined the influence of numerical procedures and of magnitude and verbal number representations on fMRI signal in a parametric rapid event-related fMRI study. Seventeen participants judged whether the middle number of a triplet (e.g. 2_4_6) was also the arithmetical mean of them (e.g. 23_25_27) or not (e.g. 43_45_49). Results show the engagement of cognitive systems dedicated (i) to verbal and procedural number processing, which is centred on the left angular gyrus and the left supra marginal gyrus, and (ii) to magnitude and base-10 number processing, which are centred on the bilateral intraparietal cortex. The verbal number system was more activated by numerically smaller triplets, smaller numerical distances, larger distance to the correct response, and by items part of multiplication tables. In contrast, the intraparietal number system was more activated by large numerical distance, presence of decade crossing, small distance between correct and presented response and by items out of multiplication tables. When number bisection was impossible, activation in the right ventrolateral prefrontal cortex could be observed, possibly due to a cognitive mechanism of self monitoring and selection of cognitive strategies. Therefore, number bisection seems to depend on the activation of multiple procedures and number representations. Furthermore, base-10 structure of two-digit numbers was found to be a determinant of the depth of number magnitude processing. This suggests that the activation of verbal and magnitude number systems as measured by the number bisection task depends on regulatory mechanisms situated in the prefrontal cortex.

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S. LUX, J. C. MARSHALL, V. BINDRICH, H. J. MARKOWITSCH, J. N. SHAH & G. R. FINK. Neural Correlates of Recognition for When and Where Autobiographical Events Took Place.

Autobiographical memories are related to a specific time and place at which the event occurred. In a functional MRI study, we investigated the neural differences between recognizing the temporal and spatial context of autobiographical information, independent of the memorized event itself. We also analysed parametrically how remoteness of the event influences the activations associated with temporal and spatial context. 13 males with a mean age of 25 years were asked, in a two-choice recognition task, where or when a specified autobiographical event took place. While reaction times were not different for time or place judgements, subjects made significantly more errors on time judgements. Temporal context information activated right frontal and bilateral parietal areas differentially, while spatial context information activated differentially a network of left frontal, bilateral temporal and parietal areas. Midline areas including cingulate gyrus, precuneus, and supraorbital sulcus were activated during parametrical analysis of temporal context, when activations for more recent events were weighted stronger. In contrast, no parametrical contribution of remoteness was found for spatial context information. The recall of temporal context is related to remoteness and activates areas specific for time processing in a range of different paradigms (Dobbins et al., 2002, 2003; Konishi et al., 2002; Suzuki et al., 2002). The recall of spatial context is rich in associations to the content of the event and

activates therefore a more widespread neural network independent of remoteness (Burgess et al., 2001; Casino et al., 2002).

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Paper Session 8/3:00-4:30 p.m.

Language Disorders and Aphasia

Chair: Dorothea Weniger

A.K. LINDELL. Priming vs Rhyming: Orthographic and Phonological Activation in the Left and Right Hemispheres.

The classic 'verbal/nonverbal' description of left and right hemisphere function, though a handy rule of thumb, underestimates the right hemisphere's linguistic capacity. Even so, though the right cerebral hemisphere is far from 'nonverbal', clinical research suggests that it lacks the capacity to convert orthography to phonology. To evaluate the phonological processing capabilities of the left and right hemispheres in the normal population, participants completed one of two visual half-field tasks: a homophone priming task assessing implicit phonological activation, and a rhyme judgement task assessing explicit recruitment of phonology. In both tasks, the degree of orthographic and phonological overlap between stimulus pairs was manipulated: a) high orthographic and phonological similarity (not, knot); b) high orthographic and low phonological similarity (pint, hint); c) low orthographic and high phonological similarity (use, ewes); or d) low orthographic and low phonological similarity (kind, done). As anticipated, across explicit and implicit tasks, high orthographic similarity facilitated both left and right hemisphere performance. Critically, for the implicit homophone priming task, only left hemisphere trials benefited when phonological similarity between prime and target was high. As such, the findings indicate that while both hemispheres are capable of orthographic analysis, phonological processing is limited to the left hemisphere.

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H. LAUSBERG, E. ZAIDEL, A. PTITO. Left-Hand Preference for Co-Speech Gestures in Patients with Complete Callosal Disconnection.

The finding that right-handers with left hemisphere language dominance prefer the right hand for co-speech gestures is a fundamental argument for neuropsychological, psycholinguistic and recent evolutionary theories on language and gesture that propose a close association between speech and co-speech gesture production. However, several studies have reported an equally frequent use of the right and left hands in co-speech gestures, and this calls for an alternative hypothesis. We investigated hand preference for spontaneous co-speech gestures during two personal interviews in three right-handed and one left-handed patient with complete callosal disconnection. All four patients had left hemispheric dominance for language and praxis. Three of them exhibited a reliable left-hand preference for co-speech gestures despite their left hand agraphia and apraxia. The fourth patient with presumed bilateral cerebral language representation revealed a consistent right-hand preference for co-speech gestures. We conclude that the patterns of hand preference cannot be explained simply by speech lateralization or handedness. Co-speech gestures can be generated in the right hemisphere, independently from speech production, and may be directly related to specialized right hemispheric functions such as prosody, spatial cognition, or emotion. In contrast to the traditional neuropsychological and psycholinguistic theories on co-speech

gesture production, the present findings suggest that some co-speech gesture types are generated independently from speech production.

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J. ROSSMUELLER, S. PAHL, & V. HOEMBERG. Comprehensive Screening of Limb Praxis Functions in Stroke Patients: Construction and Preliminary Standardisation of the Duesseldorfer Apraxia Test (DAXT).

We present a comprehensive test battery for the assessment of ideomotor and ideational apraxia that was standardised on a representative sample of 35 stroke and 35 elderly orthopaedic inpatients without known history of neurological disease. Following the neuropsychological model of Rothi, Ochipa and Heilman (1997), upper-limb apraxia was assessed along three different input-modalities, namely imitation, pantomime on visually presented objects and actual tool use. Aiming at an increase of the instructor's objectivity, we applied two additional tests: One requiring the imitation of movements that were applied via video-sequences and another test demanding pantomimed movements on photographs of objects. Since the model of Rothi, Ochipa and Heilman (1997) implies it to be relevant, errors were scored on two dimensions: One for content errors and one for spatiotemporal errors. Zero responses were singled out. Subsequent analyses of test criteria revealed satisfactory figures concerning interrater-reliability, test reliability and various aspects of test validity.

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H. PROIOS, I. MALATRA, C. CHRISTOUDI, K. WILLMES, D. WENIGER & I. MILONAS. Development and Validation of the Aachen Aphasia Test in the Hellenic Language.

Work related to the development and standardization of the Aachen Aphasia Test (AAT) in the Hellenic (Greek) Language is to be presented. The original test was developed in German, versions of the test having been published in several other languages. The Greek version of the AAT will be the first standardized test for assessing acquired language disorders in the Greek language. We developed a pilot version of the AAT, adapted to the linguistic regularities of the Hellenic language, however maintaining the structure of the original test. The AAT consists of several subsections: spontaneous speech ratings along 6 six-point ratings scales, a 50-item version of the Token Test as well as 4 subtests, each containing 10-item sets tapping primary and secondary expressive and receptive language modalities. Administration of the test takes 45 to 75 minutes, to be performed in one session. The test was given to 100 mother-tongue normal Greek speakers. Then, data was collected from 120 aphasic patients with a well-documented neurological history, lesion site and vascular etiology. We will report the psychometric properties of the test in terms of reliability (internal consistency of item sets and subtests), construct validity (gradation of difficulty in line with linguistic processing complexity of items and tasks, correlational structure among item sets) and differential validity in terms of selection (aphasia yes/no) and clinical syndrome assignment properties. In addition, results will be presented regarding the impact of education and age on performance both in the control group and the aphasic patients group.

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M. LAUTERBACH, I. P. MARTINS & K. WILLMES. Adapting the Aachen Aphasia Test (AAT) to the Portuguese Language: Normative Data for Patients with Aphasia and Healthy Controls.

Introduction: We present the Portuguese version of the battery and its standardization in healthy subjects and patients with aphasia. The translation maintains the constructional ideas and linguistic properties

of the original version. Subjects: 101 aphasic patients clinically classified in one of the four standard syndromes were examined with the PAAT. In addition, the PAAT was administered to 153 healthy controls, stratified for age and educational level. Results: 94,1% of the 101 aphasic patients were correctly reclassified into the clinically attributed diagnostic groups by means of a linear discriminant analysis. Hierarchical cluster analyses revealed that the grouping of sets of items according to language modalities, reflected in the subtests, was corroborated empirically. All reliability estimates for the separate subtests revealed a Cronbach's alpha coefficient larger than 0,957. For healthy controls, the results of PAAT were affected by educational level, the Token Test being influenced least. Using photographs instead of line-drawings in the subtest Confrontation Naming the number of errors decreased significantly. Qualitative analysis of naming errors revealed a high percentage of about 40% perceptual errors. Discussion: The Portuguese version of the AAT showed similar construct and discriminant validity properties as well as very high reliability in line with the original version. Educational level influences not only linguistic but also perceptual capacities. Premorbid knowledge and capacities of the aphasic subject seem to exert a substantial influence on the test outcome. Correction for educational level has to be taken into account when establishing norm tables for PAAT subtest.

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M. MEINZER, D. DJUNDJA, G. BARTEL, B. ROCKSTROH. Behavioral- and Neuroplasticity in Chronic Aphasia.

Recently a new short-term intensive treatment approach for aphasia, the Constraint-Induced Aphasia Therapy (CIAT), has been introduced (Pulvermüller et al. 2001). First, we will briefly review efforts to evaluate the effectiveness of this new approach (Meinzer et al. 2005) and compare treatment efficacy to that of intensity matched conventional speech and language therapy (Barthel et al., in revision). Furthermore, new data of more than 50 patients trained with the CIAT program will be presented and implications for the treatment of chronic aphasia are discussed. Second, the short-term intensive schedule of the program allows to investigate the neural basis of aphasia therapy under rigorously controlled conditions. This has been documented in a study using magnetoencephalography (MEG, Meinzer et al. 2004). Strong correlations between improvement in standardised language tests and changes of dysfunctional slow wave activity (1-4 Hz) in perilesional areas were found. More recently, we used functional magnetic resonance imaging (fMRI) to elucidate the neural substrate of behavioral improvement following CIAT. In particular, we investigated overt language production during a picture naming task, using a temporal sparse sampling procedure. Such a design allows to observe the patients' actual task performance before and after treatment during scanning. Here we present individual and group data of 12 patients who underwent fMRI before and after CIAT. Results of whole brain and region of interest analysis (based on coregistered MEG slow wave mapping) will be presented.

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Poster Session B/1:00-4:30 p.m.

M. PAUKE, O. BALLASCHKE, & T. GUTHKE. Neuropsychological Profile in Adults with Attention-Deficit Hyperactivity Disorder.

Neuropsychological studies of adults with ADHD have only relatively recently emerged. Differences in performance for controls and adults with ADHD have been found for measures of vigilance, verbal

memory, and behavioural inhibition, but across studies differences exist with respect to performance deficits on certain tests (e.g. CVLT) and currently, there is no consensus of specific neuropsychological dysfunctions in adults with ADHD. But neuropsychological testing is important to support the clinical diagnosis and to investigate specific impairments in cognitive functioning. We will present our study with approximately 30 patients with ADHD. The diagnosis of ADHD was based esp. on medical data, self reports, rating scales (self, others: childhood, actual) and documents (school reports). The patients underwent detailed neuropsychological testing of executive functions, attention, and memory. Additional we used experimental paradigms of executive function where we assumed that adults with ADHD should have specific impairments (Stroop, Task-Switching, and Serial Order Processing). Finally, we will discuss the discriminative validity of the used neuropsychological tests and experimental paradigms.

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J.N. ZADINA, D.M. COREY, C.G. CUSICK, L.C. LEMEN, A.L. FOUNDAS. Corpus Callosum and Dyslexia: Reduced Genu and Impaired Reading.

The corpus callosum (CC) is the largest interhemispheric white matter pathway. Reduced CC volume may reflect anomalous pathways or reduced interhemispheric transfer among cortical regions involved in reading. Atypical interhemispheric transfer may play a role in dyslexia. In this study, right-handed dyslexics (n=14) and controls (n=12), matched for age, education, and sex, were given measures of intelligence, reading, and language. Volumetric MRI scans were acquired and CC volume and subregions (genu, anterior midbody, posterior midbody, isthmus, splenium) were measured on midsagittal MRI images. A novel measurement method was used, in which individual variation in CC tilt angle was controlled to allow more accurate subdivision of CC. Right and left hemisphere volume and total CC area did not differ between groups. A significantly smaller genu area was found in dyslexics (p=.036). Genu area was positively correlated with listening comprehension (p=.030) and all reading measures, including word attack, word identification, and passage comprehension respectively (p's=.012, .007, .018). Anterior midbody correlated with two comprehension measures (p's<.03). Performance IQ correlated with splenium (p=.020) and isthmus (p=.0463). fMRI has previously shown the genu co-activating with frontal, parietal, and temporal cortical areas and during attention tasks. Although preliminary, our findings may reflect weakened transfer through anterior CC to prefrontal attention and working memory areas. These results support the notion that anomalous CC anatomy may contribute to reading difficulty and/or to compensatory alternative neural strategies.

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C.KARPATHIU, V.DALLA, S.VASILADIS, S.KALTSOUNIS, A.PAPA, ISIMOTA, & H.HECAN. Diagnosis of Dyslexia Through Neuropsychological Data by Using EEG.

Aim: The creation of objective and specific diagnostic method for dyslexia. So, we studied the diagnostic procedure for dyslexia apart of environmental factors, such as are the structure of the language and the pedagogic system. Material and method: We studied from the side of neuropsychology the EEG's of 5.800 individuals, from various ages, of both sexes. This means that we studied the function of every cerebral region as it is recorded with the EEG. All the EEGs were recorded in national system 10/20 and the medical reports was from the same neurologist. Results: The results were very positive for the diagnosis of dyslexia through the findings of the EEG, because we are able: 1. To distinguish if there is dyslexia or not. 2. To distinguish the type of dyslexia. 3. To know the disturbances that the dyslexic individual will present at pedagogic and psychosocial levels. 4. To create a diagnostic scale that helps us to graduate the severity of

dyslexia, and 5. This graduation helps us to have a specific control for the therapeutic program and by this way to achieve the completely therapy of dyslexia. Conclusion: We believe that the diagnosis of dyslexia through the EEG findings is really an objective procedure.

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C.KARPATHIU, V.DALLA, S.VASILIADES, S.KALTSOUNIS, A.PAPA, & G. CHIMONAS. Treatment of Dyslexia.

Objective: Creation of a therapeutic method for the treatment of dyslexia which will be based on neurolinguistic data. This method on one hand is based on the functional localized cerebral neuropsychological data and on the other hand on the possibilities to use stimuli on neurolinguistic level for the therapy of dyslexia. Material and method: We created a complex optic-acoustic system initially based on the principal of dichotic acoustic, which we enriched with some other specific elements on the level of functional cerebral stimuli. Then we created these stimuli that mainly are specific texts in various forms of presentation, which are proposed for reading. The reading is under control and some factors are added on, such as the rhythm, as well as the frequency depending upon the quality of the stimulus. Results: We observe positive results to the therapy of dyslexia because: 1. We achieved on functional level, to change from pathological to normal the findings of the diagnostic EEG. 2. This modification affected positively the developmental process of the dyslexic individual at a short time interval. 3. The modification of the EEG provoke an important improvement initially on psychosocial level and then on the learning performance of the dyslexic individual. Conclusions: We believe that for the therapy of dyslexia the neurolinguistic logotherapy is the unique essential approach, fact that can be verified through the analogous periodic studies of the EEG.

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M. OTSUKI. Callosal Stuttering: the Symptoms and the Lesions.

Background and Purpose: There has been some reports that cerebrovascular disease caused acquired stuttering, however the precise causative lesion localization and its characteristics still remain unknown. Our aim is to identify the causative lesions of acquired stuttering and its characteristics. Patients and Methods: Patient 1 was a 76 year-old- right handed woman and Patient 2 was a 67 year-old right handed man. Both of them had not previously stuttered. There was no other speech or language difficulty such as aphasia. The characteristics of the stuttering were assessed as followings: the location of the repetition, whether in word initial, medial, or final position, number of sound-syllable reiterations, and its characteristics. We examined their lesions using MRI (Magnetic Resonance Imaging). Results: Both of the patients showed repetition in the word initiation and they were generally repeated only twice or three times. Their utterance was vague and hesitate. There was no adaptation. Patient 1 had lesions in the whole anterior body and a half of posterior body of corpus callosum. The lesion of Patient 2 was located in the border just between anterior and posterior body of corpus callosum. Conclusion: The common lesion localization of the two patients or a critical lesion for acquired stuttering without aphasia was concluded to be located just in the border of the anterior and the posterior body of the corpus callosum.

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K. SAITO, M. OTSUKI, & S.UENO. Sign Language Aphasia Due to Left Occipital Lesion in a Deaf Signer.

The localization of sign language production and comprehension in deaf people has been described to be similar that of spoken language aphasia. Especially, when deaf people comprehend sign language, auditory area is activated instead of hearing spoken language, which is

called cross modal plasticity. But there was no previous report that left occipital lesion caused sign language aphasia. We report a deaf signer with sign language aphasia due to the left occipital lesion. He was a 72-year-old Japanese man with brain infarction in the territory of the left posterior cerebral artery. Neurological findings revealed a right homonymous hemianopsia without motor and sensory deficit. General intelligence was preserved. The patient showed sign language aphasia, which included the impairment in all modality: comprehension, production, reading and writing. The characteristics of the errors of sign language production included two types. One was the substitution of the different meaning words or the different letters, whose finger patterns are similar to those of originally intended ones. These substitution words and letters seem to be equivalent to verbal and phonemic paraphasia of oral language, respectively. The other was the substitutions of unknown finger patterns which cannot indicate any words or letter. This substitution seems to be equivalent to distorted phoneme of oral language such as anarthria. Our patient's symptoms indicated that there can be another localization of the plasticity, and the occipital lobe in deaf people may be associated with not only input of the visual information but also control of the output process.

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J. RÜSSELER, J. SCHOLZ, K. JORDAN, C. QUAISER-POHL. Mental Rotation is Deficient in Dyslexic Children: Evidence from Non-Speeded Tests.

Prior investigations of mental rotation in dyslexic children have yielded equivocal results that might be caused by differences in stimulus material and in the testing formats used. Whereas some studies observed impaired mental rotation performance, others did not report any performance differences or even superior spatial abilities in dyslexic readers. Here, we report a comparison of mental rotation for letters, three-dimensional figures sensu Shepard and Metzler, and colored pictures of animals or humans in second-grade German dyslexic readers using untimed paper and pencil tasks. Dyslexic readers were impaired in all three tasks indicating a general, material-unspecific deficit in mental rotation ability. Furthermore, dyslexic children were deficient in other spatial abilities like identifying letters or forms among distracters. These findings are in line with the idea of a developmental dysfunction of the parietal cortex or a subtle anomaly of the cerebellum as possible causes for dyslexia.

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A. SANTOS, B. JOLY-POTTUZ, S. MORENO, M. HABIB, & M. BESSON. Pitch Discrimination Deficits in Dyslexic Children: Behavioural and Auditory ERP Evidence for Brain Plasticity.

Although it is commonly accepted that dyslexic children have auditory phonological deficits, the precise nature of these deficits remains unclear. This study examines potential auditory processing deficit in dyslexic children, as well as its recovery after specific training, by measuring Event-Related brain Potentials (ERPs) and behavioural responses to pitch manipulations within natural speech. In two experimental sessions, separated by 6 weeks of intensive phonic training, ten dyslexic children, aged 9 to 12, were compared to reading age-matched controls, using sentences from children's books. The pitch of the sentence's final words was parametrically manipulated (either congruous, weakly or strongly incongruous). Before training, controls outperformed dyslexic children in the detection of the pitch manipulations. Moreover, while late positivities were elicited by incongruous words in controls, no such components were found in dyslexics. Interestingly, pitch discrimination performance was significantly improved after relatively brief period of training, for dyslexics. Moreover, the amplitude of the late positivities to strong incongruities was increased, so that the effects were not significantly different in the dyslexics and controls after remediation. Most importantly, this increase was correlated to the

improvement of dyslexics' phonological and spelling abilities after training, thus suggesting a link between pitch processing and reading abilities. These findings shed some light on the brain mechanisms underlying the auditory deficit in dyslexia. Moreover, they suggest that the effectiveness of intensive intervention in dyslexic children can be associated with neural changes, and that these changes can be directly observed using the ERP method.

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S. JONSDOTTIR, A. BOUMA J.A. SERGEANT, E.J.A. SCHERDER. Relationships Between Neuropsychological Measures of Attention/Executive Function and Behavioural Measures of ADHD Symptoms and Comorbid Behaviour.

Objective: The aim of this study was to examine the relationship between executive functions (EFs), as measured by neuropsychological tests, and symptoms of attention deficit hyperactivity disorder (ADHD) and comorbid behaviour, as rated by parents and teachers. As intelligence and language ability are important covariates they were also assessed. Method: The sample consisted of 43 children aged 7-11 years who were referred for neuropsychological assessment at a tertiary clinical facility. Most of the children had the diagnosis of ADHD combined or inattentive type. Different aspects of EFs were assessed. Results: EFs were not significantly related to symptoms of ADHD, but only to comorbid symptoms of depression and autistic symptomatology. Language ability rather than EFs best predicted teacher ratings of inattention. Conclusions: The results of the study do not support the EF theory of ADHD. The importance of screening for comorbid language disorders in children referred for ADHD is emphasized.

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S. JONSDOTTIR, A. BOUMA J.A. SERGEANT, E.J.A. SCHERDER. Gender Differences in Symptoms of ADHD and Associated Factors in Normal Icelandic Children as Rated by Parents and Teachers.

Objective: To examine gender differences in symptoms of Attention Deficit Hyperactivity Disorder (ADHD) and associated factors as rated by parents and teachers in a sample of normal Icelandic children. Method: A school-based sample of 115 children (68 boys and 47 girls), aged 6 to 11 years old, was evaluated by their parents and teachers with the Behavior Assessment System for Children (BASC). Results: Parents and teachers rated boys significantly higher than girls on hyperactivity/impulsivity and aggression symptoms. Teachers rated boys higher than girls on inattention symptoms but parents did not. Externalizing problems best predicted hyperactivity/impulsivity symptoms and internalizing problems and learning problems best predicted inattention symptoms in both boys and girls. There was a significant correlation between parents' and teachers' ratings of ADHD symptoms in boys but not in girls. Conclusion: More externalizing behaviours of boys than girls may be inflating their ratings of ADHD symptoms, especially among teachers. The clinical relevance of the observed poor concordance between parents and teachers in their reports of ADHD symptoms in girls is discussed.

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R. DRECHSLER, P. RIZZO, & H.-C. STEINHAUSEN. Decision-Making on an Explicit Risk-Taking Task by Younger School-Children with Attention Deficit/Hyperactivity Disorder (ADHD) and Controls.

Introduction: Decision-making on the IOWA Gambling Task seems to be altered in adolescents and adults with ADHD. This is interpreted as an evidence for a motivational pathway in current models of

ADHD. However, in this type of task it is difficult to determine to which extent deficits in attention and working memory contribute to disadvantageous decision-making. Therefore a new risk-taking task for children was developed, with explicit rules for gains and a minimal load on memory. Participants: 27 children with ADHD and 27 control children (age range 7 to 10, mean 8.7 years) participated in the study. Method: Children performed a computerized card matching task, the "Make-a-match Game", where they chose between low, moderate, and high risk alternatives. In the low risk condition the probability of a positive outcome was 50%, in the moderate 33%, and in the high risk condition 25%. Positive outcomes of low, moderate, or high risk choices were rewarded with one, two, or three candies, respectively. Results: Children with ADHD made significantly more high risk choices than normal controls. Conclusion: These findings demonstrate that risky decision-making already discriminates between children with ADHD and normal controls at early school age.

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A. SZYMASZEK, E. SZELAG J.SENIOW. Temporal Training in Aphasia Therapy.

Several studies have reported the deficits in temporal information processing (TIP) in patients with left hemisphere damage and aphasia. These deficits are observed in studies focused on temporal order threshold (TOT), i.e. the minimum time interval between two consecutive stimuli that is necessary for a subject to indicate correctly their temporal order. The present study aims at testing whether comprehension deficits in aphasic patients can be ameliorated by the specific temporal training. We tested 10 aphasics with deficits in both auditory comprehension and TOT. Auditory comprehension was assessed on the phonological level, using Token Test and phonemic hearing tests. The TOT was measured with two experiments using either two 1ms clicks presented monaurally or two 10 ms tones (400, 3000Hz) presented binaurally. A close association between the deficits in TOT and language comprehension was found. Following the diagnostic part, patients participated in the specific temporal training aimed to improve the perception of sequencing abilities. The training consisted of 8 sessions of 45 minutes each. This training yielded the improved TIP, moreover, there was a transfer of improvement for the language domain which was untrained during the applied temporal training. These results are in agreement with previous studies showing the ameliorated language domain following the temporal training in language-learning-delayed children. Supported by the KBN grant No PBZ-MIN/001/P O5/06

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D. WALTHER, H. FREI, R. EVERTS, K. VON AMMON, F. KAUFMANN, M. STEINLIN, A. THURNEISEN. Homeopathic Treatment of Children with Attention Deficit Hyperactivity Disorder: Results of a Randomised, Double Blind, Placebo Controlled Crossover Trial.

INTRODUCTION: Common medical treatments for children with ADHD are methylphenidates. Parents, who do not want such medication, may find homeopathy an effective treatment for their child. Two publications, a partially blinded trial and a clinical observation conclude that homeopathy has positive effects in ADHD. The aim of this study was to obtain scientific evidence of the effectiveness of homeopathy in ADHD. METHODS: Eighty-three children aged 6-16 years with ADHD were recruited according to DSM-IV. Prior to the randomised, double blind, placebo controlled crossover study; they were treated with individually prescribed homeopathic medications. Sixty-two patients, who achieved an improvement of 50% in the Conner's Global Index (CGI), participated in the trial. Thirteen patients did not fulfil the eligibility criterion. Responders were split into two groups and received either verum for six weeks followed by placebo for six weeks (arm A), or vice-versa (arm B). At the beginning of the trial and after each crossover period, parents reported the CGI and patients underwent

neuropsychological testing. The CGI was evaluated at the end of each crossover period and in two long-term follow-ups. RESULTS: At entry to crossover trial cognitive performance (visual global perception, impulsivity, divided attention) had improved significantly under open label treatment ($p=0.0001$). During crossover trial mean CGI was significantly lower under verum (average 1.67 points) than under placebo ($p=0.0479$). Longterm CGI improvement reached 12 points (63%, $p<0.0001$). CONCLUSION: The trial suggests scientific evidence of the effectiveness of homeopathy in ADHD treatment, particularly in the areas of behaviour and cognitive functions.

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T. HAID, E. GAMPER, S. DITTRICH, E. BONATTI, M. KOFLER, E. QUIRBACH, & L. SALTUARI. Normative Data for Clinical Testing of Handwriting Speed: Haid-Bonatti 1-20 Test Revised (HABO 1-20-r).

Handwriting, a sequence of automatised ('open loop') movements, can be compromised in various neurological diseases. We previously published norms for a test of handwriting speed: the Haid-Bonatti 1-20 Test (HABO 1-20), and now present improved normative data for a revised version of the HABO 1-20 (HABO 1-20-r). We asked 627 neurologically healthy subjects, ranging in age from 20 to 85 years (50% over 62 years), to write numbers from 1 to 20 as quickly as possible, before and after writing a short sentence. The speed of writing was measured with a stopwatch. Median time for the mean of both trials of the HABO 1-20-r was 14 s. The two trials showed significant correlation with each other ($r = 0.931$, $p < 0.001$). There was also significant correlation of the median of both trials (HABO 1-20-r) with the time needed for writing the sentence ($r = 0.849$) and with age ($r = 0.622$) for the entire group. Therefore, we provide normative data for different age groups. The HABO 1-20 represents a simple and standardised test for quantification of finely coordinated, automatised movements of the dominant writing hand in adults. Writing speed of numbers is highly correlated with that of letters and words but has advantages: international applicability, lower demands on orthographic skills and writing practice, lower impact of hearing and vision problems or mnemonic deficits in neurological patients.

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O. REINVAL, N. RADI, M. TORNIAINEN, & M. KORKMAN. Inhibition and Selective Attention in Children with ADHD.

The aims of the study were to: (1) examine whether children with Attention Deficit Hyperactivity Disorder (ADHD; $n = 30$) are impaired on tasks of inhibition and selective attention compared to control children ($n = 40$); (2) investigate the distinctiveness of the inattentive subtype (ADHD-I) ($n = 12$) and the combined subtype (ADHD-C) ($n = 18$) of ADHD with respect to these performances; (3) study the association between teacher ratings of ADHD symptoms and the results of tasks assessing inhibition and selective attention. Results showed that the ADHD group had the most pronounced deficits on tasks of inhibition. Deficits in selective attention were more variable: the ADHD group performed more poorly on selective visual attention task compared to the control group, but significant group differences were not found on selective auditory attention. Results concerning the distinctiveness of the ADHD subtypes were not in line with the expectations. Children with ADHD-I and ADHD-C did not differ on any of the dependent measures. Finally, significant correlations were found between teacher ratings of ADHD symptoms and results of tasks assessing inhibition and selective attention. These findings suggest that teacher ratings and subtests of inhibition and selective attention measure to some extent the same characteristics of ADHD.

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A. NYMAN, T. TASKINEN, L. HAATAJA, & T. KORHONEN. Elements of Working Memory in Children with Attention-Deficit/Hyperactivity Disorder.

Objective: The aim of the present study was to investigate the elements of working memory in children with Attention-Deficit/Hyperactivity Disorder. Baddeley's model of working memory was the framework of this study. Earlier studies report inconsistent results concerning deficits in different units of working memory in children with ADHD. Methods: The final sample size will be 30 children (8-10 years) who has the primary diagnosis of ADHD (F90.0) according to the ICD-10. The control group consists of 30 healthy age, sex and socio-economical status matched volunteers. The IQ of the participants has to be at least 80. Working memory is assessed with the following measures: 1) Phonological unit: The Digit span and Word span tests 2) Central executive: The Backward digit span and Dual task tests 3) Visuo-spatial sketchpad: The Corsi blocks task and the Visual patterns task. Results: Preliminary results ($n=24$ in both groups) suggest that children with ADHD do differ statistically significantly from controls in both measures of the central executive unit. Children with ADHD performed worse in the Backward digit span than controls and they had longer reaction times in Dual task condition. Conclusions: Based on preliminary results, children with ADHD may have impairment in the central executive, but not in the phonological unit nor the visuo-spatial sketchpad.

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F. OSIURAK, G. AUBIN, P. ALLAIN, F. ETCHARRY-BOUYX, & D. LE GALL. Impact of the Ergonomic Shape of Objects in Tool Utilisation. A Study in Patients with Inability to Conventionally use Objects.

Numerous manipulable objects are constituted of handles and specific components. The hypothesis of a structural route inferring grasps from the object structure suggests that handles become grasping parts and specific components become active parts. This inference leads to conventional grasps and can be inadequate in non-conventional uses. We suggested that an analysis based on the relation material/task could also explain non-conventional uses. We hypothesized that patients with inability to conventionally use objects (e.g. driving nails with a screwdriver) can be more deficient in the material/task analysis than in inference from object. The 64 actions of the experimental task involved the non-conventional use of objects (screwing with a knife blade). Either handles (32 situations) or specific components (32 situations) had to be used as active parts. Patients had more problems to execute expected actions (correct actions: 59.7%) than controls ($n=24$, 92.6%). Three patients used specific components (60.5%) and handles (39.5%) as active parts (profile 1). Normal controls had similar pattern of performance (specific components, 58.1%; handles, 41.9%). The last three patients frequently used specific components as active parts (92.3%), but rarely used handles as active parts (7.7%, profile 2). Patients with the profile 2 principally grasped objects by their handle. We propose that this behaviour reveals an absence of material/task analysis and a dependency to the ergonomic object-shape. Patients with the profile 1 did not adhere to object structures. Their grasps were not preferentially oriented by handles. They attempted to analyse the material/task relation, but they were deficient.

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J. ROSSMUELLER, V. KRAUSE, S. GOALSZEWSKI, & V. HOEMBERG. Combined Electrophysiological Stimulation and Visual-Exploration Therapy in Unilateral Spatial Neglect: Therapeutic Implications.

Therapeutic interventions aiming at reduction of neglect symptoms include afferent electrophysiological stimulation via transcutaneous nerve stimulation (TENS), visual exploration training (VIS EX) and

exposure to slowly moving stimuli that are thought to facilitate attentional directing responses to the left hemisphere (optokinetic stimulation, OKS). Recent studies imply that respective interventions result in considerable reduction of neglect symptoms. However, the remission of neglect symptoms is rarely complete and residual deficits undermine independence in ADL. Further, the application of TENS-stimulation is limited when the training candidate reports aversive sensations resulting from the above-threshold current intensity. The MESH-Glove may represent an alternative to overcome this problem: It allows the activation of the sensory cortex through application of subthreshold current intensities to the contralateral hand. Starting with the hypothesis that activation of perilesional tissue via MESH-Glove may induce beneficial effects on neglect symptoms and that combination of therapeutic techniques may bear additional positive effects on visuo-spatial neglect, we contrasted combined electrophysiological and visual-exploratory therapy using TENS+VIS EX+OKS (n=10) vs. MESH+VIS EX+OKS (n=10). Both therapeutic interventions significantly decreased inattention to the left hemisphere in our patients suffering from right-hemisphere cerebrovascular accidents and the improvement in both experimental groups was higher than in our control patients who received VIS EX+OKS (n=5) without additional electrophysiological stimulation. We thus feel encouraged to favour MESH-Glove-stimulation in the treatment of neglect because of the potentiality to stimulate with currents below the threshold of subjective detectability.

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H. J. DE SMET, H. BAILLIEUX, C. CATSMAN-BERREVOETS, P. P. DE DEYN, P. MARIËN, P. F. PAQUER. Speech Characteristics after Cerebellar Mutism: A Critical Review.

Background: Transient cerebellar mutism and subsequent dysarthria is a well-known entity which may develop after cerebellar lesions. In children, its incidence after resection of a cerebellar mass is estimated between 8% - 29%. The literature indicates that some patients were not dysarthric after the mute period. However, contradictory information is reported. Aims: To analyze the mode of recovery of speech post-mutism in children after cerebellar damage. Methods: A literature search was conducted via electronic databases, and bibliographies of all relevant publications. Exclusion criteria were: absence of post-operative mutism; mutism after trauma or brainstem surgery; abstracts; reports with insufficient data; articles focusing on technical aspects or on survival rate in posterior fossa surgery. Results: We found 199 children with cerebellar mutism: 169 displayed dysarthria post-mutism (84.9 %); information was unavailable in 25 cases (12.6 %); 3 were considered ambiguous (1.5 %); 2 were not dysarthric (1 %). Thus, 169/171 reliable cases (98.8%) were dysarthric. The percentage of non-dysarthric patients after cerebellar mutism appears to be much lower than commonly accepted in the literature. Conclusions: Studies should address more carefully the patients' speech characteristics as to minimize these deficits has harmful consequences on the therapeutic management.

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K. KUCIAN, T. LOENNEKER, T. DIETRICH, M. DOSCH, E. MARTIN, M. VON ASTER. Impaired Neural Networks for Number Magnitude in Dyscalculic Children.

Developmental dyscalculia (DD) is a specific learning disability affecting the acquisition of mathematical skills in children with otherwise normal general intelligence. The goal of the present study was to examine the cerebral basis of DD. Eighteen children with DD aged 11.2 ± 1.3 years and twenty typically achieving schoolchildren aged 10.6 ± 1.5 years were investigated using functional magnetic resonance imaging (fMRI) during trials of approximate and exact calculation as well as magnitude comparison. fMRI revealed similar parietal-prefrontal activation patterns in DD children compared to controls in all conditions. However, children with DD showed greater

inter-individual variance. They also exhibited weaker activation in almost the entire neuronal network during approximate calculation including the intraparietal sulcus, the middle and inferior frontal gyrus on both hemispheres. In particular, the left intraparietal sulcus, the left inferior frontal gyrus and the right middle frontal gyrus seem to play a crucial role for correct approximate calculation since brain activation correlated with accuracy rate in these regions. In contrast, no differences could be found in exact calculation and magnitude comparison. Accordingly, the present study provides evidence for a deficient recruitment of neural resources for the processing of analog magnitudes of numbers in children with DD.

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S. ROTZER, K. KUCIAN, M. VON ASTER, E. MARTIN T. LOENNEKER. Optimized Voxel-Based Morphometry in Dyscalculic and Normally Achieving Children.

Functional imaging studies indicate an involvement of prefrontal and parietal cortices in arithmetic tasks. In particular, the intraparietal sulcus seems to play a major role in number processing. The aim of the present study was to analyze if children with developmental dyscalculia (DD) show structural differences in above-mentioned areas compared to normally achieving children. T1-weighted volumetric MRI data were acquired in 12 children with DD (9.3, b0.2 years) and 12 control children without any learning disabilities (9.7, b0.2 years). Voxel-based brain morphometry with an optimization of the spatial segmentation and normalization (OVBM) was applied to identify volume differences in cerebral gray and white matter. Compared to controls, children with DD showed a significant reduction in gray matter volume in the anterior cingulum, the bilateral inferior frontal / orbitofrontal gyri, the left middle frontal gyrus and the right intraparietal sulcus. Analysis of white matter volume revealed a reduction in the left middle frontal gyrus, the left superior frontal gyrus and the hypothalamic bilaterally. Children with DD did not show increased volume in any cluster compared to controls. A neural equivalence to developmental dyscalculia constitutes the decrease of gray matter volume in the right intraparietal sulcus. However, volume differences in frontal regions, especially the anterior cingulum, refer to early impairments of the attentional system and the working memory, which might have a preliminary negative effect on the acquisition of number representation and number processing capacities.

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E. SCHWARZ, S. GIUGLIANO, P. ZULAUF, & R. I. HASSINK. Auditory Perception Training in Children with Attention Deficit Hyperactivity Disorder (ADHD).

Introduction: Neuropsychological interventions are more and more evaluated and indicated on children and adolescents with specific troubles of perception, attention, memory and executive functions. Troubles of phonological perception appear isolated as partial performance disorder or as part of other disorders like ADHD or language development disorders. The program AUDIVA (AUDIVA GmbH, D-Kandern-Holzen) is a very sophisticated and sensitive tool to assess different aspects of phonological perception performance. Methods: Until now three children were followed, aged 10-12 years with ADHD diagnosis using the DSM-IV criteria and with a comorbid auditory perception disorder. On all children a medication with methylphenidate was established, the multimodal treatment ADHD regime was not changed during the training phase. Before and after a period of 20 training units of the auditory perception training AUDILOG (SCHUBI Lernmedien GmbH, DBraunschweig) the phonological perception performances were assessed with AUDIVA. Not only individual disturbed auditory aspects were detailed trained, but also compensations and different strategies were learned. The children performed also exercises at home and there were additional arrangements in the classroom. Results: Improvements were above all

analysed in these processes: In auditory differentiation, auditory separation, auditory analyse and auditory short time memory. Additional improvements of concentration, learning strategies, school achievement, social skills, self confidence and autonomy were reported by parents and teachers in questionnaires and in clinical interviews. Conclusion: Auditive perception training seems to be an essential supplemental therapy in the multimodal treatment of children with ADHD and comorbid auditory perception disorders.

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B. STEMMER & T. LEIM. Cognitive Impairment in Stroke and TBI Patients and Effects on Quality of Life and Employment Status.

Development of cognitive impairment and employment status was compared in 110 first time stroke patients with aphasia, 77 stroke patients with executive impairment, 34 stroke patients without aphasia and executive impairment and 27 TBI patients with executive impairment one year after discharge from neurological rehabilitation, i.e. about 16 months after the incident. The findings indicate that aphasic syndromes accompanying a stroke are more likely to have a negative impact on early employment than impairment of executive functions accompanying a stroke. In addition, general severity of neurological impairment and language comprehension deficits at the time of admission seem to be important factors for future employment of aphasic patients. Patients with less severe aphasia (anomia, residual aphasia) were more likely to be vocationally re-integrated than patients showing Broca-, Wernicke or Global 9aphasia syndromes. Although stroke patients with executive impairments seem to fare better than aphasic stroke patients, compared to TBI patients with executive impairment they recovered more slowly over a 16 months time period. Our findings suggest that etiology and type of cognitive impairment play an important role in the recovery process and for the employment status. However, individual patient characteristics and other external and sociopolitical factors also need to be considered.

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A.P. MEDRANO, E. MATUTE, D. ZARABOZO, & M. ROSSELLI. The Effects of the Spanish Orthographic System on Reading and Spelling in Reading Disabled Children.

The purpose of this study was to ascertain the effect of the complexity of the Spanish orthography in Reading Disabled (RD) children when reading and writing words and non-words. Participants and methods: Twenty Mexican Spanish speaking RD children (13 girls, 17 boys) from 5th and 6th grade, with normal IQ, were compared to 20 school mates (CG) matched by age and gender. Four tasks were used as dependent measures: reading a list of words and a list of non-word and writing to dictation words and non words. Word size, syllabic structure and position within the word were controlled. The degree of shallowness of the graphemes was analyzed according to Matute et al. (2003). Results: Overall the RD group had a greater percentage of errors and slower performance in all four tasks. In both groups spelling words produced more errors than reading words. When the grapheme shallowness level was taking into account, graphemes with a one to one phoneme relationship, were associated to a smaller number of errors whereas ambiguous grapheme-phoneme associations produced a higher number of errors in all tasks. Moreover, the difference in scores between the two groups increased in proportion to the opaqueness of the grapheme-phoneme associations. Conclusions: Spanish has inconsistent orthography in cases of specific phoneme-grapheme relationships. These associations are difficult to master for RD children and spelling becomes a fairly difficult task for them. Thus, a shallow-depth effect can be evident. However, other factors affecting reading and writing of words such as word frequency can influence this effect.

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M. MEINZER, T. FLAISCH, D. DJUNDJA & B. ROCKSSTROH. Selective Recovery of Language Functions in a Former Bilingual Aphasic Patient– an fMRI-Study.

Little is known about recovery of language functions in bilingual stroke sufferers. We investigated a former completely bilingual aphasic patient (french/german; 3 years after left-hemispheric stroke) whose language rehabilitation after stroke was focussed exclusively on german. Functional magnetic resonance imaging (fMRI) was used to investigate expressive language during an overt picture-naming task. Naming performance was assessed for both languages before and after intensive (german) language therapy (Constraint-Induced Aphasia Therapy, Meinzer et al. 2005). Before therapy naming performance during fMRI-scanning was correct for 38/80 items in german (french 4/80) The activation pattern during the naming task (vs. fixation) in german included a large right-lateralized fronto-temporo-occipital network. Major differences between german and french were found in right and left occipito-temporal (G. fusiformis, G. lingualis) and right superior temporal areas. After therapy the patient's language performance improved only in german (Token Test and Naming substest of the Aachen Aphasia Test, Huber et al. 1989; a naming test outside of the scanner: pre/post: 80/109 correct responses, max. 150; during fMRI naming pre/post:38/54). Increased brain activation was substantiated after therapy mainly in perilesional fronto-temporal areas and the right anterior cingulate gyrus during the german fMRI-naming task. No changes of language performance and brain activation were observed in french. Differences in language performance and fMRI-activation pattern before therapy can be attributed to long-term rehabilitation efforts in german. Short-term intensive treatment selectively improved only one language (trained german), which resulted in concomitant neuroplastic reorganisation. Naming performance and brain activation remained unchanged for the untrained language (french).

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S. BÜRGI, D.WENIGER. The Processing of Homonymy: What Makes the Two Hemispheres Differ?

Asymmetries in word processing have been studied by visual half-field (VF) presentation and the use of priming techniques. The semantic relation between prime and target and variations in the stimulus onset asynchrony (SOA) between prime and target have been found to differentially modulate the activation and retrieval of word meanings in the two hemispheres. When probing the meanings of an ambiguous prime word at short SOAs bilateral priming is observed for the dominant meaning, priming for the subordinate meaning being restricted to right visual field/left hemisphere (RVF/LH) targets. At longer SOAs the left visual field/right hemisphere (LVF/RH) maintains priming for multiple word meanings whereas within the RVF/LH the availability of word meanings is narrowed, the dominant meaning being maintained. These findings are based on lexical decision tasks, the semantic relatedness between prime and target not being considered. In a VF study subjects had to judge whether a target picture represented the meaning of an ambiguous word prime, presented sequentially in the same VF. A distinction was made between three types of semantic relatedness between prime and target, both for the dominant and the non-dominant meaning of the prime: (1) identity between the two, (2) semantic relationship between the two, (3) no semantic relationship between the two. All stimuli were presented at short (150 ms) and long SOAs (750 ms) in both VFs. Accuracy and reaction times were measured. The findings are at variance with those in the literature, to be discussed within the framework of current processing models.

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B. KEISKER, R. KLEISER, S. KOLLIAS, D. WENIGER. The Cerebral Reorganization of Language after Damage: At the Crossroads of Neuroimaging and Cognition.

The cerebral reorganization of language networks after stroke continues to be a matter of debate. The crucial issue is whether language improvement represents sparing or restoration of function in perilesional zones of the left hemisphere or recruitment of homologous right hemisphere regions. With the advent of functional imaging techniques it has become possible to elucidate the relationship between brain damage and recovered language functions in vivo. However, there is some divergence in the findings of the studies dealing with this topic. Several reasons may account for this: the nature and extent of the sustained lesion, time since onset, and methodological heterogeneity in terms of activation tasks and neuroimaging analysis. In examining the neural rearrangement of language functions following brain damage hardly any attempt has been made to tap the residual and/ or restored language processing capacities by a set of linguistic activation tasks that minimize the demands on working memory and attentional resources. As part of a longitudinal neuroimaging study concerned with the neural patterns of recovery in aphasia we present the behavioral data and the activation patterns observed in normal controls performing the following tasks in a blocked design: (1) lexical decision, (2) picture/ word matching with both noun and verb stimuli, (3) word/ word rhyme judgement, and (4) word/ word semantic relatedness judgement. All tasks comprise an auditory and visual mode of verbal stimulus presentation. The findings will be discussed within a neuroanatomical framework that combines neuroimaging data with cognitive models of word processing.

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K. BUCHER, T. NGUYEN, T. DIETRICH, T. LOENNEKER, E. MARTIN. Reading & Visual Motion Processing in the Occipito-Temporal Cortex.

INTRODUCTION: Developmental dyslexia has been associated with deficits in visual motion processing in the middle temporal area MT. However, the exact nature of this deficiency and its potential relationship to reading impairments are still unclear. The aim of this study was to investigate the relation of neuronal circuits underlying visual motion processing and reading. **METHODS:** We measured fMRI in 15 healthy adults (3T MR scanner). Three experiments were run (two of them presented here): In the first experiment activation pattern of visual motion and reading were compared. In the second experiment implicit word processing in MT was studied using words and non-words. **RESULTS:** The first experiment revealed overlapping activation patterns for visual motion processing and reading in occipito-temporal regions (FWE corrected: $p < 0.05$). A closer investigation of this circumscribed MT region showed that local activation maxima of words were located more inferior to local motion maxima ($p < 0.05$). In the implicit reading task activity tended to be higher for words than for non-words in the left hemisphere ($p = 0.059$). Conditions did not differ in the right hemisphere. **DISCUSSION:** We found that reading activated occipito-temporal areas, including MT. Furthermore, activity tended to be higher in the left MT for words than for non-words. However, considering the weak word specific effect and the slight inferior shift of local word maxima, we assume that MT is not specifically involved in reading. MT is rather part of a network that contributes to multiple functions such as visual motion processing and reading.

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Y.A. AGUILAR ISAIAS, A. BLENDER, & B. PREILOWSKI. Neuropsychological Profiles of Mexican and German Children with Developmental Dyslexia.

The aim of the present study was to compare groups of dyslexic children and matched normal readers with different language and

cultural backgrounds. Besides nationally standardized tests of intelligence as well as specific tests of language and scholastic performance in German and Mexican, the NEPSY was used to complete the neuropsychological profiles. In the Mexican as well as the German group of dyslexic children, major deficits were found for phonological awareness, visual attention and memory for names. These problems can be seen to be syndrome specific; the similarity between the groups could be attributed to both German and Mexican being equally transparent languages. Differences between German and Mexican children - both in the dyslexic and the normal controls - were found for tests of planning and problem solving, as well as tests of creativity and of memory for faces. These latter differences are explained by cultural influences, including - among others - educational demands and differences in social perception. (The first author was supported by a stipend of the KAAD (Catholic Foreign Academic Service))

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T. BORMANN, F. KULKE, & G. BLANKEN. Errors of Omission and Semantic Errors in Aphasic Naming: Is there a Common Basis?

In picture naming, some aphasics show semantic errors (saying "lion" instead of "tiger") and errors of omission. Within the discrete two-stage model of lexical access (Levelt, Roelofs, & Meyer, 1999), these two types of errors are associated with different, independent, levels of processing: Semantic errors arise from mis-selection at the lemma level while omissions are the result of blocked access at the level of word form. In contrast, cascading and interactive models allow for an influence of word form on lexical selection and thus allow for a statistical relationship of these errors (Blanken, Dittmann, & Wallesch, 2002). A group of 17 aphasic patients was assessed on a naming test controlling for semantic competition of the target items. One group of target items had few lexical-semantic competitors ('low competition' items) while the other group had many ('high competition' items). There was no main effect of 'competition' ($F < 1.0$) implying that items in the two groups did not differ in their overall difficulty. There was a highly significant main effect for 'error type' with omissions being more frequent than semantic errors ($F(1,16)=14.9, p < 0.01$; $F(1, 64)=59.7, p < 0.01$). As expected, there was a highly significant interaction ($F(1,16)=26.5, p < 0.01$; $F(1, 64)=24.5, p < 0.01$): Semantic errors were more frequent for targets with many competitors than for targets with few competitors while omissions were more frequent when few competitors were available. These results show a statistical relationship of both error types and imply a common source of these errors. They thus speak against Levelt's discrete model of naming.

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M. DI PIETRO, M. LAGANARO, A. SCHNIDER. A Study on the Specificity of Computer-Assisted Treatment for Anomia.

The choice of effective therapy for anomia is still controversial, since positive results have been found with specific model-driven treatments as well as with multi-component tasks (Nickels & Best, 1996). Previous results on computer assisted therapy showed that a single multi-component task led to significant item-specific benefits in seven out of eight acute anomic subjects (Laganaro, Di Pietro and Schnider, in press), thus leading to the question of whether a computer assisted therapy programs must be adjusted to the precise type of anomia or if a multi-component program works for most anomic profiles. Here, we investigated the effects of model-driven versus multi-component computer assisted treatment programs in seven acute anomic subjects. Two patients had clear semantic anomia, two patients presented with phonological disorder and the others had either mixed or "access" anomia. Each patient underwent in random order one four-session period of model-driven treatment and one four session period of multi-component treatment program for anomia. In

most (six) patients, the multi-component therapy resulted in equivalent naming improvement as a program adjusted to the specific cognitive impairment. In one patient only improvement was linked to the model-driven treatment. In conclusion, the observed effect of a multi-component CAT program on naming performance suggests that this treatment can be effective for most anomic patients and it may have worked in different ways for different subjects.

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B. YANG, & R. CHAN. A Meta-Analysis of Association between the DAT Gene and ADHD.

Objective: The study reported herein aimed to conduct a meta-analysis of the association of between the 10-repeat of the dopamine transporter gene (DAT1) and ADHD. **Methods** We pooled up 18 published family-based association studies, with a total of 1373 informative meioses, and 5 case-control based association studies between ADHD and the 10-repeat allele of a variable number tandem repeat (VNTR) polymorphism in the 3'~{!/~}-untranslated region of the DAT gene. A statistical test of heterogeneity was conducted for each group of study. **Results:** The results showed small but significant association between ADHD and the DAT gene in transmission disequilibrium test (TDT) studies ($\chi^2=9.63$, $p<0.01$; OR=1.18, 95% CI: 1.02~1.38), but not in haplotype-based haplotype relative risk (HHRR) ($P=0.16$) and case-control studies ($p=0.33$). There was no significant inconsistency in TDT and case-control studies, but in HHRR studies ($P=0.04$). **Conclusions:** The 10-repeat allele of the DAT gene has a small but significant role in the genetic susceptibility of ADHD. Overall, the meta-analyses support the involvement of the dopamine system genes in ADHD liability variation. However, more work is required to further identify the functional allelic variants/mutations that are responsible for this association.

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C. KNELS, E. LEISS & A. DANEK. A Case for Fractionation of Semantic Dementia.

Case studies of semantic dementia (SD) provide valuable constraints on theories about the structure and organisation of semantic memory. SD has been delineated as a syndrome of fluent but empty speech and loss of word meaning that occurs in the context of frontotemporal lobar degeneration (FTLD). Picture naming, category fluency and non-verbal picture association tests are impaired and visual agnosia may be associated. Thus, it is commonly thought that SD results from an impairment of semantic memory itself. Alternatively, on the basis of the Logogen model (based on Morton), the underlying dysfunction may not lie within the semantic system but in the access to it. We report observations to support this possibility of fractionation of SD. A 61 year old male patient with a six year history of progressive language deterioration and FTLD currently presents with fluent jargon aphasia. His vocabulary is very limited as is recognition of written and spoken words. Non-verbal semantic skills however, were unimpaired as tested with the "Pyramids and Palm Trees Test" and the "Bogenhausener Semantik Untersuchung" (BOSU). Executive skills as reflected in the block building task of Link were normal. There is no relevant psychopathology. In summary, we suggest the terms "central" and "peripheral" to distinguish two variants of SD that differ in the way that semantic memory is affected.

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N.L. BRADLEY, E. A. S.E. BLACK, V. STAMENOVA, G. DESMARAIS, & Q. ALMEIDA. The Use of Environment- vs. Body- Relative Cues in the Production of Meaningless Gestures Following Unilateral Stroke.

Non-representational gestures are an important aspect of praxis assessment. Stroke patients with unilateral left hemisphere damage (LHD, N=24) or right hemisphere damage (RHD, N=23), and 21 age-matched healthy control participants were examined for imitation of eight meaningless hand gestures. Visual control of the hand was fully available (four gestures at waist level) or obstructed (four gestures above the head or at body midline). Performance was video-taped and gesture accuracy was scored on dimensions requiring extrinsic coding (environment relative, e.g. location in space) and intrinsic coding (body relative, e.g. hand posture). Analyses revealed that LHD patients performed less accurately than the two other groups with the RHD patients only marginally impaired relative to Controls. Accuracy was greater with Available Vision versus Obstructed Vision and for Extrinsic Coded as opposed to Intrinsic Coded dimensions. A trend appeared for a Group by Vision by Coding interaction ($p < .08$). LHD patients performed more accurately with vision and for extrinsic features. These effects were independent, a finding consistent with reports that LHD patients are over-reliant on on-line visual feedback and have deficits in intrinsic coordinate control. For RHD patients, these effects were not independent; the performance advantage with available vision was seen only for extrinsic dimensions. This implies that vision aids in encoding gestural information for extrinsic, but not intrinsic, dimensions of meaningless gestures. The implications of these findings for understanding the relative importance of visual feedback and coordinate control following right versus left hemisphere stroke in gesture production will be discussed.

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M.T. MARTIN ARAGONESES, R. LÓPEZ-HIGES, S. FERNANDEZ GUINEA, D. DEL RÍO GRANDE, H. CANTO PECH. Neuropsychological Assessment of Nonthalamic Subcortical Aphasia: Two Case Reports.

Objective: The aim of this study was to examine the sentence processing of two patients with subcortical lesions and to discuss the results obtained in relation with aphasic syndromes classically established on the basis of an anatomical localization. **Participants and Methods:** We study two cases (1 female & 1 male, middle-aged), both with right manual dominance and with exclusively subcortical injuries due to capsular putaminal region haemorrhages (posterior and previous, respectively). The Exploration of language functions (Mayo Clinic, 1992) and the ECCO Battery (Cognitive Assessment of Sentence Comprehension; López-Higes, del Río & Fernández Guinea, 2005) were applied. This last includes i) a test to measure verbal working memory capacity (similar to the Reading Span Test); ii) the Lexical Knowledge test (word-picture association), and iii) the Sentence Comprehension test (simple sentence-picture verification task, that minimizes the memory demands). **Results:** Both patients differed clearly on the performance in the sentence comprehension test of the ECCO Battery, but these differences didn't become evident across a conventional comprehension assessment, in which syntactic indications are not critical. On the other hand, the localization of the injury didn't explain the differences between the patients, as well as the pattern of symptoms in each patient didn't adjust either to the classic aphasic syndromes. **Conclusions:** These results would be compatible with a distributed approach of the cerebral organization for language. Also, we think that this study demonstrate the sensibility of the ECCO Battery for detecting syntactic difficulties and its usefulness as instrument of assessment and research in aphasia.

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P. ESPARZA, J. DORFLINGER, J. MILLER, & L.D. STANFORD. Examining Visual Attention Deficits in Children Diagnosed with Dyslexia.

Dyslexia is a neurological learning disorder that is characterized by difficulties in accurate and fluent word recognition that results from deficits in the phonological component of language. Literature has suggested that deficits in visual attention processing skills contribute to reading acquisition difficulties in children with Dyslexia. In order to explore this issue, children with Dyslexia were compared to children with impaired sustained attention across selected measures of visual attention to assess performance differences. This study examined the visual attention differences between children diagnosed with Dyslexia and those diagnosed with Attention-Deficit/Hyperactivity Disorder, Inattentive Type (ADHD-I) after comprehensive neuropsychological evaluation. The sample consisted of 30 consecutive clinical referrals (females = 10), ages 5 to 17 years old, with groups matched for IQ and age. Preliminary findings revealed that the groups did not differ significantly on certain visual attention and sustained attention measures (i.e., Symbol Search, Coding, and CPT-II). However, contrary to recent empirical findings and theoretical speculations, the Dyslexia group performed significantly higher than the ADHD-I group on a non-motor visual discrimination task that requires attention to visual details. Hence, findings in this study do not support the indication that there are visual-attention processing deficits in Dyslexia. Continued research is needed to more clearly understand the unique cognitive deficits underlying Dyslexia in order to design appropriate interventions.

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M. VUKOVIC, R. SUJIC, S. KOSTIC. Early Warning Signs of Language Deficits in Patients with Temporal Lobe Lesion.

Injury of the left hemisphere temporal lobe can lead to different language disorders varying from severe form of Wernicke's aphasia to milder aphasic symptoms. Those language deficits are sometimes hard to be recognise, and therefore could be wrongly attributed to confusion and disorientation. Speech fluency, rate, rhythm and melody are preserved and could mislead clinicians to wrongly conclude that there is no language deficits present. In the case of such misconduct patients are not subjected to rehabilitation. Five cases with aphasic disorders caused by temporal lobe injury are presented in this paper. Patients were subjected to test one year after injury occurred. Reason for neuropsychological testing was inefficiency in day-to-day activities. Raven's Progressive Matrices, Rey Auditory-Verbal Learning Test, Rey-Osterrieth Complex Figure Test, Boston Diagnostic Aphasia Examination, Boston Naming Test, and Test of Verbal fluency were applied. Results had shown retained general intellectual abilities and good memory. Language abilities tests had shown word-finding difficulties, naming disorders, verbal paraphasia, difficulties in comprehension of complex ideational material and verbal commands, deficits in written language understanding and decline in Verbal fluency test. It is suspected that detection of language disorders in patients with temporal lobe lesions in timely manner and their inclusion in rehabilitation programme in the first months post onset, could help to significantly reduce manifested language disorders and make those patients more socially effective. Key words: language deficits, temporal lobe lesion, effects of non-timely detection.

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H. PROIOS, S. ASARIDOU, P. BRUGGER & F. KARGOPOULOS. Random Number Generation in Aphasic Patients: A Test of Executive Functions.

Language is just one of the higher cognitive functions that are subordinate to an executive control system. One of the tasks widely used for the investigation of executive functioning is Random Item Generation. Randomization performance was studied using the "Mental Dice Task" in 10 subjects with aphasia (APH) and 101 elderly normal control (NC) subjects. Participants were required to call out the numbers from 1 to 6 at random and in time with a

metronome (1 beat per second). Three of the aphasic subjects had problems naming the numbers and adopted a pointing strategy to indicate consecutive random numbers. The produced sequences (66 numbers) were compared to 100 pseudorandom sequences of equal length produced by a computer. The findings show that the NC participants' sequences differed significantly from the computer generated sequences in global and specific measures of randomness ($p < .001$). There were no significant differences between APH and NC participants in general response stereotypy or in the bias to count. There was, however, a significant difference between the two groups in the ability to update and monitor their responses ($p < .001$). On some of the measures, e.g. in balancing number frequencies, the APH-produced sequences were not significantly different from the pseudorandom sequences. Together, these results reflect the failure of APH to monitor sequential responding and to update stored information in the presence of self-produced interference.

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R. L. HEATH, O. MAHMASSANNI, A. ROUHANA, N. NASSIF. Aesthetic Preferences among Arabic Reading Subjects.

Previous research indicates a leftward bias in aesthetic judgments that is assumed to be patterned by cerebral lateral biases. When presented with sets of three horizontally-arranged geometric shapes, subjects tended to prefer compositions with the primary object of interest to the left of the object that indicates direction. For individuals who read from left-to-right as in English (Roman script) the interest element is located at the beginning of the habitual scanning direction, i.e. leftward. The goal of the present study was to determine if reading from right-to-left, as in Arabic, would modify aesthetic judgments. We hypothesized that script direction would interact with cerebral lateral biases, that is, an increased exposure to Arabic script would result in a decrease in preference for a leftward bias. We recruited 578 right-handed adults with a range of experience with Arabic and Roman script. The test stimuli consisted of a horizontal arrangement of three geometric shapes representing Interest, Weight and Direction. The elements were systematically rotated to create a total of 22 different compositions. Each composition was presented twice for a total of 44 test items. The results indicated that script direction may influence the processing of nonlinguistic stimuli. As anticipated, we found that as the use of Arabic script increased, the preference for a left-to-right directionality decreased. Further, subjects preferred a composition in which content, represented as Interest or Weight, was placed before the directional element.

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Z. HU, RCK. CHAN. Developmental Pattern of Social Attribution Ability in Healthy Han Chinese School-Aged Children.

Objectives: This study aims to explore the developmental pattern of the performance of social attribution in healthy Han Chinese school-aged children with a modified version of social attribution task (SAT). Method: A series of computer-presented cartoons are designed using the Macromedia Director MX 2004 program. There are five cartoons in the modified SAT, including i° bridge \pm , i° hen and snake \pm , i° three eggs \pm , i° small dog \pm , i° pig, wolf and fox \pm . A sample of 60 school-aged children (20 cases in each group of 6-8- and 11-year old) was recruited from local primary schools in Guangzhou, China. All children were given the original and modified versions of SATs as well as a set of neuropsychological tests. Results: There were marked differences between three age groups in most parameters of the original and modified versions of SAT. The results also indicate that older children tended to perform better on both SAT versions than younger children. However, gender differences were only found in the modified version of SAT, with girls outperformed boys in most of the parameters. Significant relationships were also found between versions of SAT, verbal IQ, and executive function performances. However, such relationships disappear after controlling for age and

verbal IQ. Conclusions: Developmental trend was demonstrated in healthy Han Chinese school-aged children in performing both the original and modified versions of SAT. However, gender difference is only found in the modified version of SAT. It may be due to a higher involvement of language ability in this version.

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L. VAN ITERSON. Different Rates of Directional VIQ- PIQ Discrepancies in Special Education Samples: Below Average IQ, Learning Disabilities, Childhood Psychiatry, and Childhood Epilepsy.

Purpose: Although Verbal (VIQ) versus Performance IQ (PIQ) discrepancies in intelligence tests are thought to be equally distributed in both directions (VIQ>PIQ, VIQ<PIQ) on psychometric and on empirical bases, in children with developmental disorders they are often skewed. This study addresses discrepancies in four different groups of children with developmental disorders, focussing on discrepancies large enough to be statistically rare: ≥ 20 points. Methods: Using special school placement as independent variable for group membership, Wechsler tests of N=1094 children with (1) Below Average IQ (BAIQ), (2) Learning Disabilities (3) Childhood Psychiatry, and (4) Childhood Epilepsy were collected. N1=208, N2=428, N3=362, N4=96; mean age (years): 1=8.8, 2=12.5, 3=11.2, 4=10.4 mean IQ: IQ1=77, IQ2=99, IQ3=91, IQ4=86). Frequencies of directional VIQ-PIQ discrepancies were contrasted to those normally expected, applying chi-square-statistics. Results: Rates of discrepancies differ ($p < .001$) from expected values; rates also differ between groups. Higher rates of VIQ>PIQ than expected are found in (partial) epilepsy only, lower are found in BAIQ and Learning Disabilities. Higher rates of VIQ<PIQ are found in BAIQ, Learning Disabilities and Psychiatry. Conclusions: Consistent with studies on the auditory/verbal/phonological base of learning disabilities, children with academic failure (BAIQ+LD) have a clear 'bias' towards exclusive VIQ<PIQ differences, not seen in other samples. Psychiatric samples show discrepancies onto either direction, more extreme values as VIQ<PIQ. (Partial) epilepsy shows the opposite pattern: both directions, more as VIQ>PIQ. These results suggest that differences in brain development as measured by rare discrepancies relate to dissimilar academic and behavioural outcome; underpinning need for personalized teaching.

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J. VUKSANOVIC & M. VUKOVIC. Nonverbal Memory Abilities in Children with Idiopathic Partial Epilepsy.

Although it is known that children with benign partial epilepsy with centro-temporal spikes (BPECTS) have very good prognosis, recent studies have shown that these children have subtle cognitive deficits. The purpose of this study was to assess nonverbal (short-term and long-term) memory in children with BPECTS compared to children with other forms of idiopathic partial epilepsy and to an age-matched control group. The sample consisted of 12 children with BPECTS aged 7-11 compared to a group of 26 children with other forms of idiopathic partial epilepsy and a group of 31 healthy children. Wechsler Intelligence Scale for Children-Revised (WISC-R), and Test of Visual-Perceptive Skills (non-motor) Revised (Morrison F. Gardner, 1996) were used. The results have shown subtle short-term memory deficits in the group of children with BPECTS compared to the age-matched healthy group of children, but it did not reach significance. On the other side, they performed significantly better when tested both in short-term and long-term memory than the group of children with other forms of idiopathic partial epilepsy.

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P. RIZZO, R. DRECHSLER, & H.-C. STEINHAUSEN. The Self-Rating Scale of Executive Functions (SEF) for Children Aged 8- to 10-Years.

The present study aimed at developing a self-rating scale for children aged 8 to 10-years, assessing metacognitive knowledge of self-regulation in the area of executive functions (the Self-Rating Scale of Executive Functions, SEF). To date no diagnostic tool relating to this area is available for young school children. Items of existing self-rating scales are generally formulated for adolescents and adults and refer to concepts which are too difficult or abstract for younger children. Therefore the SEF offers a reference frame dealing with everyday situations, within which the child can rate itself and which is illustrated by gender-specific pictures. Based on theories distinguishing hot and cool aspects of executive functioning, the SEF has been subdivided into two main scales encompassing behavioural regulation (emotion, motivation, motor activity) and cognitive regulation (inhibition, organizing/planning, speed of processing and attention). The SEF has been constructed on data from 50 children and validated on another sample of 100 normal school children. The scale possesses good reliability ($\alpha = .89$). While a theoretically postulated two-factor structure could not be confirmed, a newly formulated two-factor model, in which inhibition has been assigned to behavioural regulation, indicated a very good fit. Convergent and divergent aspects of validity could be established by comparing self-ratings with the ratings of parents and teachers. The SEF is an instrument measuring metacognitive knowledge of self-regulation in the area of executive functions, which can be used in an educational context. Currently the authors are investigating the validity of the SEF for clinical populations.

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E. GIGER, P. ZULAUF & R.I.HASSINK. "Short-term" Neuropsychological Interventions on Children and Adolescents with Attention Deficit Hyperactivity Disorder (ADHD) and Learning Disabilities.

Introduction: Attention Deficit Hyperactivity Disorder (ADHD) is a neurobiological disorder defined by core symptoms of inattention, hyper-/hypoactivity and impulsiveness. The burden of this disorder is considerable and is often characterized by academic (or occupational) impairment and dysfunction within the family and society. Background: Neuropsychological interventions are evaluated and indicated in neurorehabilitation after acquired or congenital cerebral lesions. These interventions are more and more used in the treatment of children and adolescents with specific troubles of perception, memory and executive functions. Aim of this study is to evaluate the outcome of "short-term" neuropsychological interventions on children and adolescents with ADHD and comorbid learning disabilities. Methods: Up to now we followed 5 patients, aged 10-15 years with ADHD diagnosis using the DSM-IV criteria for a short neuropsychological treatment. All established therapies were continued during the period of intervention. After a detailed neuropsychological examination, specific individual academic success-strategies were implemented for the specific needs of the patients (5-10 consultations). Parents and involved teachers were also specifically instructed and trained. The evaluation was individualized. Questionnaires of change of behaviour and academic achievement assessment were used to evaluate the success. Results: All patients improved significantly their academic, learning and attitudinal characteristics within 2-3 months and they were able to sustain these improvements after intervention. An intensive collaboration with parents and professionals was essential. Conclusion: Children and adolescents with ADHD and comorbid learning disabilities can essentially profit from individually selected academic and neuropsychological strategies applied during a short time.

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M. GRACIA-BAFALLUY & M. P. NOEL. Intervention Program on Finger Discrimination in Normal Children.

In children, finger using is important during counting and calculation (Butterworth, 2003; Noel, 2005). Furthermore, perceptive-tactile abilities have been reported to be a better predictor of numerical performances one and even three years later its evaluation than general intelligence factors (Fayol, Barrouillet & Marinthe, 1998). Finally, finger agnosia and dyscalculia are associated in the Gerstmann syndrome. Based on these observations, we hypothesized that intervening on finger discrimination in a population of normal 6 years old children showing reduced performance in a finger gnosis test would increase their finger representation and should also result in improving their numerical skills. For that purpose, we evaluated finger gnosis in 112 Belgian children from normal schools, and selected those with the best (control group: CG) and the worst scores (experimental groups: EG1 and EG2), having 16 children in each group. EG1 followed a program addressed to work on finger differentiation, during which every finger was associated with a colour, through different exercises (colour sequences, keyboard tasks, finger praxis...), in two weekly sessions of half an hour each, for eight weeks long. Numerical tasks were not intervened. EG2 followed just an intervention in reading exercises, with neither finger nor numerical intervention at all. Finally, CG followed the normal schooling without any kind of intervention. Expected results are a rise in finger gnosis levels only in EG1, which would get close to finger gnosis levels in CG, and hopefully, a better numerical performance in EG1 and not in EG2.

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S. ZOTTER, L. KAUFMANN, E. HABERLANDT, L. ZIMMERHACKL, J. ZIHL. Functional Neuroplasticity in Congenital Brain Lesions with Secondary Epilepsy: Two Neuropsychological Case Studies.

Background: The aim of the study was to investigate functional neuroplasticity in two 17-year-old girls (TB, MG) who –despite large posterior lesions- displayed normal academic achievement. In healthy individuals, language processing (e.g. phonology) is supported by distributed neural networks in the left hemisphere, while calculation skills seem to be based on either bilateral fronto-parietal networks (subtraction) or left-lateralized temporo-parietal regions (multiplication). Methods: Neuropsychological tests tapping different aspects of language, attention, memory, visual perceptual and visual-spatial functions, executive functions, number processing/calculation and reading skills (including lexical decision tasks) were administered to TB and MG and to 10 matched control subjects. Subjects: TB: large left-sided parieto-occipital lesion (after congenital resection of an intracranial cyst). MG: superior parietal cystic lesion on the right hemisphere (after congenital thrombosis of the sagittal/transversal sinus and parietal odema). Both subjects are seizure free with anticonvulsant medication. Results: TB showed reduced verbal memory performance, but no deficits in language. As expected, MG exhibited deficient visual-spatial skills but surprisingly also impaired memory performance for verbal and nonverbal material. Overall, results indicate that compensatory processes are not restricted to language and visual-spatial skills as previously reported, but can also be observed in other cognitive domains, in particular reading and arithmetic.

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M. BEAUCHEMIN, P. VANNASING, C. ARCAND, P. BELIN, & M. LASSOUDE. Four-Month-Old Babies Recognize Their Mother's Voice.

The human voice is a very prominent stimulus in our auditory environment as it plays a critical role in most human interactions, particularly as the carrier of speech. Our ability to discriminate and

recognize human voices is amongst the most important functions of the human auditory system, especially in the context of speaker identification. However, the means by which infants acquire this ability remain ambiguous. Indeed, the neurophysiology of infant-mother interaction is poorly understood, partly because of the difficulty in studying young human subjects. Brain physiology related to cognitive processes can be studied in humans with event-related potentials (ERPs). In order to study how infants process their own mother's voice and to compare it with the processing of an unfamiliar human voice, we studied auditory mismatch negativity (MMN) to mother's voice and to an unfamiliar female's voice in 4 months old infants. Infants were presented the vowel /a/, uttered by stranger I (standard), stranger II (deviant) and by his/her own mother (deviant). MMN elicited by the maternal voice was compared with that of strangers. Despite hearing only a very brief voice recording (212 ms), infants showed enhanced brain activity while hearing the maternal voice when contrasted with that of strangers. Although preliminary, these findings further support the contention that recognition memory is functional in early infancy and that it may help establishing and/or strengthening an emotional tie between the infant and his/her mother. Correspondence: Maude Beauchemin, Ms., University of Montreal, Department of psychology, 90, avenue Vincent d'Indy, H2V 2S9 Quebec, CA. E-mail: maude.beauchemin@umontreal.ca

F. OSTORSKY-SOLIS, J.C. FLORES LÁZARO. Development of Neuropsychological Performance for some Measures of Orbital and Medial Prefrontal Cortex Function in Children.

In general there are few studies about executive function (EF) development related to orbital and medial prefrontal cortex (PFC) function in children and infants (Crone and Van der Molen, 2004). Early PFC development allows children to develop a progressive capacity to regulate and control behaviour and emotion (Zelazo and Muller, 2003). The main objective of this study was to explore the developmental characteristics of the neuropsychological performance for some measures of orbital and medial PFC function. 160 subjects from 6 to 17 years old have been studied. The sample has been divided in four age-groups: 6-8, 9-11, 12-14 and 15-17, with 40 subjects by each group (equal number of males and females). The executive function battery (Flores Lázaro and Ostrosky-Solís, 2005) has been used. Results in six EF are shown: motor control, inhibitory control, risk choices detection, set maintenance (positive reinforces maintenance), positive choices detection and global performance in risk-benefit processing. Results coincide with other studies (Crone and Van de Mollen, 2004; Zelazo and Muller, 2003) that detection of risk choices is a capacity already present as early as 6 years old. Maximum performance of Inhibitory and motor control is reached as early as 9-11 years old. Maximum performance for positive reinforcer maintenance (set maintenance), detection of benefit choices and global performance in the card game version are reached later: 12-14 years old. Results shows different developmental characteristic for different neuropsychological measures of orbital and medial frontal lobe function development.

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M.L. LORUSSO, A. FACOETTI, S. PESENTI, C. CATTANEO, R. GALLI, M. MOLteni, & G. GEIGER. Effects of Visual-Spatial Attentional Training in Developmental Dyslexia.

Recent studies have shown the critical role of the ability to actively select visual information (attentional focusing) in developmental dyslexia. A program specifically devised by Geiger and Lettvin to train selection of visual information and small-scale focusing has been tried out with a group of 16 dyslexic children. The results of visual-spatial attentional training (VSAT) were compared with those obtained by another group of 11 dyslexic children who underwent customary reading training (RT) in a speech-therapy context. Both programs had a duration of four months. The children following VSAT worked at their homes, while the children following RT had two weekly sessions at a day-care center. All children were assessed

on reading, spelling and phonemic awareness and their FRFs (Form-Resolving Fields), i.e. the amplitude and shape of their field of correct visual recognition, were measured. The children who followed the experimental training improved their reading and spelling performances as much as the children who were treated by speech therapists: no significant differences were observed between the two groups. Moreover, separate analyses reveal that improvements after VSAT on reading accuracy, reading speed, spelling, phonemic awareness reached statistical significance. The group receiving RT, on the other hand, showed significant improvements on spelling and phonemic awareness only. The results are discussed in terms of underlying neuropsychological processes and the role of low-level perceptual processes and of visual-spatial attention in reading and dyslexia is underscored.

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G. NAVA, R. ARREOLA, B. SALAS, E. GONZALES & P. VALDEZ. Treatment of a Child with Hemineglect.

Left hemineglect has been observed in children with right hemisphere damage and as a developmental disorder. This work describes treatment of an 8-year-old male child with left hemineglect. He was referred by the school at age 7 years 5 months, because of poor academic achievement. He performed drawings from right to left; he tended to use the right part of the space in a sheet while drawing or writing, he had many errors in the left side of the words while reading aloud, but had few errors in cancellation tasks. This pattern of performance was again observed at age 8 years 3 months, at this time line bisection was also recorded, he transected 17/21 horizontal lines slightly to the right of the center. He then participated in a treatment program, designed to direct his attention to the left side of the visual field, by marking the extreme left of each paragraph and each word while reading, and performing many activities from left to right, such as drawing, block construction, searching objects in the space, and searching letters in a paragraph. After a 9 month period of treatment, he transected 9/21 lines slightly to the right, used the left part of a sheet while drawing and writing, but he continued making errors in the left side of the words while reading aloud. In conclusion, after treatment the child used better the left side of the space, but without improvement in reading the left side of the words.

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A. VON BUEREN JARCHOW^{1,2}, T. JARCHOW³, D. NAIR¹, M. MEYER², L. JAENCKE² & G. SCHLAUG¹. Multi-Modality matters in Rhythm Perception.

Proper integration of multi-sensory information with motor preparation and execution is important for perception and production of music. Previous studies have shown reduced rhythm discrimination when presented visually compared to auditorially (Collier&Logan, 2000; Repp&Penel, 2002). However, it is not clear how rhythm

perception is affected when different sensory modalities (auditory(A), visual(V) and tactile(T)) are combined. The aim of the current study was to examine rhythm perception in children using unimodal or multimodal sensory stimulation. To present stimuli in three different modalities a multimodal stimulation and tapping-response box was developed and used for testing in this study. The Multimodal-Box allows rhythmic stimulus presentation in the A, V and T modalities separately, or in any combination. For each of the seven conditions (A,V,T,AV,AT,VT,AVT) fourteen trials of increasing rhythmic complexity were presented. In a forced choice paradigm 46 children (27 female; mean age 13 years) were asked to judge two consecutive rhythmic phrases as same or different. The order of the seven conditions was randomized. A hierarchical regression analysis showed that the auditory modality had maximum contribution for a better performance ($p<0.001$), followed by vision ($p<0.001$), vibration ($p<0.01$) and the bimodal condition AV ($p<0.05$) Adding another modality to a single or bimodal condition always improved performance. These results may have implications for further research or treatment options in which one sensory domain can be used to improve perceptual problems or deficiencies in other sensory domains.

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L. KAUFMANN, H. KRINZINGER, M. GRAF, H.-C. NUERK, & K. WILLMES. Gender Differences in Basic Numerical Skills.

Background: Gender differences regarding complex mathematical skills favouring males have been repeatedly reported (e.g. PISA, 2003). A popular neurocognitive explanatory hypothesis is the so-called "spatial cognition hypothesis" (Casey et al., 1992) emphasizing a correlation between spatial cognition and complex computational skills. Considering the spatial orientation of the "mental number line" (Dehaene, 1992) and the fact that successful retrieval of numerosities requires flawless orientation on the mental number line, gender differences should also emerge regarding basic number processing. Method: Upon collecting normative data for the German version of the calculation test TEDI-MATH 875 children aged 4 to 8 were subjected to tasks tapping abstract counting principles, counting skills, number comprehension, computational skills and approximative number comparison. Results: Males outperformed females on the following subtests: transcoding (first and second grade), number comparison (second semester of first grade and second grade), base-10 system (second semester of second grade) and some aspects of exact computation (first and second grade). On the contrary, gender differences did not reach significance in kindergarten and third grade (the latter might be explained by ceiling effects). Overall, our findings suggest that males might develop an earlier understanding of the base-10 system, which is essential for the successful solving of complex computations as well. Furthermore, the results will be discussed with reference to the "spatial cognition hypothesis".

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FRIDAY MORNING, JULY 28, 2006

Paper Session 9a/9:00 - 9:45 a.m.

Clinical Neuropsychology

Chair : Marianne Regard

A. VASKINN, K. SINDET, S. FRIIS, A. BIRKENAES, J. ENGH, H. JONSDOTTIR, A. RINGEN, C. SIMONSEN, S. OPJORDSMOEN & O.A. ANDREASSEN. Learning Potential in Schizophrenia Measured by Standard CVLT-II.

Learning potential (LP) or the ability to learn from feedback and instruction has been proposed to predict functional outcome in schizophrenia better than neurocognitive abilities. LP has already been shown to predict the ability to learn problem-solving skills, the acquisition of work skills, and readiness for psychosocial rehabilitation. Often a time-consuming test-retrain-test administration of the Wisconsin Card Sorting Test with continuous feedback and instructions during the training administration is used. LP corresponds to the difference in performance from pretraining to posttraining. We wanted to investigate if aspects of the standard California Verbal Learning Test-II can be used to characterize a schizophrenia population in learning potential terms. Thirty subjects with a DSM-IV diagnosis of schizophrenia were examined with the three-trial WCST and subdivided into three groups (23 high-achievers, 5 learners and 2 non-learners). The sample size was then increased, and eighty-four participants underwent a neuropsychological test battery, including the CVLT-II. This sample was subdivided into the same three groups (10 high-achievers, 49 learners and 24 non-learners) based on the amelioration of their performance from Trial 1 to Trial 5 on List A. The neuropsychological test profiles of these three groups will be presented, and the relationship between the WCST and the CVLT classifications will be discussed.

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A. BATEMAN. Assessing SubScale Construct Validity of the European Brain Injury Questionnaire (EBIQ) Using Rasch Analysis.

Rasch Analysis provides an item response examination of properties of questionnaires. It is argued that fit to the model indicates that items of the questionnaire contribute to a uni-dimensional trait. Eight EBIQ sub-scales have been proposed, derived from 63 questions rated with 3 response categories indicating frequency of symptoms ("not at all", "a little", "a lot"). Data from 226 patients were entered into the analysis. The sample (72% male, median age 34) with acquired brain injury (1-10 years prior to assessment) represented consecutive referrals to Oliver Zangwill Centre. After item exclusions from each sub-scale, fit to the Rasch model was achieved for 7/8 of the sub-scales (Cognitive, impulsivity, depression, somatic, isolation, physical and communication). The motivation sub-scale did not work. Visual inspection of plots of targeting revealed good spread of items across the full range of respondents' scores indicating the items provide a good operational measurement range for difficulties experienced by people with brain injury. Plots of threshold maps sorted by item location revealed relative "difficulty" of items for example 'throwing things in anger', 'dizziness', contrasting with more readily endorsed items concerning 'memory' and 'being misunderstood'. This analysis demonstrated that the scales do not work in their original format. However, removal of items enabled fit to the Rasch model. The revised scales can be considered valid and unidimensional for assessing personal experience of consequences of brain injury across a

number of domains. This analysis provides a platform for further parametric analysis of impact of rehabilitation.

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L. CYSIQUE, R. DEUTSCH, J. H. ATKINSON, T. D. MARCOTTE, L. DAWSON, I. GRANT, R.K. HEATON & the HNRC group. No Neuropsychological Effects of Incident Major Depression in HIV-Infected Men.

Major depressive disorders (MDDs) are relatively common in HIV+ individuals and it is often assumed that depressive symptoms influence neuropsychological (NP) performance. Although cross-sectional studies of HIV+ individuals generally have found no systematic link between current MDD and NP performance, longitudinal studies are needed to clarify whether incident MDD may impact NP functioning in some people. HIV+ adult men (n = 227), who did not meet criteria for current MDD at baseline, participated longitudinal NP study for an average of two years. Participants received repeated NP assessments, and structured psychiatric interviews to ascertain presence or absence of lifetime and current MDD. Ninety-eight participants had a lifetime history of MDD, and 46 participants met criteria for incident MDD during follow-up (23 at time of NP retesting). Groups with and without lifetime and/or incident MDD had comparable demographic, HIV disease status and treatment histories at baseline, and numbers of intervening assessments. Lifetime MDD was associated with greater complaints of neurocognitive difficulties in everyday life, and such complaints were increased further at the times of incident MDD. However, detailed group comparisons revealed no NP performance differences in association with either lifetime or incident MDD. Finally, NP data from consistently non-depressed participants were used to develop "norms for change" and these failed to show any increased rates of NP worsening among individuals with incident MDD. In conclusion, our results suggest that incident MDD does not lead to NP decline in ambulatory HIV+ individuals, and that neurocognitive impairment and depressive disorders should be considered as independent processes.

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Paper Session 10a/9:00 - 9:45 a.m.

Attention and Executive Function

Chair: Bernhard Sabel

L. BECK, A. HEUSINGER, M. BÖCKER, H. NIEMANN, & S. GAUGGEL. Comparison of Two Computerized Attention Tests in a Sample of Brain Damaged Patients.

Objectives: The purpose of the present study was to determine the relationship between two computerized attention tests (i.e., the Attention Network Test, ANT, and the Tests for Attentional Performance, TAP) and a rating scale for the assessment of attention deficits (Attention Deficits Rating Scale, ADRS). Methods: Fifty-seven brain-damaged patients with different aetiologies performed the ANT and the corresponding subtests of the TAP. In addition, patients

and staff filled out the ADRS. Results: Considering the means of corresponding ANT and TAP conditions, significant correlations ($r = .54 - .68$) were found for alerting and orienting subtests and overall reaction time. Comparison of condition means of the two attention tests with reported deficits in the ADRS revealed significant correlations for ANT ($r = .62 - .70$) and TAP ($r = .55 - .86$). Conclusions: Results indicate that ANT and TAP are comparable regarding overall reaction time and condition means. Furthermore, there was a substantial association between staff- and patient ratings of attention impairments and the computerized attention tests scores supporting the validity of the computer tests.

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C. HEIDINGER, G. SCHUHFRIED. Deficit-Oriented Assessment and Intervention: About the Necessity for the Theory-Based Correspondence between Psychological Tests and Cognitive Training Programs by the Example of Dimensions of Attention.

The work on hand is concerned with the linkage of assessment, training and evaluation of training effects demonstrated in the ability dimension attention. According to Sturm (2005) six dimensions of attention can be differentiated: alertness, vigilance, covert shift of attention, selective attention, focused attention and divided attention. An effective training initially presupposes a comprehensive assessment of the impaired performance dimensions. This is to clarify where a training requirement exists. Deficit-specific training is put forth on the impairments determined this way. In order to accomplish an evaluation of the training effect in individual cases and thus contribute to the quality assurance of professional proceedings assessment procedures are used again following training. The prerequisite for this is however a close conceptual link of training and test procedures. In the last years the Dr. Gernot Schuhfried Company developed theory-based test procedures and training programs for the six attention dimensions outlined by Sturm (2005). The correspondence between the cognitive construct of the test and the training with at the same time independent item components enables a deficit-specific intervention, which has already proven effective in some training studies (e.g. Sturm 2003). The combination of the newly developed computerized cognitive training system CogniPlus and the Vienna Test System permits the scientifically established and user friendly execution of the stations of psychological work: assessment of state, deficit-specific therapy and evaluation of training success.

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R. PTAK, L. GOLAY, & R. MÜRI. Oculomotor Capture by Remote Distracters in Spatial Neglect

Ipsilesional distracters may capture attention of patients with spatial neglect even though patients are instructed to ignore them. This effect has mostly been studied using manual reaction time (RTs) measures. Here, we examined the bias of neglect patients' oculomotor responses towards irrelevant ipsilesional distracters. Six healthy participants and six neglect patients were asked to execute saccades to peripheral targets presented left or right of fixation. Targets were presented alone or with a distracter that appeared either on the same side as the target, on the opposite side, or at fixation. We analyzed direction errors, saccade amplitude and latency. Though instructed to disregard the distracter, healthy participants made saccades to ~20% of opposite-side distracters. While only same-side distracters modulated their saccade amplitude only opposite-side and fixation distracters modulated their saccade latency. In contrast, neglect patients made saccades to ~20% of contralesional distracters, but to ~60% of ipsilesional distracters. Correct left saccades of neglect patients were hypometric, but their amplitude was modulated similarly by same-side distracters as the amplitude of right saccades. Interestingly, modulation of saccade latency was comparable between left and right saccades: opposite-side distracters and fixation distracters markedly increased saccade latency independently of saccade direction.

Contrasting with these oculomotor effects, distracters did not modulate manual RTs. These results suggest that oculomotor capture and distribution of manual RTs are based on different underlying mechanisms: while slowing of RTs to contralesional targets may reflect a biased attentional gradient, oculomotor responses are more compatible with low-level inhibitory mechanisms within the oculomotor system.

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Paper Session 9b/10:15 - 11:00 a.m.

Clinical Neuropsychology

Chair: Marianne Regard

A. BERALDI, T. MEINDL, T. ZETZSCHE, C. BORN, M. REISER, R.R. ENGEL, K. FAST. Neuropsychological Anomalies and Neurofunctional Results in Patients with Borderline Personality Disorder.

To advance a better understanding of the neuropathophysiology of the borderline personality disorder (BPD) several neuropsychological, neuroanatomical and neurofunctional studies have focused on BPD showing consistent but also heterogeneous results. Neuropsychological data suggest impairments in cognitive domains of attention, memory, visuospatial and executive functions (O'Leary, 1991; Swirsky-Sacchetti, 1993; Judd & Ruff, 1993; Sprock et al., 2000; Dinn et al., 2004; Monarch et al., 2004; Posner, 1999; Van Reekum, 1993, 1996; Bazanis et al., 2002). Neurofunctional imaging in BPD suggest a hypersensitivity of the limbic system, especially the amygdala (Herpertz et al., 2001). In our study patients with BPD and healthy controls have undergone an extended neuropsychological battery. First preliminary results show deficits in visual attention and memory as well as in working memory. In the second part of this study, two sets of forty pictures (neutral, positive, low and high negatives) each, that we have collected according to borderline disorder relevant topics (isolation, frustration, social interaction), have been presented in fMRI. On the one hand we examined the influence of arousal on perception and memory (bottom-up process). On the other hand we intended to study the capacity of cognitive control and its influence on perception and memory (top-down process) by asking the subjects to regulate their emotions in different ways. We expected patients with BPD to show higher levels of arousal even for low-arousal pictures and to show more difficulties than controls especially for the changing perspective strategy. This is reflected in behavioural and neurofunctional data.

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L. MAUCIERI, & R. HANLON. The Comorbidity and Synergy of Head Trauma and Psychiatric Illness.

Introduction: Research has documented the frequent comorbidity of head trauma and psychiatric illness. This manifests as both increased incidence of head trauma among patients with pre-existing psychiatric illness, and post-traumatic onset of psychiatric disorders. We examine two cases in the context of self-report survey data and the wider literature, to help investigate the complex relationship between head trauma and psychiatric symptoms Method: Patient B. N., a 23-year-old right-handed male, sustained a severe head injury four years ago from an MVA, which resulted in a coma of 15 days. He had a history of OCD in childhood. Since the trauma, he has been hospitalized eight times for suicidality and paranoia, as part of a

suspected Bipolar Disorder of organic basis. Neuropsychological testing documents a decline in intelligence from premorbid expectation, severely deficient naming, and moderately deficient visual working memory, response inhibition, and sustained visual attention. In another case, R. F., a 33-year-old left-handed female, suffered postsurgical infection from a craniotomy following an MVA. She exhibited behavioral disinhibition and lability, which were likely exacerbations of her premorbid personality structure. She also had depression, and persistent deficits in multiple cognitive domains over repeated screenings. **Results and Conclusions:** Both cases illustrate a complex interaction of premorbid psychological features, head trauma, and post-injury impairment. These findings are consistent with the literature regarding psychiatric presentation and head trauma, and the increased incidence of head trauma among those with psychiatric illness. Implications for treatment and clinical conceptualization are discussed and explored. Correspondence: *Lawrence Maucieri, Adler School of Professional Psychology, Clinical Neuropsychology, 65 East Wacker Place, Suite 2100, 60601 IL, US. E-mail: Lmaucieri@sbcglobal.net*

J. TONKS, W. H. WILLIAMS, I. FRAMPTON, P.J. YATES & A. SLATER. Are Cognitive Deficits and Emotion Processing Deficits Dissociable Following Paediatric Brain Injury? A Case Series.

The ability to interact with others is dependent upon a range of cognitive and emotional systems operating effectively; systems which plan and organise behaviour, and systems that may function at the basic level of analysis of stimuli, such as recognising whether someone else is happy, angry or sad. Research findings previously reported in the literature have been integrated into a dissociable schematic, which offers a novel representation of the sub-components of the emotion processing system. We advocate that basic-level (recognition) systems may well be compromised by brain-injury. Aim: To explore whether it is possible to dissociate the higher-order levels of cognitive processing and separable units of emotion processing in children with acquired brain injuries. Methodology: A case series of seven children with brain injuries, who were identified as 'at risk' of developing an emotional or behavioural disorder, according to a social-behavioural measure, were given a battery of tests, which assessed cognitive function, and novel and adapted measures, which assessed abilities to recognise emotions from faces, voices and eyes. Results: four profiles of impairment were identifiable; impairment that affects both cognitive function and emotion recognition domains, impairment that affects either cognitive function or emotion recognition ability- thus attesting to a dissociation, and highly specific selective impairments that affect abilities in reading emotions from voices, eyes or faces. Conclusions: The profiles identified indicate that the organisation of emotion processing systems in children is compatible with the schematic, derived from adult research.

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Paper Session 10b/10:15 - 11:00 a.m.

Attention and Executive Function

Chair: Valentine Marcar

J. FISH, T. MANLY & B. A. WILSON. Modulation of Executive Functioning in Acquired Brain Injury.

A principal aim in the assessment of executive functioning is the prediction of problems in everyday life. The assumption that tests predict everyday performance is by no means unequivocally

supported by research findings (Burgess et al, 1998), though the development of ecologically valid tests is helping to improve the situation. Most assessment procedures share one major drawback: they tell us very little about variability in performance. We have used methods that attempt to gauge this variability, with reference to prospective memory rehabilitation. We used a naturalistic task, in which patients are asked to make four daily telephone calls to a voicemail service, and found significant facilitation of performance when a text-message based alerting strategy was used. A second study investigated how different aspects of executive functioning are influenced by motivational salience, employing traditional experimental research methodology. We would argue that measuring variability in, rather than absolute level of, performance, provides a better reflection of everyday function than standard "snapshot" assessment procedures, as well as providing theoretical insight into the cognitive processes involved in these complex behaviours, and clinical insight regarding the implementation of rehabilitation strategies.

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C. MRAKOTSKY, A. BOUSVAROS, E. KENNEY, D. DEFILIPPO, D. WABER, & R. GRAND. Impact of Corticosteroids and Inflammation on Memory and Executive Functions in Pediatric Inflammatory Bowel Disease.

Inflammatory bowel disease (IBD) (Crohn's disease, ulcerative colitis) is a chronic illness with autoimmune etiology treated with corticosteroids to control inflammation. Steroids adversely affect the brain, changing sleep, appetite, and mood. Less is known about their impact on cognition, especially in children. Data is emerging that inflammation itself may disrupt neural systems. Objective: We investigated the effects of high-dose steroids and inflammation on memory, executive functions, and mood in children with IBD. Methods: Children (age 8-17) with IBD on high-dose steroids (≥ 30 mg/day prednisone) (N=26) were compared to those off steroids for ≥ 6 months (N=22). Impact of inflammation was assessed in the whole sample. Assessment included the WASI, WRAML2, CMS, ROCF, DKEFS, CPT-II, BRIEF-P/SR, CBCL/YSR, and measures of disease severity, pain and sleep. Results: Groups were comparable in demographics and IQ. The steroid group (M=44.2 mg, range 30-75 mg) had poorer spatial learning ($p < .01$), visual memory for detail ($p < .05$), slower processing ($p < .10$), and reported more problems with shifting ($< .01$), working memory ($p < .05$), mood ($p < .001$), pain and sleep ($p < .05$). Sleep and pain contributed to mood differences. Higher steroid dose was associated with poorer outcome. Inflammation contributed to thought and mood problems ($< .05$). Independent of steroids, higher levels of inflammation were related to poorer delayed visual memory ($p < .05$), nonverbal skills ($p < .01$), and mood ($p < .01-.05$). Conclusions: Steroids affect aspects of memory and executive functions in children treated acutely for IBD. Sleep problems, pain, and inflammation may play a role. The neurobehavioral impact of steroids versus underlying immune factors will be discussed.

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S. MONTEVERDI, M. ZETTIN, A. RUZZINI, G. GEMINIANI. Attention Allocation and Working Memory Effort in Dual-Task Paradigm after Severe TBI.

Aim of this study is to investigate dual-task performance in TBI patients under four experimental conditions, with or without emphasis on one of the two tasks, in order to investigate the functioning of the Central Executive System (CES) of working memory. METHODS AND PROCEDURES: Eight severe TBI cases at chronic phase were selected. Patients were compared to matched controls. For the experimental conditions we used a simple visual response time (MIDA-basal) and an auditory prose memory task with evaluation of immediate recall (PM-task). Participants were administered four

conditions: 1. single task (MIDA-basal or PM-task), 2. neutral condition (MIDA-basal and PM-task, without immediate recall score registration), 3. implicit dual-task condition (MIDA-basal and PM-task presented as distractor, with immediate recall score registration), 4. explicit dual-task condition (MIDA-basal and PM-task, with immediate score registration). RESULTS TBI performances showed interference effects in explicit dual-task condition. Surprisingly, patients were adapted performance in implicit dual-task condition, with positive results both in MIDA-basal and PM-task scores. Results suggest that divided attention deficits in TBI are related to impairment of strategic processes responsible for allocation and switching, in a structured task. TBI performance is explained with wrong allocation of resources by CES only when the task requires controlled and structured processing. Results have important consequences in development of divided attention and working memory rehabilitation.

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Poster Session C/9:00-12:30 a.m.

S. V. MÜLLER, U. KLAUE, A. SPECHT, P. SCHULZ.

Occupational Neuropsychology: A New Field of Intervention?

Main goal of rehabilitation is social and vocational reintegration of handicapped people. Neuropsychological disorders prove to be particularly critical factors in this context. The existence of neuropsychological impairments can lead to excessive demands in rehabilitation lowering the chance of successful vocational rehabilitation. To prove the assumption of need of neuropsychological furtherance within the scope of vocational rehabilitation programs, 69 persons undergoing rehabilitation in the Berufsförderungswerk Sachsen-Anhalt passed through a neuropsychological screening to identify persons with cognitive deficits. The study yielded every third to fourth person to suffer from cognitive deficits. In addition, the documents of all these persons were reviewed to find hints of mental disorders and neuropsychological deficits in order to compare persons with known mental disorders or neuropsychological deficits with persons without diagnosis with regard to their performance in the neuropsychological screening. On the one hand the results confirm cognitive functional deficits of people with a known neuropsychological diagnosis. The assumption of cognitive functional deficits of mental disorder documented in the files could not be confirmed. On the other hand, a serious share of people without striking medical-psychological pre-results showed raw values below average method. Furthermore could be shown a negative effect on the efficiency of people having a subjectively experienced load. Due to results requirements of neuropsychological furtherances and therapy programs in the professional rehabilitation can be confirmed. At suspicion of impairment of cognitive functional areas specific diagnostic measures should be taken up in order to start suitable interventions. Neuropsychological furtherances should be orientated at specific requirements of vocational rehabilitation programs to increase the efficiency, especially with regard to vocational requirements and therefore to improve the prerequisites for the immediate vocational education. Key words: neuropsychology, vocational rehabilitation, return to work, neuropsychological screening, cognitive functional deficits.

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J. TAN, D. F. HULTSCH, M. A. HUNTER, & E. STRAUSS.
Psychometric Investigation of the Modified Scales of Independent Behavior-Revised for Use in an Elderly Population.

There are a limited number of tools that examine an extensive array of functional abilities, particularly for use in the elderly population. This

study reports a psychometric analysis of a modified version of the Scales of Independent Behavior-Revised (SIB-R) in a non-demented, elderly population. Self reports were completed by 255 community dwelling older adults, ranging in age from 64 to 90. Informants' ratings (e.g. spouse, adult child, friend) of participants' functioning were also obtained. Both informant and self reports showed excellent internal consistency and good one-year test-retest reliability, but the two modes of report provided different scores with lower scores on the informant reports than the self reports. Factor analysis of the modified SIB-R resulted in three factors: basic living skills, social/cognitive engagement, and physical/environmental engagement. As expected, the basic living skills factor on both informant and self reports correlated with the Lawton and Brody's IADL measure. However, informant and self reports revealed somewhat different factor structures, suggesting that different information was obtained from the two modes of report. The utility of the modified SIB-R to differentiate among five mild cognitive impairment groups was also investigated. Individuals with deficits in multiple cognitive domains (including the memory domain) were rated the lowest by informants across all factors. Ratings on self reports, however, were dependent on the factor in question. These results support the usefulness of the modified SIB-R in a non-demented, elderly population; however, whether informant or self reports should be used remains unclear.

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F. SÜRER, H. SCHMIDT, K. GROTH, A. HINZ, A. DANEK. A New Computerised Version of the Tower of Hanoi on a Tablet PC.

A popular test to assess executive functions is the Tower of Hanoi (ToH) but no standardised versions exist. This makes it difficult to draw appropriate conclusions and to make proper comparisons. We developed a ToH computerised version on a tablet PC with a touch pen. It simulates the original wooden game in a realistic and 3D manner in order to be used as a bedside-test. Our study aimed at examining the differences of performance between various neurological patients and healthy controls. In addition to timing solution steps, the program documents the solution pathway chosen and visualises it in a "Hanoi graph". 72 controls (42 female) participated and were divided into two age groups (20-45 years, mean age 29.2; 46-70 years, mean age 57.3). 37 patients belonged to four disease groups: inflammatory (6), cerebrovascular (13), neurodegenerative (13), other (5). Participants had to solve seven tasks in a fixed sequence, each differing in the level of difficulty. Performance was analysed in terms of pathways taken, reaction times, errors and backward moves. Patients commonly did not solve all tasks or were impaired to solve the tasks in the minimum amount of moves. The younger and older controls were faster in solving the tasks than the patient groups, the younger in each group being faster. This tool is easy to handle, the "Hanoi graph" can be interpreted easily and the data is saved automatically. It is an improvement to the wooden version and could establish criteria for the analysis of performance on the ToH.

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J. BILLINO, M. BRAND & A. RÖSLER. Cognitive Estimation in Patients with Subcortical Vascular Dementia.

Subcortical vascular dementia (SVD) has been defined as a subgroup of vascular dementia. However, there is still little knowledge about the specific cognitive profile. Cognitive estimation represents a complex, highly relevant function in daily living. The purpose of our study was to investigate if subcortical vascular lesions interfere with fronto-subcortical circuits activated during tasks of cognitive estimation. A total of 39 subjects participated. 18 subjects (mean age 69.7) fulfilled the research criteria for SVD. 21 subjects (mean age 64.9) constituted the control group (CG). All subjects underwent

extensive neurological-psychiatric examination. Brain scans were rated according to the Age-Related-White-Matter-Changes scale. Educational background and MMSE scores were recorded. Cognitive estimation was assessed by the test for cognitive estimation (Test zum kognitiven Schätzen, TKS). TKS scores differed significantly between the two subject groups. SVD patients were impaired in cognitive estimation compared to control subjects (mean score 9.7 vs. 11.8). In both groups, MMSE scores correlated significantly with the TKS score (SVD: $r=0.632$; CG: $r=0.515$). Interestingly, a significant correlation between educational level and cognitive estimation could be shown only in the control group ($r=0.544$). In contrast, performance was not affected by general knowledge in the SVD group. Our results suggest that SVD patients suffer from a deficit in cognitive estimation. This deficit might be explained rather by reduced connectivity via subcortical circuits than by semantic knowledge deficits per se. Acknowledgement: Supported by the German Research Foundation (Ro-2437/1-1). JB is currently student of the graduate program 'Brain and Behavior' (DFG 885/1). Correspondence: *Billino Jutta, Justus Liebig University Giessen, General and Experimental Psychology, Otto-Behaghel-Str. 10F, 35394 Giessen, D. E-mail: jutta.billino@psychol.uni-giessen.de*

A. SCHOLES, & B. HARRISON. Neuropsychiatry: A Developmental Perspective.

Working with clients across the lifespan provides a unique perspective in relation to neuropsychological and neuropsychiatric functioning. It enables a clinician to keep in mind that children grow up, and developmental disorders can have a significant impact on adult functioning and differential diagnoses. The recent development of a neuropsychiatric clinic for children and adolescents at Alfred CAMHS, with links to the Melbourne Neuropsychiatry Centre's clinical unit at the Royal Melbourne Hospital has enabled this perspective in a neuropsychiatric context. Dr Amy Scholes has worked as a neuropsychologist for both of these hospitals for six years and has been involved in the development of the Alfred's new Paediatric Organic Psychiatry (POP) clinic, initiated by psychiatrist Dr Beate Harrison. This lifespan perspective will be conveyed via a case study presentation of a rare childhood neuropsychiatric disorder (Landau Kleffner Syndrome), with implications for adulthood also discussed. The neuropsychiatry services and their development will also be outlined.

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A. ISOMURA, H. UTSUMI & A. HASEGAWA. Phenotype of Parkinson's Disease: Association Between Cerebral Blood Flow Measured by Single Photon Emission Computerized Tomography (SPECT) and Neuropsychological Performance.

This study examined the relationship between neuropsychological performance and the analysis of the single photon emission computerized tomography (SPECT) in phenotype of Parkinson's disease (PD). PD patients were categorized into two groups based on their initial symptom manifestation; 1) tremor type (individuals who exclusively exhibited tremor at onset) ($n=11$) and 2) bradykinetic type (those who manifested bradykinetic symptoms or mixed of tremor and bradykinetic symptoms at onset) ($n=20$). These two groups did not differ in terms of the disease duration. Each participant underwent a comprehensive neuropsychological battery and the SPECT, and we evaluated group differences based on these data. ANOVAs were utilized to evaluate between-group differences on cognitive measures and the SPECT data were analyzed using three-dimensional stereotactic surface projection (3D-SPP) technique and stereotactic extraction estimation (SEE). The results revealed that the bradykinetic group performed significantly worse than the tremor group on the measures of visual memory, psychomotor speed, and executive function. In addition, on the SPECT, the bradykinetic group showed hypoperfusion on parts of the temporal and frontal areas in contrast to the tremor group. Taken together, neuropsychological performance

and the SPECT data were mostly consistent, and they suggested that the bradykinetic group and the tremor group were dissimilar both cognitively and pathologically. They further indicate heterogeneity of PD and variability in disease progression. A subgroup of PD patients experience progressive cognitive declines as the disease advances whereas others only exhibit minimal cognitive and physiopathological changes despite the duration of the disease.

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L. TRINIDAD-OLIVERO. A Constructivist Neuropsychological Rehabilitation Model for Dyslexia.

The constructivist neuropsychological model sees the rehabilitation for dyslexia in a panoptic way. It includes the neuropsychological aspects and the context dyslexic manifestations. The model emphasized the rehabilitation process as an active construction. In the context of dyslexia, the model explains and works with the underlined cognitive abilities like: auditory processing, phonemic awareness, attention, working memory, executive functions, and processing speed. The implementation of the model begins with a comprehensive assessment observing a biocultural frame; which embraces the neuropsychological and ecological assessment that helps to understand, in a broader way, the manifestation of dyslexia. The dyslexic manifestations seen through the assessment, helps to understand the areas for working in a real environment. The constructivist model of neurorehabilitation provides a foundation where skills deficits are corrected in a meaningful context. The model focuses on the child needs and interests, the learning processes, and the interaction with the environment. The model helps the child with dyslexia to construct knowledge about the words, the functions of symbol and communicating exchanges. The model celebrates the inventive and explorative use of language. The constructivist model of neurorehabilitation for dyslexia has 5 core integrating and interactive elements: sound-symbol awareness thru perceptual-motor processes, word recognition in a meaningful context, reading comprehension via multi strategies and reflective auto assessment. This model of rehabilitation actively integrates the intra and interpersonal components, providing the space for a holistic growth. The assessment, model, strategies and case example will be addressed in this presentation.

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T. JÄGER, M. KLIEGEL, C. ROTT, & D. WOZNIK.

Cognitive Development at the Frontier of Functioning: A Longitudinal Analysis from the Heidelberg Centenarian Study.

Human longevity has dramatically increased over the last 100 years, resulting in a strong increment in the population of the oldest old. In the present study, we report analyses from the population-based Heidelberg Centenarian Study investigating cognitive status, intraindividual cognitive development, and the effect of mortality on cognitive development among $n=91$ (82 deceased) 100-year-olds. Cognitive functioning was quantified using the Global Deterioration Scale (GDS) in a longitudinal design including a maximum of 8 GDS assessments after every 6 months ($M = 3.4$ assessments) until death. Individual Growth Curve Modeling was performed to investigate both age-related and death-related intraindividual patterns of change in cognitive functioning and interindividual differences in cognitive development. Results revealed that the centenarians exhibited a significant decline in cognitive ability in both the age-related and death-related analyses, confirming that cognitive loss is highly prevalent among the oldest old. In the last 6 months of life, centenarians showed a significantly accelerated decrease in cognitive functioning, which is in line with the hypothesis of a terminal-decline in mortality-related cognitive development that is believed to be indicative of a rapidly approaching death (e.g., Berg, 1996). However, there was also a significant interindividual variability in cognitive development indicating that

both biological as well as person-specific factors influence cognitive status at the end of life. Finally, in an analysis examining the influence of several variables (i.e., sociodemographic, health-related, and personality-related variables) for cognitive decline, only depression was found to have a significant predictive value for a larger decrease in cognitive functioning.

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V.L. MARCAR & L. JÄNCKE. The Visual Evoked Potential Reflects the Neuronal Recruitment Involved in the Processing of Luminance and Contrast by the Human Visual System.

We examined the brain electrical activity of visual cortex to different visual stimuli in forty-two, healthy, adult volunteers. We presented three reversing displays and four flashed or onset displays. The reversing series consisted of a windmill and a chequerboard with filled elements and a chequerboard with line drawn elements. The flashed series consisted of a uniform disc, a windmill and a chequerboard with filled elements and a chequerboard with line drawn elements. The change in mean luminance was identical for the windmill and chequerboard display with filled elements. The contrast information in the chequerboard displays with filled elements and line drawn elements was identical. We compared the amplitude of the components to the reversing and flashed series of displays. The amplitude of the early components were similar from the windmill and the chequerboard display with filled elements, while the amplitude of the late components were more similar for the chequerboard displays with filled and line drawn elements. This latter pattern was also observed for the late component of the evoked potential from the onset response to the flashed displays. Our findings suggest that luminance and contrast are processed independently by the human visual system.

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S. FERNANDEZ GUINEA, M.R. GARCIA VIEDMA, R. MARTOS MONTES. Attentional Control Problems in Early Stages of Alzheimer's Disease.

Recent studies have showed alterations in some components of the attention system and executive functions at the early stages of AD (García-Viedma, 2001; García-Viedma, Fernández-Guinea, López-Luengo, Delgado Losada & Martos-Montes, 2001; Johannsen, Jakobsen, Bruhn & Gjedde, 1999; Nebes & Brady, 1993; Parasuraman & Haxby, 1993; Perry & Hodges, 1999, 2000; Perry, Watson & Hodges, 2000). These results could indicate the influence of the attention control system alteration in these deficits, as Morris suggested (1986). In a sample of elderly people and patients with Alzheimer's disease at the first stage, we explored attention or executive control operations such as: a) the ability to inhibit irrelevant information and select the relevant one, and b) the ability to exchange information processing strategies (Baddeley, 1996). We designed a Stroop-like task (participants had to read words and indicate the colour of the ink) and a task-switching (participants had to solve series of very simple arithmetical operations, sums or rests). The results showed statistical differences between both groups in reaction time and errors measures. The Alzheimer's disease group showed poorer performance in inhibition, information recuperation strategies and cognitive flexibility tasks. It is concluded that attention control difficulties are present in the early stages of Alzheimer's disease.

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N. BIER, J. MACOIR, S. LOUVEAUX, L. GAGNON, J. DESROSIERS, & M. VAN DER LINDEN. Known, Lost, and

Recovered: Efficacy of Formal-Semantic Therapy and Spaced Retrieval Method in a Patient With Semantic Dementia.

Introduction: Semantic dementia (SD) is characterized by the deterioration of concepts about the world. Few studies have addressed rehabilitation in SD. To this respect, formal-semantic (F-S) therapy is promising. It consists in the relearning of lost concepts by means of tasks in which the name of concepts and their semantic characteristics are presented. The effect of this therapy also could be enhanced by spaced retrieval (SR), a method improving long term retention through recalls of information after increasing time intervals. Objective: To explore the efficacy of the F-S therapy, combined to the SR method, in TBo, a patient with SD. Method: Following baseline measures, TBo had to relearn a list of 8 lost concepts with F-S therapy: picture naming and generation of verbal attributes with semantic feedback. Four of these 8 concepts were repeated with SR and 4 with simple repetition. Performances were measured throughout the study with picture naming, generation of verbal attributes and spelling. Two untrained lists of 8 items were also measured for generalization effects. Results: TBo relearned 3/8 concepts' names and 6/8 attributes with F-S therapy compared to untrained lists (0/16) ($p < .01$). F-S with SR was not superior to F-S with simple repetition ($p = .17$). No generalization was observed. Discussion: Results show that relearning is possible in SD. The F-S therapy is promising although its effects seem highly specific. Learning methods did not play a role on therapy effects. Further research should explore semantic treatment by resorting to preserved abilities in functional situations.

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T. JARCHOW, P.Z. ELIAS & L.R. YOUNG. Adaptation and Motion Sickness Susceptibility.

Artificial gravity provided by a fast spinning short radius centrifuge (2.5m) is a promising countermeasure to the deconditioning of several vital body functions during prolonged exposure to weightlessness. However, head movements out of the plane rotation while spinning trigger disturbing vestibular sensations such as self-motion, induce improper eye-movements and leads to motion sickness (MS.) Our current research focuses on parameters contributing to adaptation and to the accompanying symptoms of head movements in a spinning environment. In several experiments a total of 61 supine subjects were adapted on two days to do 42 yaw-head turns while spinning at 23 rpm. During adaptation the experienced MS and the intensity of tumbling sensations as well as the time constant of the vestibulo-ocular reflex was recorded for every head turn. Motion sickness susceptibility for a specific type of motion is difficult to predict, therefore we use a post-hoc criterion to classify the subjects as susceptible to motion sickness (sMS, N=27) and as not susceptible (nMS, N=34.). Both groups show adaptation and on the second day the symptoms are lower and subjects are more comfortable doing head turns while spinning. However, the response of the sMS group is less concise: Their variability is higher, they are more affected by the direction of the head turn and their rate of adaptation is slower. The different response patterns of the sMS and nMS group are discussed on the background of the sensory conflict model by comparing the effects of different internal models versus deficient sensory inputs.

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I. GALTIER, A. NIETO, J. BARROSO, E. DE NOBREGA, R. CORREIA, B. HERNANDEZ & JN. LORENZO. Coping and Depression in Nondemented Parkinson's Disease Patients.

Coping strategies are an understudied aspect of Parkinson's disease. In this study we aimed to examine illness coping strategies in nondemented Parkinson disease patients and its relationship with illness severity and depression. We studied twenty-nine patients (ages 40-75; MMSE mean score 26.37). Illness severity and depression

were assessed by subscale-III (Motor examination) of UPDRS and Beck Depression Inventory, respectively. Coping strategies were measured using an adaptation of the Brief COPE (Carver, 1997). It consists on 13 factors grouped into 3 coping styles (focused in the problem, focused in the emotions and disadaptive). Results showed that "Acceptance" (i.e., "I've been learning to live with the disease), "Information search" (i.e., "I've been trying to obtain more information about it") and "Active coping" strategies (i.e., I've been taking actions to try to make the situation better) are the mostly used. "Behavioural disengagement" (i.e. I've been giving up the attempt to cope) and "Venting" (i.e. I've been expressing my negative feelings) are the least employed strategies. The greater motor affectation, the greater the use of "Information search" strategies. The greater age of onset of disease, the greater the use of coping focused in the emotions, especially "Religion". Disadaptive strategies were more frequently used by the most depressive patients. In summary, coping adaptive styles, focused in the problem and focused in the emotion, are the most used by these patients. The use of coping patterns, which are regarded as maladaptive, was associated to the severity of depression. Correspondence: *Ivan Galtier, University of La Laguna, Psicobiología y Metodología de las Ciencias del Comportamiento, Campus de Guajara, 38205, ES. E-mail: igaltier@ull.es*

R. CORREIA, J. BARROSO, A. NIETO, E. De NOBREGA, I. GALTIER. Differential Impairment Across Letter-Based, Semantic and Action Verbal Fluency Tasks in Normal Aging.

Although verbal fluency impairment is widely reported in healthy aging research, there is no agreement about to what extent this impairment depends on the given task cue. Literature suggests differences in critical brain regions when comparing letter-based fluency to semantic fluency, what implies that different processes might be required for each of these tasks. It has been argued that letter-based fluency tasks require more frontal lobe implication while semantic fluency may be more related to nonfrontal regions, as left temporal lobe. Lately, action verbal fluency has also been reported as having great frontal lobe involvement, but this task has not received much attention in aging as yet. Two groups of ten participants each [young adults age $X(Sd) = 41.10 (5.705)$; old adults age $X(Sd) = 67.60 (3.062)$] were compared on letter-based (F, A, S), semantic (animals) and action (things that people do) verbal fluency tasks. All participants were neurologically normal and right-handed, and both groups were equally distributed by sex. Our results point to that older adults perform significantly worse than young adults on letter-based ($F(1,18) = 6.134$; $p < .05$) and action ($F(1,18) = 5.002$; $p < .05$) verbal fluency tasks, while with semantic cues no differences were found ($F(1,18) = 0.121$; $p > .05$), even after controlling processing speed effects on these tasks performance. Thus, these findings suggest that in normal aging, verbal fluency appear more impaired as the task cue demands a greater, cortical-subcortical, frontal lobe involvement. Correspondence: *Rut Correia, University of La Laguna, Psychology/Psychobiology and Methodology of Behavioral Sciences/Neuropsychology, Campus de Guajara, 38205 Canary Islands, ES. E-mail: rcorreia@ull.es*

J. BARROSO, R. CORREIA, A. NIETO, I. GALTIER, E. De NOBREGA. Confrontation Naming Decline in Normal Aging: Verbs Versus Nouns Naming.

Regarding the neural correlate of confrontation-naming, it's been argued a different neural substrate depending on the kind of stimulus presented (nouns versus verbs). Thus, cortico-subcortical frontal structures have been commonly associated with verb confrontation naming, while temporal lobe regions are related to noun naming. Researches studying performance on confrontation-naming tasks in the healthy aging population have documented a different age-related decline with an accelerated rate of the decline for noun naming. However, there are not many studies which have controlled important variables as visual complexity, lexical frequency and naming agreement percentage in order to make both tasks (nouns and verbs) comparable. Ten neurologically normal elderly adults [age $X(Sd) = 67.60 (3.062)$] were compared to ten young adults [age $X(Sd) = 41.10 (5.705)$] on tasks of noun and verb naming. All

participants were right-handed. Despite our results show that young adults perform better than elderly adults in both tasks [noun ($F(1,18) = 8.97$; $p < .01$); verb ($F(1,18) = 25.25$; $p = .00$)] it seems to be a divergence in the later group performance. Verb naming appears more impaired than noun naming ($F(1,18) = 17.30$; $p < .01$) in elderly adults. Thus our results do not confirm previous studies and suggest that verb naming declines at a more accelerate rate than noun naming in normal aging when tasks are designed to be of comparable difficulty. Finally, these results are congruent with brain aging studies where mild frontal lobe impairment, cortico-subcortical, is a convergent evidence in normal aging.

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R. SCHMID, T. JÄGER, & M. MARTIN. Effects of a Weekly Memory-Training on Patients Diagnosed with Dementia or Mild Cognitive Impairment.

In a longitudinal study, we investigated whether memory trainings across a 1-year period have positive outcomes on cognitive abilities in patients diagnosed with dementia ($n = 38$) or mild cognitive impairment ($n = 34$) relative to two control groups. The memory training groups received weekly memory trainings by a clinician. The first control group consisted of dementia patients of whom a proxy attended a schooling that taught them how to handle with the disease ($n = 65$). The second control group were dementia patients that received memory trainings at home by one of their proxies ($n = 63$). Neuropsychological testing was administered at the beginning and at the end of the 1-year period. Results revealed that whereas the memory training groups showed relatively stable scores in the Mini-Mental State Examination (MMSE), the two control groups had significantly lower MMSE-scores after the 1-year period. Further neuropsychological tests revealed that the memory training groups did not decline in their ability to learn and immediately reproduce word lists, whereas both control groups scored significantly lower in this task in the second relative to the first testing session. The same positive effect of the memory training was found for a category fluency task. By contrast, no differential effects across experimental groups were found in other tasks tapping orientation, verbal short-term and long-term memory, letter fluency, object naming, or the abilities to follow instructions, to draw figures, or to create sentences. Correspondence: *Theodor Jäger, Saarland University, Saarbrücken, Department of Psychology, Experimental Neuropsychology Unit, D. E-mail: s9thjaeg@stud.uni-saarland.de*

L. ZAMARIAN, E. STADELMANN, H.-C. NÜRK, N. GAMBOZ, J. MARKSTEINER, & M. DELAZER. Direct and Indirect Retrieval of Multiplication Facts in Mild Cognitive Impairment and Healthy Elderly.

So far, no study has specifically investigated memory retrieval of arithmetic facts in MCI compared to healthy elderly. In the present investigation MCI patients ($N = 18$), healthy old ($N = 18$) and young adults ($N = 18$) performed three computerised tasks aimed to assess multiplication fact knowledge (e.g., $3 \times 4 = 12$). The production (e.g., $3 \times 4 = ?$) and the verification task ($3 \times 4 = 12?$ correct answer 'yes', $3 \times 4 = 16?$ correct 'no') evaluated explicit access to multiplication knowledge. In the number-matching task indirect access to multiplication was assessed by requiring participants to perform a visual comparison between problem-digits (3×4) and target-digits (34, 'do 3×4 and 34 have the same digits?'). Indirect access to multiplication knowledge was indexed by increased interference from related distractors (3×4 followed by 12; 3×4 followed by 16) relative to unrelated distractors (3×4 followed by 17). MCI patients and older adults were slower in responding across tasks compared to younger adults. MCI and healthy old participants were as accurate as young adults in production, but less accurate in verification. In number-matching, differences between MCI patients and the two other groups appeared. MCI patients showed significant larger interference from related distractors than healthy old adults. These findings suggest that aging has a general effect on processing speed, but only a task-

specific effect on accuracy. MCI-related changes appear specifically in the indirect multiplication task and suggest that MCI patients have access to multiplication knowledge, but have enhanced difficulties to inhibit strongly related but task-irrelevant information. This last result adds evidence to the hypothesis of MCI-related disexecutive disjunction.

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M. SCHWARZ, F. HERTEL, U. LUEKEN, E. SCHWEIGER, W. WITTLING, & M. BETTAG. Side-Specific Intraindividual Differences of Deep Brain Stimulation of the Subthalamic Nucleus on Cognitive Performance.

This study evaluated the intraindividually different effects of deep brain stimulation (DBS) of the Subthalamic Nucleus (STN) on cognitive performance of patients with Parkinson's Disease (PD) depending on the stimulated hemisphere. Eight PD patients (4 men, 4 women) who underwent bilateral DBS of the STN were each assessed under right-hemispheric stimulation as well as stimulation of the left STN after successful adjustment of the stimulation parameters. Mean (SD) duration since surgery was 13 (6.4) months, mean time between both sessions was 16 (4) days and the patients' mean (SD) age at participation in the study was 60 (6.3). All patients were assessed under both conditions. Cognitive assessment included tests on verbal vs. non-verbal as well as implicit memory and executive function. No difference between both conditions was found for implicit memory. Verbal and non-verbal memory failed to show significant results but trends towards an increased performance of verbal memory measures under left-hemispheric stimulation as well as increased performance of non-verbal material under right-hemispheric stimulation. Performance in most executive tasks was found to be significantly worsened during stimulation of the left STN. In accordance to our hypotheses, trends show that DBS seems to facilitate performance in specific memory aspects. Significant results in frontal tasks are very likely to be based on a decreased performance due to unilateral stimulation. Due to the low sample size of the present pilot study, the potential for generalization might rather be limited. In conclusion, the results are intended to present the basis for future research.

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M. RIOS-LAGO, R. YUBERO, J. A. PERIANEZ, N. PAUL, & P. GIL. Attentional Control and Speed of Information Processing: Differences in TBI and Normal Ageing.

Attention is frequently affected in TBI and normal ageing. There are two main hypotheses for these deficits: a) Some demonstrate specific deficits for different attentional mechanisms; b) Others suggest that a decline in attentional performance is an expression of a slowing down of cognitive operations. Thus, two are the main objectives: 1. To clarify the importance of slowness in TBI and ageing; 2. To study the different patterns of impairment and better characterize their difficulties. The effects of traumatic brain injury (n=44) and normal ageing (n=16) were assessed using three neuropsychological tests: TMT, Stroop Test and Working Memory tasks. They were compared with a sample of healthy young controls (n=29). First, analyses of variance were performed to study the differences among the three groups. In a second step, covariance analyses were used to control the influence of speed of information processing. Our results suggest that the deficit in both aging and TBI are qualitatively different, showing different patterns of impairment. TBI patients showed a characteristic slowness of information processing, but no specific problems on attentional components. On the other hand, data for the ageing group suggest that the differences cannot be explained by general factors such as generalized slowing. It should be emphasized that behavioural changes in the aged group are not disabling and should not be considered abnormal. Seen in this light, it becomes important to characterize the cognitive changes of normal aging as specifically as possible so that this profile can be clearly contrasted with disease states.

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F. J. MORENO MARTINEZ & K. R. LAWS. Category Deficits in Alzheimer's Disease: An Exaggeration of Item Difficulty or an Influence of Intrinsic Variables?

Despite a well-documented semantic deficit in Alzheimer's disease (AD), some doubt remains as to whether impairment differentially affects different categories of information. Most studies have shown impairment in the living thing (LT) domain, others in the nonliving thing (NLT) domain, and finally others have not found category-specific impairment. This inconsistency could have several explanations: 1) the failure to control confounding intrinsic variables (e.g. familiarity); 2) failure to include a normal control group in many studies; 3) use of restricted sets of items and a small number of categories; and 4) methodological problems associated with analyzing "problematic" data, e.g. control data with non-normal and skewed distributions. We investigated picture naming in 32 patients with AD and 34 age- and education matched healthy controls. We examined picture naming in 7 Living and 7 Nonliving categories from the Nombela semantic battery (a new Spanish evaluation instrument with norms gathered from the Spanish population). Because control subjects find simple picture naming very easy, their performance is abnormally distributed, and therefore we used bootstrap methods to analyse the data. Result from both ANOVAs and ANCOVAs showed: 1) persistence of a living deficit was found in patients after intrinsic variables were controlled; however, critically, 2) covarying control performance alone removed the category effect by itself. Results suggest that the level of item difficulty experienced by controls underpins the difficulty seen in Alzheimer's patients. In other words, the patient category effect is an exaggeration of the normal level and direction of difficulty shown by healthy controls.

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H. SINZ, T. BENKE & M. DELAZER. Decision Making in Mild Alzheimer's Disease.

Though decision making is crucial in every day life, little is known about this ability in mild stages of Alzheimer's disease (DAT). Impairments in decision making have been described in patients with ventromedial prefrontal cortex lesions and in patients with dysfunction of the neurotransmitter systems, in particular the dopaminergic system. Non demented patients with Parkinson disease and Korsakoff syndrome showed specific difficulties. Both patient groups take disadvantageous decisions and do not profit from feedback to the same extent as healthy controls. In the present study we investigate decision making in mild Alzheimer Disease (DAT) as defined by neuropsychological criteria. All patients perform a gambling task with explicit and stable rules (Game of Dice Task; Brand et al.(2005)). Subjects have to evaluate the probability of an event, the associated gain (or loss) and to choose among several alternatives. The number of risky and safe choices, as well as the sensitivity to feedback are analyzed. Furthermore, patients perform tests of verbal and visual memory, object naming, numerical processing and fronto-executive functions. Though as a group mild DAT patients differ from healthy controls in neuropsychological background tests (verbal memory, fronto-executive functions) they do not score lower than controls in decision making. Groups are comparable in the number of safe and risky decisions and in their use of negative feedback for the next decision. Both groups preferred safe and conservative choices. It is hypothesized that early DAT patients tend to apply a conservative response style, as often reported for elderly subjects.

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S. ROGERS & R. FRIEDMAN. The Underlying Mechanisms of Semantic Memory Loss in Alzheimer's Disease and Semantic Dementia.

Patients with Alzheimer's Disease (AD) and patients with Semantic Dementia (SD) both exhibit deficits on explicit tasks of semantic memory such as picture naming and category fluency. These deficits in both patient groups have been attributed to a degradation of the stored semantic network. An alternative explanation attributes the semantic deficit in AD to an impaired ability to consciously retrieve items from the semantic network. The present study used a lexical decision priming task to implicitly examine the integrity of the underlying semantic network in AD and SD patients matched for degree of impairment on explicit semantic memory tasks. The AD (n=11) and SD (n=11) patient groups were matched for age, education, level of dementia and impairment on four explicit semantic memory tasks. Healthy elderly participants (n=22) were matched for age and education. Semantic priming effects were evaluated for three types of semantic relationships (attributes, category coordinates, and category superordinates) and compared to lexical associative priming. AD patients showed normal category superordinate priming, and significant (although somewhat reduced) category coordinate priming, but no attribute priming. SD patients showed no priming effect for any semantic relationship. All groups showed significant lexical associative priming. The results indicated that SD patients do indeed have substantial degradation of semantic memory, while AD patients have a partially intact network, accounting for their successful priming at higher semantic levels. These findings suggest that AD patients' impairment on explicit semantic tasks is the product of deficient explicit retrieval in combination with a partially degraded semantic network.

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S. FERNÁNDEZ GUINEA, M.L. DELGADO LOSADA, J.M. RUIZ SÁNCHEZ DE LEÓN. Anxiety and Depression Symptoms Decrease after a Strategies Training Program to Improve Memory.

Introduction: This study focused in the psychological effects of a memory program applied to elderly people with subjective memory complaints. The specific objectives of this memory program were: a) inform on what it is, how it works and how it is possible to improve the memory; b) learn a wide range of useful strategies to obtain it; and c) modify attitudes and beliefs on the memory of seniors, and consequently improve the quality of life of these people. **Method:** 130 participants (older than 60 years old) composed the control and experimental (people receiving the strategies memory program) groups. They were evaluated before and after receiving the training program, and six months later too. Yesavage's Geriatric Depression Scale (GDS), Goldberg Depression and Anxiety Scales (GDAS), Sunderland's Memory Failures Everyday Life (SMFEL) were applied. **Results:** The statistical analyses showed a significant decrease in the anxiety and depression symptoms in the experimental group at the end of the program ($p < 0.001$ in GDS and GDAS) and six months later ($p < 0.001$ in GDS and GDAS). The results also showed a significant reduction of memory complaints ($p < 0.001$ in SMFEL at the end and six months later). **Conclusions:** The "Training Program in Strategies to Improve Memory" not only improves learning and memory in the elderly but also decreases anxiety and depression symptoms, memory complaints, feeling of loneliness and increases social relations and general satisfaction with life.

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A. BERARDI, S.M. KOSSLYN, A. RIFFLE. Age-Related Differences in Visual Perception and Mental Imagery.

The Imagery Processing Battery (IPB) is a set of 15 tasks designed to evaluate a wide range of visual perceptual and mental imagery abilities predominantly mediated by the dorsal or ventral visual

streams. It includes, among others, tests of imagery for faces, objects, colors, mental rotation, image scanning and maintenance. In order to assess age-related differences in visual perceptual and mental imagery abilities, the IPB was administered to 32 young (age range: 18-25) and 32 elderly participants (age range: 60-75 years). All participants were right-handed and matched for sex. All participants were or had been university undergraduates. ANOVAs indicated that generally, for all dorsal tasks, elderly subjects were slower and made more errors than young subjects, more consistently in imagery. For all ventral tasks, older subjects were slower but made comparable amounts of errors relative to young subjects. These results could not be accounted for by the generalized slowing hypothesis. Response times were correlated for all imagery and for all corresponding perception tasks separately. Error rates were not analyzed further because many subjects had very low error rates. The obtained correlation matrices were analyzed using multidimensional scaling and principal component analyses. Results indicated the presence of two clusters, reflecting the dorsal/ventral nature of the tasks. However, the clusters were not as clearly segregated in the elderly group as they were in the young group. These results suggest, at the behavioural level, that the dorsal and ventral visual pathways are less well segregated in healthy old relative to young subjects.

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N. RIEFFEL, A. BERARDI. Progression of Executive Dysfunction from Minimal to Mild Alzheimer's Disease.

The progression of Alzheimer's disease (AD) is associated with impairments in many aspects of executive function. Previous research has shown that several aspects of executive function are already impaired in mild AD. The aim of this study was to determine the order of occurrence of executive dysfunction in minimal versus mild AD patients. Three groups of participants matched on age, education, sex, depressive symptoms and physical health were studied: 15 patients with minimal AD (MMS 17-21), 15 patients with mild AD (MMS 24-30), and 28 normal controls (all MMS \geq 26). Executive functions were evaluated using tests of planning ability (Porteus Mazes), reasoning (Raven's Matrices), cognitive flexibility (Stroop), short-term memory (WAIS-R digit span), letter and category fluency, as well as a battery of frontal lobe function (Frontal Assessment Battery). The results show that minimal AD patients differed from normal controls on all executive tests (all $p < .05$). Minimal and mild AD patients had comparable performance on all executive tests (all $p > .23$), at the exception of letter and category fluency, where the minimal patients were less affected than the mild (both $p < .02$). The results indicate that there are impairments in planning ability, reasoning, cognitive flexibility and fluency already in minimal AD. These deficits remain stable in mild AD, with additional impairments only in letter and category fluency. Altogether, the results suggest that executive dysfunction is already important in minimal AD and that, among the functions tested, the only ones that are further affected from minimal to mild AD are letter and category fluency.

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L. SAN MIGUEL-MONTES, I. PITA, C. SERRANO, M. MARGARIDA & O. CARDONA. Executive Performance of Hispanics with Idiopathic Parkinson Disease: WCST-Computer Version.

This study aimed to describe the performance on the Wisconsin Card Sorting Test-Computer (WCST) of Hispanics with Idiopathic Parkinson Disease, explore correlations of motor impairment, verbal memory (WMS) with executive functions (WCST) and observe if feedback/cues helped on executive tasks. Fifteen volunteers, male (12) and female (3), mean age 63 (sd=7.41), diagnosed with Idiopathic PD of mild and moderate severity (Hoehn & Yahr), were recruited at the Movement Disorder's Clinics-University of Puerto Rico School of Medicine. Mean education was 13 years (sd=2.26). The Motor Scale, Logical Memory (WMS-LM) and WCST -Computer

were administered by a neurologist and neuropsychologist. Additional feedback was given to PD patients for WCST -Computer. Descriptive statistics found mean scores of 10 (sd=5.0) for WMS-Delayed, a mean raw score on WCST of 60.85 (sd=24.45) for correct responses, 2.14 (sd=1.77) for complete categories, 67.14 (sd=24.45) on total errors, 25.57 (sd=8.36) for perseveration errors, and 27.71 (sd=11.89) on perseverative responses. Correlation analysis suggested a strong relationship among motor impairment and WCST total errors (.77, $P=.05$) and WCST total correct (-.77, $p=.05$). Verbal Memory was strongly related to WCST total correct (-.79 $p=.05$) and WCST total errors (.77, $p=.05$). Additional feedback did not improve performance on WCST. Conclusively, results suggest that Hispanic PD patients at mild to moderate stages experience moderate to severe deficits on memory and executive functions that do not improve with additional feedback and verbal cues. Correlations suggest strong associations between motor impairment, executive functions and memory. Additional follow up studies should include larger samples and healthy controls.

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Y. PAELECKE-HABERMANN, J. WIEMANN & B. LEPLow. Depression and Cognition in Parkinson's Disease.

A substantial number of patients with idiopathic Parkinson's disease (PD) also develop depressive symptoms. Mayberg's (1994) secondary depression (SD) model assumes that the degeneration of mesencephalic and striatal neuron causes neurophysiological changes in basotemporal-limbic regions as well as in fronto-subcortical circuits. As similar alterations were also found within major depression (MD) patients, these neurophysiological changes are causative for SD in PD. However, the clinical impression of depressive symptoms in PD patients differs from primary MD. On the one hand, depressive PD patients do not exhibit typical depression-related thinking styles (e.g. attributional styles, self-efficacy, Leplow, 2006). On the other hand, feelings of anxiety, uncertainty and helplessness are more prevalent in depressive PD patients (Lemke, 2002). Aim of our present study was to examine whether PD patients with secondary MD show specific cognitive dysfunctions compared to patients with PD or primary MD only. As interruptions of fronto-subcortical circuits are also associated with executive dysfunctions, we compared the performance of MD and SD patients in selective attention and several domains of executive functions. Test selection was based on Smith and Jonides' (1999) theory of storage and executive processes, which comprises five executive components, attention and inhibition, coding, monitoring, planning, task management. The results are discussed regarding Mayberg's SD model.

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E. GREENFIELD, J.J. EVANS, H. EMSLIE, T. MANLY & B.A. WILSON. Cognitive -Motor Dual Tasking in Alzheimer's Disease.

Previous studies have suggested that walking may be disproportionately affected by concurrent cognitive demands (e.g. conversing) in patients with Alzheimer's disease. Cognitive-motor dual task difficulties may increase the risk of falls or could contribute to poor attention to important environmental stimuli (e.g. traffic) when motor demands are increased (e.g. negotiating pavements). We present results of a study of the performance of a group of patients with Alzheimer's disease on a battery of cognitive-motor dual tasking tests. Twenty patients with a diagnosis of Alzheimer's disease were compared with 20 matched healthy controls. Groups were compared on a single motor condition (walking), dual motor condition (walking when clicking a counter), two dual cognitive-motor conditions (walking and sentence verification; walking and tone counting) and a dual cognitive condition (sentence verification and tone counting). AD patients were poorer in the single task conditions, but also showed a disproportionate decrement (difference between dual task and single

task) on walking when combined with another motor task (clicking), walking when combined with one of the cognitive tasks (tone counting), but not when combined with the other cognitive task (sentence verification). In the dual cognitive condition, performance on the sentence verification task showed a disproportionate decrement. Consistent with previous findings, it appears that there is a tendency for the cognitive/ more demanding task to be preserved at the expense of the motor/ easier task. Our findings support the argument that this is an important area of clinical assessment with potentially significant functional implications.

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J. VAN PAASSCHEN, L. CLARE, D.E.J. LINDEN, R.T. WOODS, & M.D. RUGG. A paradigm to Explore Memory-Related Networks in Alzheimer's Disease through fMRI.

Compensatory neural networks involved in memory processes in Alzheimer's disease (AD) are a topic of increasing interest in functional magnetic resonance imaging (fMRI). However, due to the nature of the impairments in AD, it has been difficult to come up with a paradigm that allows for this type of research in people with AD. Therefore, we introduce a novel paradigm consisting of a face-name association task in a blocked design. The task has been tested behaviourally in older adults with memory impairments and has been successfully piloted in people with AD during fMRI scanning. Two face-name pairs are repeatedly presented three times for six seconds, followed by a retrieval task in which participants are asked to identify whether a particular name and face belong together. In a subsequent control task, participants are asked to decide whether the gender (male/female) written below a given face is a correct match or not. In total, 12 face-name pairs are shown over six runs, each consisting of three blocks (encoding, retrieval, gender decision). The short run time (3.8 minutes) ensures that fatigue is kept to a minimum, and allows for the all-important frequent contact between the researcher and the participant. Preliminary imaging results demonstrate a reliable, task-related signal in extrastriate cortex, fusiform gyrus, precuneus, right medial frontal gyrus and left medial temporal lobe. It has previously been suggested that some of these areas constitute a compensatory network that assists in memory processing.

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C. NACK-CHEON, K. SEONGHEE, A. SUN YOUNG. 18F-FDG PET Findings in Corticobasal Degeneration: An SPM Analysis.

Background: Corticobasal degeneration (CBD) is a rare parkinsonism plus dementia syndrome but show characteristic clinical features represented as asymmetric parkinsonism, apraxia, myoclonus, supranuclear gaze palsy, and dementia. Methods: We compared the regional metabolic patterns on (18)F-FDG PET images obtained from 10 patients with CBD and 11 healthy subjects using a voxel-wise analysis (statistical parametric mapping [SPM]). Results: Significant hypometabolism was identified in superior frontal gyrus including the supplementary motor area, superior parietal lobule including precuneus, thalamus, inferior frontal with insula, pons, and cerebellar hemisphere. These areas with hypometabolism were identified to various clinical features of CBD. The clinical lateralization of each patient was well identified to radiological lateralization. Conclusion: Our results suggest that CBD is a degenerative dementia that primarily affects premotor cortex with supplementary motor area and superior parietal lobule with precuneus. The hemispheric asymmetry of hypo metabolism was common in patient with CBD, which is well correlated with clinical feature. These clinical and FDG-PET findings help differentiate CBD from other cause of dementia.

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E. KOZORA, D. ARCINIEGAS, L. ZHANG J. DETLING & S. WEST. Cognitive Functions in Depressed Systemic Lupus Erythematosus Patients.

Objective: We aimed to compare cognitive functioning in patients diagnosed with systemic lupus erythematosus and depression (Depressed-SLE) to patients with depression only (Depressed) and healthy controls using the American College of Rheumatology battery of neuropsychological tests for SLE (ACR-SLE). **Methods:** 13 Depressed-SLE, 10 Depressed psychiatric outpatients and 22 healthy controls similar in age and education completed the ACR-SLE neuropsychological battery. A cognitive impairment index (CII) derived from the ACR-SLE ranged from 0-12 (Kozora et al., 2004). **Results:** The Depressed-SLE group was significantly higher ($p=0.025$) on CII compared to healthy controls ($M=1.6$, $SD=1.6$) and showed a trend ($p=0.053$) toward a higher CII ($M=3.4$, $SD=2.5$) compared to the Depressed control group ($M=1.5$, $SD=1.5$). The Depressed-SLE group was significantly impaired compared to the healthy controls on Stroop Color Word ($p=0.006$), Digit Symbol ($p=0.002$) and Trail Making Test -B ($p=0.008$). A trend showing greater decline on Digit Symbol in Depressed-SLE compared to Depressed subjects ($p=0.058$) was also noted. **Conclusions:** Depressed-SLE patients had greater cognitive dysfunction compared to healthy controls in terms of an overall cognitive impairment index score and specific tests of complex attention and visuomotor speed. Depressed-SLE patients also tended to perform worse than Depressed outpatients in overall cognitive abilities and visuomotor speed. Results suggest that cognitive dysfunction in Depressed-SLE patients is more severe than in patients with only psychiatric depression, and may represent global changes in the central nervous system. **Correspondence:** Elisabeth Kozora, Dr., National Jewish Medical and Research Center, Psychosocial Medicine, 1400 Jackson Street, 80206 CO, US. E-mail: kozorae@njc.org

T. BAUMGARTNER, K. LUTZ, C.F. SCHMITDT, L. JAENCKE. The Emotional Power of Music: How Music Enhances the Feeling of Affective Pictures.

Music is an intriguing stimulus widely used in movies to increase the emotional experience. However, no brain imaging study has to date examined this enhancement effect using emotional pictures (the modality mostly used in emotion research) and musical excerpts. Therefore, we designed this functional magnetic resonance imaging study to explore how musical stimuli enhance the feeling of affective pictures. In a classical block design carefully controlling for habituation and order effects, we presented fearful and sad pictures (mostly taken from the IAPS) either alone or combined with congruent emotional musical excerpts (classical pieces). Subjective ratings clearly indicated that the emotional experience was markedly increased in the combined relative to the picture condition. Furthermore, using a second-level analysis and a regions of interest approach, we observed a clear functional and structural dissociation between the combined and the picture condition. Besides increased activation in brain areas known to be involved in auditory as well as in neutral and emotional visual-auditory integration processes, the combined condition showed increased activation in many structures known to be involved in emotion processing (including for example amygdala, hippocampus, parahippocampus, insula, striatum, medial ventral frontal cortex, cerebellum, fusiform gyrus). In contrast, the picture condition only showed an activation increase in the cognitive part of the prefrontal cortex, mainly in the right dorsolateral prefrontal cortex. Based on these findings, we suggest that emotional pictures evoke a more cognitive mode of emotion perception, whereas congruent presentations of emotional visual and musical stimuli rather automatically evoke strong emotional feelings and experiences.

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T. BAUMGARTNER, L. VALKO, M. ESSLEN, L. JAENCKE. The Neural Correlate of Spatial Presence in an Arousing and

Non-Interactive Virtual Reality: An EEG and Psychophysiology Study.

Using EEG, psychophysiology and psychometric measures, this is the first study which investigated the neurophysiological underpinnings of Spatial Presence (SP). SP is considered a sense of being physically situated within a spatial environment portrayed by a medium (e.g. television, virtual reality). 12 healthy children and 11 healthy adolescents were watching different virtual roller coaster scenarios. During a control session, the roller coaster cab drove through a horizontal roundabout track. The following realistic roller coaster rides consisted of spectacular ups, downs and loops. Low resolution brain electromagnetic tomography (LORETA) and event-related desynchronisation (ERD) were used to analyse the EEG data. As expected, we found that compared to the control condition experiencing a virtual roller coaster ride evoked in both groups strong SP experiences, increased electrodermal reactions and activations in parietal brain areas known to be involved in spatial navigation. In addition, brain areas were strongly activated which receive homeostatic afferents from somatic and visceral sensations of the body. Most interesting, children compared to adolescents reported higher SP experiences and demonstrated a different frontal activation pattern. While adolescents showed increased activation in prefrontal areas known to be involved in the control of executive functions, children demonstrated a decreased activity in these brain regions. Interestingly, recent neuroanatomical and neurophysiological studies have shown that the frontal brain continues to develop to adult status well into adolescents. Thus, the result of our study implies that the increased SP experience in children may result from the not fully developed control functions of the frontal cortex.

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T. BAUMGARTNER, F. BECCHIO, M. LIPPUNER, L. JAENCKE. Multisensory Processing of Congruently and Incongruently Presented Emotional Facial and Music Stimuli - An EEG and Psychophysiology Study.

Using EEG, psychophysiology (skin conductance responses) and psychometric measures, this is the first study which investigated the neurophysiological underpinnings of congruently and incongruently presented emotional music (classical excerpts) and facial picture stimuli (taken from the Pictures of Facial Affect by Ekman and Friesen). 37 healthy adults experienced two congruent emotional conditions [happy pictures combined with happy music (HH), sad pictures combined with sad music (SS)] and two incongruent emotional conditions [happy pictures combined with sad music (HS), sad pictures combined with happy music (SH)]. All congruently and incongruently presented emotional conditions showed a similar strong increase in skin conductance responses compared to a neutral control condition consisting of neutral facial pictures simultaneously presented with a non-aversive white noise sound, indicating a similar arousal level in all emotional conditions. In contrast, the comparison of the different emotional conditions showed distinct brain activation patterns, revealed by low resolution brain electromagnetic tomography (LORETA) in different time segments within the first 1000 ms after stimulus onset. As hypothesized, comparison of the visual evoked potentials (VEP) of both congruently presented emotional conditions compared to the incongruent condition SH revealed stronger activations in the incongruent condition in brain areas known to be involved in multisensory integration (BA 39, 40), error detection and error monitoring (dorsal part of ACC) as well as cognitive control and evaluation processes (DLPFC, DMPFC). In contrast, the other incongruent condition (HS) demonstrated, compared to the congruent conditions, no activation increase in the aforementioned brain areas – fitting nicely into the observation that the subjects experienced this condition as significantly less incongruent – most of the subjects rather automatically imagined in this condition a funeral scene with happy facial pictures of the late deceased combined with sad musical excerpts of the orchestra.

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D. SPECK, T. BAUMGARTNER, L. JAENCKE. Spatial Presence and Emotional Anticipation in a Mediated Environment.

Using fMRI and psychometric measures, this study investigated the neurophysiological underpinnings of spatial presence (SP) and emotional anticipation (EA) in a mediated environment. SP is considered as a sense of being physically situated within a spatial surrounding portrayed by a medium while EA is a complex combination of a future-oriented cognitive state, affect, and autonomic arousal. Twelve healthy adults watched different virtual rollercoaster scenarios consisting of three phases: ascent, dynamic, finish. The realistic rollercoaster rides combined spectacular ups, downs and loops whereas control conditions consisted of horizontal straight or sinuous-lined tracks. Group analysis and region-of-interest correlations were used to analyze the fMRI data. Activations in the prefrontal and insular cortex showed a negative correlation to subjective SP experience. While prefrontal brain regions are known to be involved in executive control functions, the insular cortex integrates different sensory information. During the ascent-phase, subjects reported high arousal and showed increased activation in the limbic system (amygdala, hippocampus, medial and posterior cingulate). Furthermore activation of the left amygdala showed a positive correlation with subjective arousal. We hypothesize that increased activation in prefrontal brain regions prevents SP experience due to their executive control functions. High visual, compared to low somato-sensory input, leads to sensory discrepancy in the insular cortex. As a result, subjects who could suppress activation in the insula report a higher SP experience in consequence of improved elimination of the conflicting information. While EA activates similar neural structures as in normal emotion perception, the amygdala seems to respond to emotional intensity.

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T. ZAEHLE, K. JORDAN, T. WUESTENBERG, N. VON STEINBUECHEL, F.W. MAST. The Neural Basis of the Egocentric and Allocentric Spatial Frame of Reference.

The present study examines the functional and anatomical underpinnings of egocentric and allocentric coding of spatial coordinates. For this purpose, we set up a functional magnet resonance imaging experiment using verbal descriptions of spatial relations either with respect to the listener (egocentric) or without any body-centered relations (allocentric) to induce the two different spatial coding strategies. We aimed to identify and distinguish the neuroanatomical correlates of egocentric and allocentric spatial coding without any possible influences by visual stimulation. Results from sixteen participants show a general involvement of a bilateral fronto-parietal network associated with spatial information processing. Furthermore, the egocentric and allocentric conditions gave rise to activations in primary visual areas in both hemispheres. Moreover, data show separate neural circuits mediating different spatial coding strategies. While egocentric spatial coding mainly recruits the precuneus, allocentric coding of space activates a network comprising the right superior and inferior parietal lobe and the ventral occipito-temporal cortex bilaterally. The results also show bilateral hippocampal activations during allocentric, but not during egocentric spatial processing. Our results demonstrate that the processing of egocentric spatial relations is mediated by medial superior-posterior areas, whereas allocentric spatial coding requires an additional involvement of right parietal cortex, the ventral visual stream and the hippocampal formation. These data suggest that a hierarchically organized processing system exists in which the egocentric spatial coding requires only a subsystem of the processing resources of the allocentric condition.

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T. ZAEHLE, M. MEYER, L. JAENCKE. Spectro-Temporal Processing During Speech Perception.

Neurobiological models of speech perception have been incorporating the role of temporal information processing during speech perception (Hickok, G. & Poeppel, 2004). Recent brain imaging studies have demonstrated that the left PT principally governs the analysis of rapidly changing acoustic cues available in both speech and nonspeech stimuli (Jancke, L. et al., 2002, Zaehle, T. et al., 2004). These findings qualify the view that early analyses of the physical attributes of speech signals occur in the bilateral posterior superior temporal gyrus, with the left posterior auditory cortex being specifically adept at analysing the temporal arrangement of spectro-temporal features. The present fMRI-experiment was set out to further elucidate the neural underpinnings of basic linguistic processing. We presented participants with sine-wave analogues that could be perceived either as nonspeech auditory forms (naive condition) or, after instruction and short practice, as speech (informed condition). Behavioural results revealed a difference in the processing mode; spectral-temporal integration occurred during speech perception, but not when stimuli were perceived as non-speech. In terms of neuroimaging we observed an activation increase in HG, PT, and STS of the left hemisphere reflecting the switch from nonspeech perception (naive condition) to speech perception (informed condition). For the informed condition, HG and STS explored a significantly stronger involvement of the left hemisphere when directly compared to the contralateral area. This finding demonstrates that the left posterior superior temporal cortex is specifically proficient at decoding briefly changing temporal cues that may explain the left hemisphere preference for speech.

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K. SHARPLES, P. YATES, & A. MITCHELL. Traumatic Brain Injury, Psycho-Social Adjustment and the Construction of Identity: A Discursive Approach.

Objectives: The construction of social identity following brain injury has received scant attention in the literature, particularly utilizing qualitative methodologies. This paper explores interpretative repertoires available to individuals with a traumatic brain injury (TBI) and their significant others, the function and consequences of such repertoires for identity formation following injury, and the implications for community rehabilitation services. Methods: Discourse analysis was utilized to interview in depth six adults who had sustained traumatic brain injury (age range 22-60; years since injury 4-20). A semi-structured interview schedule was used to elicit conversation around lived experience over time, from before the injury to future aspirations. Each participant was interviewed with one or two significant others of their choice (age range 40-69). Results: Analyses suggested four main interpretative repertoires which informed participants' co-construction of identity: 1) The medicalisation of TBI; 2) dependence as intrinsic to TBI; 3) TBI as deficit; 4) progression and productivity as key life defining features; 5) The construction of 'abandonment' was also common, due to participants' dependence on the provision of specialist, expert services in the community. Conclusions: The 'medicalisation of TBI' is discussed in relation to the common, passive positioning of individuals with TBI, which often occurred in relation to memory loss. Clinical implications are discussed in terms of facilitating individuals in the co-constructing and re-authorship of more empowering and inclusive narratives, and providing community rehabilitation services which promote meaningful social identities, separate from medical discourse.

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S. KOENEKE, K. LUTZ, M. ESSLER & L. JAENCKE. Use-Dependent Changes in Premotor Cortex Activation: When Adults Start Taking Piano Lessons.

The present study aims to explore changes in neuronal activity that occur when subjects start taking piano lessons at a higher age (age range: 50-65 years). An additional objective of the study consisted in

the further validation of LORETA (Low Resolution Brain Electromagnetic Tomography) within the motor domain. We investigated 21 subjects: 10 of them started taking piano lessons coupled to daily musical training, while the others served as control. Subjects played scales during the experiments. Behavioural data were recorded via digital MIDI piano, while neural function was assessed as task-related spectral EEG power within the alpha frequency band before and after the first two month of piano training. LORETA was used to localize intracortical neuronal sources. Analyzing behavioural data reveals speed gains and increased regularity in performing scales in the training group. Corresponding EEG data show clear changes in task-related alpha band power when comparing pre- to posttraining measurements. Power increases were observed in medial motor regions, while power decreases were present in lateral premotor

cortex. Our results agree with concepts of a strong lifelong capacity of the brain for functional reorganization. Although the musical training did not specifically aim at the increase of speed, subjects played the scales faster after training suggesting a reduction of effort associated with the motor performance. The different effect patterns of lateral and medial premotor cortices might be due to reduced effort performing complex, self-paced movements and because of a stronger integration of the acoustic feedback into the motor plan after training. Correspondence: *Susan Koeneke, Dr., University of Zurich, Psychological Institute, Neuropsychology, Treichlerstr.10, 8032 Zurich, CH. E-mail: S.Koeneke@psychologie.unizh.ch*

FRIDAY AFTERNOON, JULY 28, 2006

SYMPOSIUM 9/1:00 – 2:30 p.m.

Neural and Behavioral Plasticity in Spina Bifida Meningomyelocele

Host: Jack M. Fletcher

M. DENNIS. Age Based Functional Plasticity After Congenital Lesions of the Midbrain and Cerebellum.

Introduction: Age-based functional plasticity, the purported advantage conferred by a younger rather than an older age at brain insult, has typically invoked evidence from cortical malformations and/or lesions. Less information is available about core adult functions of the midbrain and cerebellum in children with insults to these brain regions. This presentation reviews evidence for a core midbrain function, attention orienting, and a core cerebellar function, short duration timing (around 400ms), in children with spina bifida who have congenital malformations to these regions. Method and Results: School-aged children with SBM have a deficit in orienting to salient or unexpected events and, to the extent that they have midbrain malformations, in orienting efficiently so as to explore the environment. The cerebellum is important for short-duration timing, deficits in which are apparent in: adults with acquired cerebellar lesions; adult survivors of childhood cerebellar lesions; children with genetic cerebellar disease, such as ataxia-telangiectasia; children with cerebellar pathologies, and children with embryogenetic cerebellar defects, such as spina bifida meningomyelocele, who have deficits in short-duration timing on both perceptual and motor timing tasks. Further, children with spina bifida meningomyelocele have reduced cerebellar volumes on quantitative MRI studies, with timing deficits being related to reduced cerebellar volume. Discussion: Core functions of the midbrain and cerebellum do not appear to show age-based functional plasticity, even under conditions involving congenital malformations. Concepts of functional plasticity in the immature brain should incorporate information about the outcomes, not only of cortical lesions, but also of midbrain and subtentorial malformations.

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J.M. FLETCHER, K.M. HASAN, M.E. BRANDT. Quantitative Neuroimaging Studies of Children with Spina Bifida.

Introduction: Spina bifida meningomyelocele (SBM) is a congenital neural insult complicated by hydrocephalus. Consequently, the neural architecture of the brain in SBM is significantly re-arranged. Quantitative MRI studies have begun to explore this reorganization. Methods and Results: In study 1, MRIs from 87 children with SBM and 29 controls 7-16 were subjected to a quantitative segmentation procedure. Results revealed a significant group X region X tissue interaction. Children with SBM showed reductions in gray and white matter in midbrain and posterior brain regions, with an increase in CSF. There were no differences in anterior regions. Children with upper level spinal lesions had smaller cerebellar volumes than children with upper lesions. Regional brain volumes correlated significantly with fine motor and visual-spatial skills. In study 2, DTI was conducted in 25 patients with SBM and 21 controls. Results showed a significant increase in anisotropy in the caudate nucleus, minor forceps, and posterior limb of the internal capsule. These differences may reflect increased density and connectivity involving the genu into the frontal regions. Such findings may explain the preservation of motor (as opposed to motor control) in SBM. Discussion: SBM results in significant reorganization of the brain, providing a clear example of neural plasticity. The neural reorganization helps explain the behavioral plasticity associated with spina bifida and the characteristic strengths and weaknesses of the neuropsychological profile of SBM.

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H.J. HANNAY. Plasticity of Cerebral Commissures and the Development of Other Pathways in Response to Partial Agenesis of the Corpus Callosum.

Introduction: Most children with spina bifida meningomyelocele (SBM) have partial dysgenesis of the corpus callosum (CC), especially involving the rostrum and splenium as well as hypoplasia of some or all regions. This presentation reviews evidence for hypoplasia of the CC, enlargement of the AC as well as the role of other cerebral commissures and pathways as compensatory mechanisms in interhemispheric transfer. Method and Results: Ninety children with SBM and thirty normal control children were assessed with a CVC dichotic listening task, a related monotic listening task and other tasks. Status of the splenium (normal, hypoplastic, missing), level of lesion, and handedness were related to dichotic listening findings; the status of the AC was not since so few children with SBM had an enlarged AC. Discussion: Hypoplasia may be

sufficient for interhemispheric transfer of some types of information. Enlargement of the AC is unlikely to be a compensatory mechanism for a missing splenium. Enlargement of the hippocampal commissure, and the development of partial Probst's bundles as a compensatory mechanism for some children with SBM needs to be explored further. Correspondence: *Fletcher, Jack M., Ph.D. Pediatrics. THE UNIVERSITY OF TEXAS MEDICAL SCHOOL AT HOUSTON, Tx, US. E-mail: Jack.Fletcher@uth.tmc.edu.*

S. SARKARI, E. CASTILLO, M. MCMANIS, A.C. PAPANICOLAOU. Transcallosal Connectivity during Touch Perception in Children with Spina Bifida.

Introduction: Partial dysgenesis of the corpus callosum (CC) is common in spina bifida meningomyelocele (SBM), but little is known about effects on the cortical representation of functions involving transcallosal connectivity. During touch perception and after the initial activation of contralateral somatosensory areas (SI and SII), neural activity spreads through the CC, reaching ipsilateral secondary areas in the parietal operculum. We describe cortical representation of touch in SBM, and test the integrity of cortical responses mediated through the CC. **Method and Results:** Four healthy children and three children with SBM underwent evaluations which included MEG recordings of somatosensory evoked fields (SSEFs), high resolution MRI and diffusion tensor imaging (DTI). The cortical generators of ipsi- and contralateral SSEFs were calculated and spatiotemporal features compared in the two groups and related to radiological and behavioral findings. The results indicated that tactile perception produced ipsilateral activation in SII in controls at the expected latency reflecting transcallosal connectivity (8 to 18 msec). Absence of ipsilateral activation was found in 2 children with SBM and severe dysgenesis of the body and splenium of the CC. A third SBM case, showing similar neuroradiological results, showed ipsilateral activation but with weaker responses than in the control group. **Discussion:** Our data support the idea that there exists a lack of transcallosal connectivity in children with SBM. Potential compensatory mechanisms will be addressed in future research.

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SYMPOSIUM 10/1:00 – 2:30 p.m.

Interdisciplinary Team Work and Socially Meaningful Neuropsychological Rehabilitation

Host: Fergus Gracey & Andrew Bateman

F. GRACEY, K. HENWOOD, J. EVANS, D. MALLEY, K. PSAILA, A. BATEMAN, B.A. WILSON. "There was a Big Meeting ... and then Everybody Seemed to Pull Together": Clinical Difficulty, Team Functioning and the Role of Interdisciplinary Formulation.

Objectives: To report the findings of a qualitative research approach to the study of psychiatric rehabilitation team functioning when faced with clinical 'difficulty'. To describe the relevance of these findings to practice development in a holistic neuropsychological rehabilitation service. **Methods:** A social constructionist grounded theory analysis of a psychiatric rehabilitation team's discussions about 'difficult patients' was carried out to develop a theoretical account of team functioning. A case report of service application of this model to facilitate effective teamwork and collaboration with service users in neuropsychological rehabilitation is described. **Results:** The analysis identified 5 core categories regarding the sharing and shifting of responsibility, client characteristics, and service resources. When discussing 'difficult patients' team members provided accounts of staff, team and organisational difficulty. The grounded theory account highlighted how the team engaged in systemic shifting of

responsibility that served to maintain poor team functioning and compromise client rehabilitation. In contrast, when discussing clients described as 'not so difficult' the team described a 'fit' or 'match' between client and service, and within the team. The use of interdisciplinary formulation within a neuropsychological rehabilitation service appears to facilitate collaboration between different disciplines and with the service users. **Conclusion:** This study models team functioning in response to client 'difficulty'. It is concluded that development of shared understanding is a feature of good teamwork. A formulation-based approach to facilitating shared understanding in neuropsychological rehabilitation is advocated, along with the need for further organisational research within neuropsychological rehabilitation.

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T. OWNSWORTH, J. FLEMING, D. SHUM, P. KUIPERS, J. STRONG. A Randomised Controlled Trial of Metacognitive Contextual Interventions for Facilitating Goal Attainment Following Acquired Brain Injury.

Objective: To evaluate three interventions for improving goal attainment, emotional well-being and psychosocial adjustment following acquired brain injury (ABI). **Methods:** 32 participants with ABI (mean time since injury = 3.5 years) were randomly allocated into six groups involving an intervention or waiting list control condition for one of three intervention formats, namely, (A) group-based support (n=11), (B) individual occupation-based support (n=10), and (AB) a combined group and individual support intervention (n=11). Each 8-week intervention entailed 3 hours of weekly therapy conducted by a neuropsychologist (A), an occupational therapist (B) or both therapists (AB). Participants were assessed pre-intervention, post-intervention and at 3-month follow-up on the following measures: Patient Competency Rating Scale, Head Injury Behaviour Rating Scale, Hospital Anxiety and Depression Scale, Brain Injury Community Rehabilitation Outcome 39 Scales, and Canadian Occupational Performance Measure. **Results:** Preliminary data analysis for 17 intervention participants and 10 waiting list control participants identified that the intervention groups demonstrated significant improvement on self-reported depression, relatives' ratings of behavioural competency, psychological well-being, and self- and relative ratings of performance and satisfaction on self-identified goals, whilst waiting list controls displayed no significant change. Data for the completed RCT will be presented along with a comparison of the relative efficacy of different intervention formats. **Conclusions:** These preliminary findings highlight the efficacy of different metacognitive contextual interventions. Further research is needed to examine differential outcomes, thus potentially enabling clinicians to identify clients' suitability to particular intervention formats.

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M. SCHÖNBERGER, F. HUMLE, T.W. TEASDALE. The Development of the Therapeutic Working Alliance, Patients' Awareness and their Compliance During the Process of Brain Injury Rehabilitation.

Purpose: To examine the development and interaction of the therapeutic alliance, patients' compliance and awareness during the process of brain injury rehabilitation and the role of demographic and injury related variables in this process. Subjects were 86 patients who underwent a holistic neuropsychological outpatient rehabilitation programme. Patients had suffered a traumatic brain injury (n=27), a cerebrovascular accident (n=49) or another neurological insult (n=10). **Measures:** The therapeutic alliance between clients and their primary therapists, clients' awareness and their compliance were rated 4 times during the 14-week rehabilitation programme. The therapeutic alliance was rated by both clients and therapist using the Working Alliance Inventory (WAI), awareness and compliance were rated by

the therapists. Injury severity was measured as length of hospitalization; injury localization was dichotomized as frontal or right-hemisphere vs. other localization. Results: Clients' and therapists' perspectives on their alliance tended to converge over time. Clients' experience of their emotional bond with their therapist added as much to the prediction of clients' awareness as the localization of their brain injury. Clients' awareness was related to their compliance and mediated the impact of the therapeutic alliance on their compliance. Conclusions: A good therapeutic alliance is the basis of successful rehabilitative work. A phenomenological and interdisciplinary approach to rehabilitation is recommended.

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P. YATES, R. WADE, S. GLANFIELD. Implementing an Integrated Rehabilitation Pathway in a Sub-Acute Neuro-Rehabilitation Service: Team Process and Initial Outcomes.

Objectives: Recent UK governmental initiatives in health service reform have promoted the need to integrate the experience and perspective of the patient in clinical processes and outcomes. This paper describes the development of an integrated rehabilitation pathway to guide patients and clinicians through a process of a sub-acute neurological rehabilitation from pre-admission to post-discharge. Methods: A number of key developments have been implemented in team process including interdisciplinary documentation, structured goal planning, regular case review meetings, the development of a patient life-goals questionnaire, use of a standardised outcome measure (FIM+FAM UK), semi-structured patient and family satisfaction interviews, and team clinical audit. This process is illustrated via a case study and a patient's perspective on the pathway. Initial results from the service satisfaction audit will also be presented. Results: A positive trends towards recovery of function were found on the FIM+FAM UK measure. High levels of satisfaction with the rehabilitation process were reported from patients and families via the audit process inherent within the pathway. Conclusion: The integrated rehabilitation pathway provides the patient, team and family with a framework for documentation, goal-setting, and evaluating progress and outcomes in sub-acute neuro-rehabilitation.

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PAPER SESSION 11/1:00 – 2:30 p.m.

Brain Imaging II

Chair: Stephanie Clarke

M. THIMM, G.R. FINK, & W. STURM. Neural Recovery from Acute and Chronic Spatial Neglect.

We investigated neural recovery from spatial neglect in patients with right hemisphere lesions by means of fMRI using a spatial attention task for activation. Spontaneous recovery was investigated in 4 patients comparing the results at an acute (17 ± 6 days) and chronic (121 ± 21 days) stage post stroke. Substantial improvements in neglect were associated with increased neural activity right-sided in the middle frontal gyrus, inferior parietal cortex and inferior temporal gyrus, and left-sided in the superior temporal gyrus, temporoparietal junction and anterior cingulate gyrus. Thus the pattern of acute reorganisation comprised areas of the affected right hemisphere fronto-parietal attentional network and of corresponding analogous left sided areas. Recovery from chronic neglect was investigated in 14 patients after performing a three week daily computerised neglect training. Half of the group was treated by alertness training (AIXTENT) the other half by optokinetic stimulation training (OKS). Although less pronounced than in the acute patients, both types of training effectuated comparable behavioural improvements in neglect.

Common areas of increased activity after both trainings were found in the precuneus (bilaterally), right middle frontal gyrus and left temporooccipital cortex. However, after AIXTENT training there was significantly more activation in several bilateral frontal areas. Vice versa after OKS training there was bilaterally more activation in the precuneus and cuneus. The differential activation of frontal or parietooccipital areas may reflect the differential impact of the trainings on the anterior system of attention intensity (AIXTENT) or posterior system of spatial attention (OKS).

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R.E. FRYE, J.M. FISHER, A. COTY, J. LIEDERMAN & E. HALGREN. Consonant-Vowel Syllables Induce Multiple Resonant Cortical Interactions.

Voice-onset time (VOT) provides an important auditory cue for recognizing spoken consonant-vowel (CV) syllables. In our earlier behavioral work (Liederman, Frye et al., *Psychon Bull Rev.* 12:380, 2005), we found a temporally modulated dynamic context effect that influences discrimination of CV syllables that differ in VOT. We hypothesized that this effect was a result of adaptive resonance theory (ART) network dynamics within the neural circuitry responsible for identifying phonemes. In order to better characterize the dynamics of the biological neural networks responsible for processing these CV syllables, eight English speaking young adults performed a version of the aforementioned discrimination task during whole-head magnetoencephalography. Dynamic statistical parametric maps demonstrated cortical activation as early as 50ms after stimulus onset near Heschl's gyrus (HG) with activation then spreading to the planum temporale (PT). Reactivation of HG occurred after PT activation, and, in some participants, volleys between these two regions persisted. Activation then usually spread anterior to HG, along the supratemporal plane, into the insular cortex, with final termination in the inferior frontal cortex. Progression of this activity was characterized by recurrent volleys of activation between adjacent anterior and posterior areas. Autoregressive modeling demonstrated gamma coherence between the HG and PT. These data support the notion that resonant neural networks are important for processing language stimuli even early in the decoding process and that these neural networks may communicate within the gamma frequency range. These data are consistent with ART network dynamics within the cortical areas responsible for language decoding

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H.G. TAYLOR, P.A. FILIPEK, J. JURANEK, B. BANGERT & M. HACK. Reduced Brain Volumes in Adolescents with Very Low Birth Weight: Preliminary Findings.

Objective: To investigate the effects of very low birth weight (<1500 g, VLBW) on brain structure in adolescent survivors and to examine associations of brain volumes with neonatal factors and outcomes. Participants and Methods: The sample consisted of 37 adolescents with birth weight <750 g, 35 with birth weight 750-1499 g, and 36 term-born controls (mean age 16.8 years). Participants were followed since early childhood as part of a longitudinal study, at which time the groups were matched on age, sex, and demographic status. At the time of the long-term follow-up, a battery of tests assessing cognitive skills, academic achievement, and behavioral adjustment was administered to participants. The majority of participants also received magnetic resonance imaging (MRI). Brain tissue segmentation was performed using MRI morphometric analysis of T1-weighted images. Results: ANCOVAs that controlled for sex, age, and total cerebral volume revealed smaller total brain volumes and larger lateral ventricles in one of both VLBW groups compared with term controls. Selective reductions were observed in the retro-callosal white and gray matter, corpus callosum, and subcortical structures. Reduced volumes were associated with lower birth weight, shorter gestational age, and neonatal complications. These reductions, in turn, predicted poorer cognitive, achievement, and behavioral outcomes.

Conclusions: VLBW is associated with long-term alternations in brain structure that are consistent with early periventricular brain insult. These brain abnormalities help to account for neurobehavioral and achievement outcomes in adolescents with VLBW and imply limits to neural plasticity.

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J.K. FOSTER, M.J. HOUSE, T.G. ST PIERRE, R.N. MARTINS, R. CLARNETTE, J. RICCI. Longitudinal Quantitative MRI R2 Relaxometry in Elderly Participants Reporting Memory Loss: A Useful Tool for the Monitoring of Dementia Onset?

Magnetic resonance imaging (MRI) can be applied as a useful, non-invasive tool for characterizing, *in vivo*, the neurological changes associated with age-related memory loss and dementia. The transverse proton relaxation rate, R2, is an MRI parameter affected by changes in both brain iron concentration and water content. The objective of this pilot study was to assess longitudinal changes in R2 measured in elderly participants with mild-severe levels of cognitive impairment, and to determine the degree to which any changes in R2 signal over time were associated with changes in cognitive functioning. Six elderly participants reporting memory problems underwent two 1.5T MRI scans 12 to 24 months apart, with neuropsychological testing taking place in close temporal proximity to the scans outside the magnet. R2 data were collected from 14 brain regions in all participants. Correlations between annualized percentage changes in R2 values and annualized changes in cognitive scores were assessed. There were significant negative correlations between cognitive changes and R2 changes in the right temporal cortex and left hippocampus. In contrast, there were significant positive correlations between cognitive changes and R2 changes in the left temporal and parahippocampal cortex and in the right internal capsule, thalamus and putamen. These findings suggest that *in vivo* quantitative changes in R2 may be capable of characterizing neurological processes associated with age-related cognitive decline. Specifically, this technique may offer a useful tool for the monitoring of neurocognitive changes associated with the onset of dementia.

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M. CROSSLEY, S. LANTING, J. POOCK, & M. REMMEN. Thirty Years Post Right- vs Left-Sided Hemispherectomy: Evidence for Brain Plasticity and Human Resilience.

We report on two individuals who completed neuropsychological assessments 33 years following left-sided (JH; age 49 yrs) and right-sided (SM; 47 yrs) hemispherectomy for early childhood onset intractable seizure disorder. JH is single, lives independently, drives a vehicle, rides a bicycle, and is fully employed as a janitor. SM is twice-widowed, lives alone, participates in volunteer and church activities, and performs as a soloist in her church choir. SM enjoys word and computer games; JH enjoys physical activities and social outings. Both JH and SM are engaging and humorous individuals who maintain close relationships with family and friends. Patterns of neuropsychological test results are partially consistent with known right and left-hemisphere specialization for higher brain functions. SM has left-side hemiplegia and dense left visual field hemianopia; JH has right-side hemiplegia and right visual field hemianopia. Verbal and Performance IQ scores are significantly different for SM (VIQ = 85; PIQ = 67) but not for JH (VIQ = 82; PIQ = 74). Similarly, SM performed normally on measures of verbal memory, but in the impaired range on nonverbal memory measures; she was distractible and impulsive during testing. In contrast, JH performed normally on both verbal and nonverbal memory tasks, and was normally attentive during testing, although she reported subjective dysfluency and displayed a weakness for numeric functions. In keeping with Ogden's (1988; 1996) theory of functional preservation, both JH and SM were impaired on speeded and complex visuospatial processing and

executive tasks, but had highly functional basic language, verbal memory, and social skills.

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J. S. WU, N. LENZO, M. MCCARTHY, A. CAMPBELL, K. BATES, J. K. FOSTER & R. N. MARTINS. Subjective Memory Complaint Accompanies Cerebral Glucose Metabolic (FDG-PET) Changes in Apolipoprotein e4 gene Carriers.

Subjective memory complaint (SMC) is common in later life and may be associated with an increased risk of developing dementia, particularly Alzheimer's disease. From a genetic perspective, the apolipoprotein (ApoE) e4 allele have been associated with an increased risk of developing Alzheimer's disease (AD). An increased presence of neurological soft-signs (NSS) has been observed in ApoE e4 carriers and in subjects with AD. The aim of the current study was to investigate metabolic changes using FDG-PET imaging in 11 ApoE e4 carriers with or without SMC, and to compare the severity of regional impairment of glucose metabolism, the prevalence of NSS, and the results of neuropsychological assessment. Eight participants with SMCs and three control non-memory complainers were tested. Cognition was evaluated using the MMSE, CVLT and the CAMCOG. All participants additionally received a physical and neurological examination. FDG PET was performed on a GSO PET camera. PET data were analysed and the findings compared to an FDG database utilising Neurostat. In this preliminary study of 11 ApoE e4 carriers, declines in brain glucose metabolism were observed in the regions of the temporal lobes, the posterior cingulate cortex and the anterior cingulate cortex. Inter-group FDG comparisons as well as comparisons relative to the normative Neurostat database will be presented. Relationships of FDG data to neurological and neuropsychological findings will also be discussed.

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Paper Session 12/ 1:00 – 2:30 p.m.

Neurology and Cognition

Chair: Marianne Regard

R. KANE, S. REICH, P. SHORT, L. SHULMAN, K. ANDERSON, L. GRATTAN, J. KENT, W. WEINER. Sensitivity of the Automated Neuropsychological Assessment Metrics (ANAM) System for Assessing Cognitive Changes in Parkinson's Disease.

The Automated Neuropsychological Assessment Metrics (ANAM) is a computerized neurocognitive test system developed by the US Department of Defense to monitor changes in human performance over time. The battery has been used clinically to assess cognitive impairment resulting from various disorders including SLE, MS, toxic exposure, head-injury, and concussion. The present study presents preliminary findings from a project designed to validate the test battery in screening for cognitive changes in non-demented patients with Parkinson's disease (PD). PD patients and controls were given selected ANAM measures. PD patients also received a comprehensive neurocognitive test battery. An impairment index was calculated from the traditional battery and used to classify PD patients as impaired or non-impaired. ANAM's sensitivity to cognitive changes in mild PD was assessed by comparing performance of all 3 groups (impaired PD, n=14; non-impaired PD, n=20; and controls n=37) on tests used in this battery. The impaired PD patients were older than non-impaired PD patients and controls. Hence, age was used as a covariate in the analyses. For all ANAM measures used in the study, age and group

membership explained between 15% and 41% of the variance. Membership in the impaired PD group was a significant predictor of test performance for all but one ANAM task. Non-impaired PD patients did not differ from controls. When ANAM throughput scores were combined into an overall index of cognitive efficiency, the impaired PD group performed more poorly than the non-impaired PD group and controls. Controls and non-impaired PD groups did not differ.

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B. FIMM, I.A. HEBER, C. FROMM, V.A. COENEN, F. BLOCK & M. KRONRNBERGER. The Influence of Deep Brain Stimulation of the Subthalamic Nucleus on Attentional Functions.

Deep Brain Stimulation (DBS) targeting the basal ganglia is an established therapy for patients with advanced Parkinson's Disease (PD). While several studies investigated the interaction of DBS with various cognitive functions, little is known about its impact on specific attentional functions. However, clinical and experimental studies point out the role of the basal ganglia in controlling visuo-spatial and executive attention.

Accordingly, our main objective was to investigate if DBS of the subthalamic nucleus (STN) may lead to changes in attentional function as a consequence of the modulation of fronto-striato-pallido-thalamo-cortical neuronal loops. 15 DBS-STN patients were examined following a "ON/OFF protocol" using computer-based neuropsychological attention tests (Test for attentional performance – TAP: Alertness, Go/Nogo, Working Memory, Divided Attention, Visual Scanning). No significant effects of DBS on attentional functions were observed on a group level. However, single subject analyses revealed significant changes in specific attentional functions (i.e. visual search, divided attention and working memory) in some patients. Interestingly, the stimulation parameters of these patients are characterized by a major amplitude difference between left and right hemisphere. In conclusion, DBS of the STN can have influences on attentional functions in PD patients. However, additional research is needed to confirm the findings and to identify further contributing factors in a larger number of patients.

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M. MATTINGLY, J. SLEVIN, A. BIRD, L. BLONDER, D. GASH, G. GERHARDT, R. KRYSZCIO, A. YOUNG, F. SCHMITT. Motor Skill Improvement in Parkinson's Disease with GDNF Infusion.

Introduction: The treatment for Parkinson's disease (PD) and associated cognitive decline becomes increasingly challenging as the disease progresses. Glial cell line-derived neurotrophic factor (GDNF) has demonstrated antiparkinsonian actions in animal models and two recent clinical studies in England (Gill et al., 2003) and in the U.S. (Slevin et al., 2005). Improvement of motor functions and cognition was evaluated in PD patients who received unilateral intraputamin infusion of GDNF. This open label study included 12 months of neurocognitive assessments following GDNF. Methods: Ten patients were evaluated with a battery of neurocognitive tests at baseline, and at weeks 26, 32 and 52 post-GDNF infusion. Participants' mean age was 58.6 (range = 47 – 70) at baseline and they averaged 13.3 years of education (range = 7-18 years). Eight patients were men and 90% were right-hand dominant. Each participant was placed on a dose-escalation regimen of GDNF: 3, 10, and 30 µg/day at successive 8-week intervals, followed by a 1-month washout period (from week 28 through week 32). Results: After adjustments for multiple comparisons, Finger Tapping total scores for the non-dominant hand improved significantly at 26 weeks compared with baseline scores ($P < .01$, $P < 0.002$) independent of side of catheter placement and were associated with similarly improved ratings of clinical efficacy. Cognitive abilities were stable throughout year. Conclusions: Analysis of the neurocognitive data demonstrates improved motor functions in

the non-dominant hand and stable cognition following 26 weeks of unilateral intraputamin GDNF infusion. Unilateral administration of the protein resulted in significant, sustained motor improvement following a washout period.

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K. BOYER, A. MAILLARD-WERMELINGER, P. BLACK, J. RIVIELLO. Improved Neuropsychological Function Following Resection of Hypothalamic Hamartoma: 3 Case Studies.

Clinical observations of patients with Hypothalamic Hamartoma (HH) suggest progressive decline in cognitive functions and emotional/behavioral regulation with increasing seizures in childhood/adolescence. Increasingly safe methods to remove these lesions have been developed, but the neuropsychological consequences of resection have not been well documented. Three patients were followed for one-year before surgery and at least 6-months after surgery. Three patients, aged 12 (cases A and B) and 10 (case C) had removal of their HH by a transcallosal or endoscopic approach. Each received 3 neuropsychological evaluations; T1: one year pre-surgery; T2: at surgery; T3: 6-12 months post-surgery. In all cases decline in emotional regulation were reported preoperatively. For cases A and B psychometric results indicated decline in general cognition between T1 and T2; case B also demonstrated decline in language, memory and behavioral management. Following surgery all cases were seizure free for at least 6 months. Neuropsychological evaluations at T3 documented improved emotional regulation in all cases, based on norm-referenced questionnaires. Case A evidenced significant general cognitive improvement at T3, with return to T1 level. Case B demonstrated improved language and behavioral regulation to levels similar to T1. Processing speed improved in case C. Removal of HH and decline in epileptic activity had a clear positive effect on neuropsychological functioning in three cases. Importantly, improvements were documented in functions in which declines were observed prior to surgery. There was no evidence of postoperative decline. Neuropsychological decline in HH patients may be reversible following surgery with improved seizure control.

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B. KÖYLÜ, E. TRINKA, A. ISCHEBECK, P. VISANI, T. TRIEB, C. KREMSER, L. BARTHA, M. SCHOCKE, and T. BENKE. Semantic Activation in Temporal Lobe Epilepsy - an fMRI Study.

Functional imaging data suggest that the core network engaged in verbal semantic memory (SM) processing encompasses frontal and temporal lobe structures, with a strong left lateralization in normal right handers. The impact of long term temporal lobe epilepsy (TLE) on this network is unclear. We studied verbal SM in 50 patients with chronic, intractable TLE (left TLE = 26, right TLE = 24) and 35 right handed normal controls using a fMRI semantic decision paradigm. All patients had language lateralized to the left hemisphere, as verified by the intracarotid amobarbital procedure. Within and between group analyses showed remarkable activation differences. The control group activated frontal and temporal areas bilaterally, with a strong left predominance. Left TLE patients showed a partial shift of activations to the right hemisphere. Activations in the right TLE group included mainly lateral temporal, right > left mesial temporal and inferior occipital activations. In sum, longterm, intractable TLE changes the fMRI related activation pattern of verbal SM. Furthermore, side of seizure focus has a specific impact on the resulting activation network. These findings presumably result from morphological changes and from plasticity which are both inherent to chronic TLE.

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J.J. EVANS & N. KAPUR. The Contribution of Seizures to Deficits in Long-Term Memory Consolidation- Evidence from a Novel Diary-Based Procedure.

Several patients have been described who demonstrate relatively normal acquisition and retention of new memories over the short delays used in standard anterograde memory testing, but abnormally fast forgetting over delays of days or weeks (Mayes 2003). Almost all of these patients suffer from epilepsy secondary to acquired brain injury. However, the role of recurrent seizures in producing this form of memory disorder remains unresolved. Case A suffers with long-term accelerated forgetting following viral encephalitis, which resulted in recurring temporal lobe seizures. He shows normal memory after delays of up to a day, but is impaired following delays of several days/weeks. We present a detailed study of Case A's memory for autobiographical events, and describe use of a novel diary-based method. Case A kept a diary of one event per day for 55 days. He also recorded any seizures. Cued recall and recognition tasks were constructed using recorded diary events. We compared his performance to a matched control subject. Case A had very poor recall of events. Recognition was also poor, but appeared to be less affected. Analysis showed that events further away in time were less likely to be recalled. There was no correlation between seizure frequency per week and recollection, though performance did dip in the week with most seizures. The data suggests that seizures may not necessarily contribute to long-term accelerated forgetting, or, if they do, the relationship between the occurrence of seizures and memory consolidation may be a complex one.

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Symposium 11/3:00 – 4:30 p.m.

Mild Head Injury in Childhood: Controversies and Conundrums

Host: Keith Owen Yeates & Vicki Anderson

H.G. TAYLOR. Post-Concussive Symptoms in Children with Mild Head Injury.

Objective: To investigate the nature, persistence, and predictors of post-concussive symptoms (PCS) in children with mild head injury (MHI). Participants and Methods: Children with MHI (n=190) and a comparison group with uncomplicated orthopedic injuries (n=101) were recruited from consecutive visits to the outpatient emergency departments of two children's hospitals. Age at injury was 8-15 years. MHI was defined as blunt head trauma accompanied by loss of consciousness (LOC), a GCS score of 13-14, persistent amnesia, or at least 2 other symptoms of concussion. Ratings of somatic, cognitive, and behavior-emotional symptoms were elicited from the children and their parents within the 2 weeks after injury (baseline) and at 1, 3, and 12 months post injury. The MHI group also completed MRIs at baseline. Results: After controlling for background factors, the MHI group had higher self-ratings of somatic symptoms at baseline than the comparison group. The MHI group had higher parent ratings of somatic and cognitive symptoms across the first three assessments, even when controlling for pre-injury PCS. Group differences were greater for younger children at the 1- and 3-month assessments. LOC (40% of MHI group) but not MRI abnormality (13%) predicted higher ratings of PCS at all assessments. Conclusions: PCS can persist in children with MHI and are manifest primarily in complaints of somatic and cognitive problems. Persisting PCS are more common in younger children and in children with LOC, with the latter subgroup displaying PCS even at 1 year post injury.

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A. MAILLARD-WERMELINGER. Mild Closed Head Injury and Executive Functions in School-Aged Children.

Objective: This study sought to examine the effects of mild closed-head injury (CHI) on executive functions in school-age children. Participants and Method: The prospective, longitudinal study involved 8-15 year old children, 190 with mild CHI and 101 with mild orthopedic injuries (OI). They were administered two measures of executive functions from the Cambridge Neuropsychological Testing Automated Battery (CANTAB) about 10 days and 3 months post-injury. Parents completed the Behavior Rating Inventory of Executive Functions (BRIEF) on both occasions, providing retrospective ratings of premorbid functioning at the first assessment. The groups did not differ in socioeconomic status, race, age, or premorbid executive functions as measured by the BRIEF. Results: The groups did not differ on either CANTAB subtest at either occasion. On the BRIEF, at 3 months, children with mild CHI showed a non-significant trend toward a deficit on the Metacognition composite scale and a significant deficit on the Organization of Material subscale. The CANTAB Spatial Working Memory subtest predicted ratings on the BRIEF at 3 months post-injury. Neither loss of consciousness nor MRI abnormalities explained differences on the CANTAB or the BRIEF in the mild CHI group. Discussion: Children with mild CHI show very limited evidence of deficits in executive functions, either cognitively or behaviorally. Cognitive weaknesses in executive functions predict deficits in executive functions in everyday life, but this is true of children both with and without CHI. Injury characteristics do not appear to predict executive functions after mild CHI.

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V. ANDERSON. Children's Attentional Skills 5 Years Post-Mild TBI.

Background: Intact attention is critical for the acquisition of new information and knowledge. Following traumatic brain injury (TBI), children demonstrate residual impairments in this domain, which may restrict their ongoing development in both social and cognitive areas. However, while the presence of such deficits appears to be well-established for severe TBI, controversy remains regarding the potential for mild TBI to lead to such persistent and significant problems. While a small number of research papers have reported attentional deficits following mild TBI, no study to date has reported findings in this domain across the first 5 years post-TBI in very young children. Methods: The present study examined attentional skills in a group of children who had sustained a mild TBI (n=12) between the ages of 2 and 7 years and compared their performances to those of a non-injured control group (n=16). Groups were matched for age, SES, and premorbid ability. Children were recruited at the time of injury and assessed over the 5 years post-TBI, with focus on age-appropriate tests of attentional ability. Results: Results indicated that children with a history of mild TBI demonstrated intact attentional skills and were not distinguishable from controls on these measures at any follow-up time points. Conclusions: Findings suggest that young children are able to recover well from mild TBI, with no reason to suggest the presence of persisting deficits that might impact development.

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A. COLLIE. Comparison of Cognitive Outcome Following Sports-Related Concussion in High-School Age Children and Adults.

Objective: Direct sport participation accounts for approximately 15-20% of mild TBI. The nature, magnitude and duration of post-sports concussion cognitive impairments in children are rarely studied. The current study aimed to compare cognitive outcome following sports-related concussion in children and adults. Methods: This prospective, longitudinal study enrolled 1015 Australian footballers participating in senior (N=692) and junior (N=323) community-based Australian competitions over a period of four consecutive competitive seasons (2001-2004). A series of computerised cognitive tests (CogState™), the Digit-Symbol Substitution Test (DSST) and the Trail Making Test part B (TMT -B) were administered to all participants at baseline (i.e., preseason) and again following diagnosis of concussion. All concussed participants were assessed repeatedly until all symptoms and cognitive deficits had recovered. Results: A total of 89 concussions were observed in 79 participants, of which 10 involved junior (i.e., adolescent) participants. Consistent with prior studies, symptomatic adult athletes displayed significant decline from baseline on simple reaction time, choice reaction time, and one-back tasks from the CogState test battery at the first post-concussion assessment. No cognitive changes were observed on computerised measures of learning and memory, or on the DSST or TMT-B tasks. The small sample of adolescents studied here demonstrated declines from baseline on simple and choice reaction time tests only. Conclusions: The pattern of cognitive dysfunction and symptom recovery in concussed high-school aged children is generally consistent with that observed in concussed adults. Larger studies of younger samples are required to accurately identify the cognitive deficits, as well as the scholastic and behavioural changes, following sports-related concussion in children.

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L. CROWE A Prospective Study of the Effects of Sports Concussion on Cognition in Children and Adolescents.

Background: Concussion is a common injury of adolescence, yet limited information exists about its cognitive and behavioral impacts. In childhood and adolescence, the brain is in a rapid state of development and is constantly acquiring new skills and knowledge, therefore it is not sufficient to extrapolate knowledge from adult populations in designing treatment and management models. Therefore, a unique model of cognitive recovery that is specific to children is necessary. Methods: Using a prospective design 500 adolescents (aged 10-18 years) were administered a computer-based cognitive test, *CogSport for Kids*. This 'playing card' series of tasks has been designed to assess motor function, attention, episodic memory and working memory. Any participant who sustained a concussion in the following calendar year was readministered the same protocol at the time points of 2, 5, 10 and 30 days post-injury. Results: The impact of concussion on these cognitive variables at four different time points post-concussion were investigated, providing evidence for rapidly recovering function within the 390 months post-

insult. The clinical and theoretical implications of these findings will be discussed.

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Symposium 12/3:00 – 4:30 p.m.

Variability of Genetic Causes of Cognition Across the Life Span

Host: David Roeltgen

D. ROELTGEN, S. MAJERUS, J. ROSS. Genetic Causes of Cognitive Impairment, Variability of Phenotypic Endpoint.

Many genetic associations with cognition and behavior have been described recently. Implied in these descriptions is a causal effect of the genetic disturbance on the behavior observed. However, even if a gene and gene product are identified, the intervening steps from gene product to behavior are complex. Four genetic disorders of cognition are presented (22q11.2 deletion, XO, Fragile X and FTDP-17). Each of these disorders presents a unique characteristic of the influence of a genetic disturbance on cognition. 22p11.2 is an example of a disorder with a cognitive deficit that is present in childhood and is relatively stable across the lifespan. XO is an example of a disorder that includes not only genetic features (probably more than one) but also hormonal influences on the final behavior. Fragile X is an example of a disorder with tremendous phenotypic variability across the lifespan. FTDP-17 is an example of a disorder in which the cognitive disturbance is dormant until adulthood. The genetic and phenotypic features of each of these is presented. The significance of the differences among the disorders is stressed and the need to consider interactive mechanisms in the production of the cognitive phenotype is stressed.

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D. ROELTGEN. Turner Syndrome.

Turner syndrome (TS) is a genetic disorder involving females who lack all or part of one X chromosome (from complete monosomy X or partial deletions of either the short [Xp] or long [Xq] arm, partial monosomy X). The phenotype includes ovarian failure, typical physical features (including short stature and web neck) and a characteristic neurocognitive profile, including impaired visual-spatial/perceptual ability, attention, working memory, and spatially dependent executive function plus generally normal verbal function. The neurocognitive phenotype is relatively consistent across age groups and appears to be multifactorial, related to a complex interaction between hormonal deficiencies and genetic abnormalities. The hormonal determinants of cognition in TS are related to estrogen and androgen deficiency. Estrogen replacement improves some features such as speeded motor function and androgen improves some features such as working memory and arithmetic. In contrast, the hallmark feature of impaired visual-spatial/perceptual ability appears to be genetically determined. Our genetic hypothesis is that haploinsufficiency for gene/genes on the short arm of the X chromosome (Xp) is responsible for this hallmark feature of the TS cognitive phenotype. This disorder highlights the persistence of a relative consistent neurocognitive profile across the life span, but one that can be influenced by therapeutic intervention.

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S. MAJERUS. Verbal Short-Term Memory, Genes and Neuro-Developmental Disorders.

A number of studies have studied atypical verbal short-term memory (STM) development in children with various genetic disorders, including Down syndrome, Williams syndrome and Velo-cardio-facial syndrome. Verbal STM has also been a major focus of studies trying to link specific language impairment (SLI) and its genetic underpinnings. These studies suggest that reduced verbal STM capacity, as measured by typical span or nonword repetition tasks, cannot be associated with a precise genetic anomaly. However, the breakdown of verbal STM as a function of the multiple cognitive processes intervening in verbal STM tasks could be a more fruitful strategy when trying to link a specific cognitive function to its genetic correlates. In a series of experiments exploring various STM mechanisms in Williams syndrome, Velo-cardio-facial syndrome and Specific Language Impairment, we show that reduced verbal STM capacity in these populations is related to different functional impairments: children with Williams syndrome present abnormal item STM, children with Velocardiofacial syndrome show abnormal order STM and children with Specific Language Impairment have difficulties during the output stage of verbal STM tasks, but not during the encoding or storage stage. In the light of these results, we will put forward the importance of cognitive 'dissection' when studying gene-behavior relationships and methodological issues for future research will be discussed.

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D. ROELTGEN. Frontal-Temporal Dementia from Chromosome 17 Mutations.

Many genetically determined neurocognitive phenotypes are present at birth and relatively consistent across the life span. (See the abstract on Turner syndrome in this symposium.) In contrast, the dementia associated with Chromosome 17 mutations occurs in middle age after a normal development and normal cognitive function during young adulthood. In general frontotemporal dementia is characterized by behavioral and cognitive disturbances. Behavioral dysfunctions may include altered mood with disinhibition and personality changes, loss of empathy, impulsiveness and hallucinations. Cognitive dysfunctions may include impaired attention and executive function and loss of speech production. Many may have extrapyramidal dysfunction. Frontotemporal dementia is actually a group of disorders, some of which are familial. The main familial group is defined by the presence of tau bodies and is associated with mutations on chromosome 17. These are inclusions in neurons and glia that consist of phosphorylated tau protein. It is theorized that hyperphosphorylated tau inhibits assembly and disrupts microtubules, leading to protein aggregates. What is uncertain is why certain brain structures are susceptible and not others. Also, it is uncertain why this disorder presents in midlife.

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K. VOELLER. The Multifaceted Neurocognitive Profile of Fragile X Syndrome.

The Fragile X syndrome (FXS)--the most common inherited mental retardation syndrome-- affects approximately 1 in 4500 males and 1 in 9000 females. FXS results from the transcriptional silencing of the FMR1 gene which in turn leads to loss function of the fragile X mental retardation protein (FMRP). FMRP is prominently expressed in the basal forebrain, the hippocampus, and the cerebellum and plays a crucial role in the formation and function of synapses. The loss of FMRP results in impaired synaptic plasticity. Phenotypic presentation of fragile X varies with age, gender, and FMRP function. Affected males present early in childhood with mental retardation, macrocephaly, macroorchidism, and hyperactivity. They avoid eye contact and have rather stereotypical social behaviors. Affected females may be retarded or of normal intelligence. Neuropsychological evaluation reveals relatively intact verbal skills but frontal executive and visuospatial memory deficits are prominent. In school they present with math learning problems. They are prone to anxiety and depression. Neuroimaging studies reveal that they do not recruit the brain regions involved in certain specific tasks (e.g., arithmetic and visual-spatial memory) to the extent that normal controls do. Carrier males are asymptomatic until later in adulthood. Symptoms of Fragile X-Associated Tremor/Ataxia Syndrome (FXTAS) are observed in about 17% of carrier males in their 50s. By age 80 years, some 75% of male carriers are symptomatic. Motor symptoms --intention tremor, ataxia, and in some patients, parkinsonism--are often the presenting features. The dementia associated with FXTAS involves prominent frontal executive deficits, characterized by disinhibition, distractibility, perseveration, witzelsucht, poor frustration tolerance, initiation difficulties, and fatigue/daytime sleepiness. Affected males manifest an irritable depressed mood, without clear evidence of anhedonia. Verbal comprehension is typically intact, with significant deficits in perceptual organization, working memory and processing speed. Research on the role of FMRP in synaptic plasticity has provided considerable information about how this mutation affects the brain and cognitive function and provides an understanding of the neurobiology of learning and memory.

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Paper Session 13/3:00 – 4:30 p.m.

Dyslexia and Developmental Disorders

Chair: Dorothy Bishop

L. KAUFMANN & H.-C. NUERK. A Broad Examination of Elementary and Complex Number Processing Skills in 9 to 12 Year-Old Children with ADHD-C.

Background: ADHD (attention-deficit hyperactivity-disorder) and academic difficulties are frequently associated, but up to date this link is poorly understood. In this study, we provide a first overview which components of number processing and calculation skills may be disturbed in ADHD children without observable learning disabilities and might thus deserve a more fine-grained investigation in the future. Method: In a series of tasks, we explored number processing and calculation skills in 9 to 12 year-old children with ADHD-combined type (ADHD-C) and matched children without ADHD (of any type) that were free of concomitant dyscalculia and/or dyslexia. Results and Conclusion: Surprisingly, the strongest (and significant) group

differences were obtained in the elementary number comparison task. On the contrary, group differences were not significant regarding over learned and explicitly trained arithmetical skills such as simple and complex mental calculation and written calculation. Importantly, our results are not explainable by group differences regarding specific working memory and executive function components. We conclude that number processing deficits in ADHD children should be investigated even when no concomitant learning disabilities are reported. Moreover, our data indicate that such investigations should not be restricted to complex arithmetical skills, but should also include core numerical abilities such as number comparison. Finally, our data extend Armstrong et al.'s (2001) postulate of a semantic verbal processing deficit in children with ADHD to the numerical domain.

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B. KAR, M. SHUKLA, N.TRIPATHI. Cognitive Deficits in Children with Dyslexia(A Proposal on Electrophysiological Correlates of Remediation in Dyslexia).

The present paper is a part of the ongoing work on dyslexia at our centre. 18 children were identified with dyslexia on formal assessment. Dyslexics were found deficient on simultaneous and successive processing on the cognitive assessment system. These children were tested on phoneme oddity and phoneme deletion tasks. The preliminary results are based on our assessments of 4 normal and 4 dyslexic children in the age range of 8-12 years. The results indicate a significant difference in the accuracy scores and higher reaction times on phoneme oddity and phoneme deletion tasks. We are using these tasks as behavioural measures of the effects of remediation in a pre and post design. Effects of remediation in dyslexia have been examined using behavioural tasks and fMRI and not with EEG/ERP. Dyslexia being a temporal processing deficit, electrophysiological changes may be a useful evidence for neuronal plasticity. We are conducting ERP experiments using auditory temporal processing tasks to look at the effects of remediation using a 64 channel EEG/ERP system. Results of the EEG data and ERP experiments are expected soon. The preliminary results of the behavioural tasks suggest that children with dyslexia have lower accuracy scores on temporal order judgement tasks using two and three tones and with phonemes with varying ISIs. Behavioural results show differences between dyslexics and normals we expect a change in latencies on electrophysiological data. Our current work presents a novel design to study effects of remediation in dyslexia using EEG/ERP as a measure of plasticity.

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M. HOEN, M. ROGIERS, H. MÜLDER. The Impact of Ear-Level FM Receiver Use by Children with Auditory Processing Disorders and other Learning or Attention Related Disorders, an Overview.

Children with auditory processing disorders (APD) have normal auditory thresholds, yet their listening abilities appear to be impaired. Behaviorally, their parents and teachers describe them as being uncertain about what they hear, report they experience difficulties listening in the presence of background noise, struggle to follow oral instructions and have problems understanding rapid or degraded speech. The management of children with APD usually comprises direct therapeutic remediation, compensatory strategies and environmental modifications. Environmental modifications are designed to improve acoustic clarity, and potentiate learning ease through facilitated listening. In this context, personal ear-level FM devices were developed as hearing helps to improve clarity and signal-to-noise ratio in noisy environments as schools. In this presentation we will review recent experimental evidences showing: i) excellent subjective acceptance of ear level FM systems, parents, teachers and children rating these devices as facilitating long term auditory concentration and clearly helping children listen to their teachers, ii) behavioral evidence showing that ear-level FM devices

can actually help APD children overcome their difficulties listening to speech in noisy classrooms and finally iii) behavioral and electrophysiological evidence that long-term ear level FM use can improve listening abilities of children with APD. Altogether these observations demonstrate the therapeutic and rehabilitation advantages of the use of ear-level FM devices in parallel of classical therapeutic remediation and compensatory strategies for children with APD. These results also suggest the potential application of ear-level FM helps to other language, speech and attention related disorders populations as for example dyslexic or SLI children.

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U. MAURER, I. BUCKELMÜLLER, K. BUCHER, R. BENZ, S. BREM, F. KRENZ, H.C. STEINHAUSEN & D. BRANDEIS. Mapping Effects of Development and Dyslexia on the Auditory Mismatch Response.

The auditory mismatch responses (MMR) in the event-related potential (ERP) may be used to detect precursor deficits of dyslexia. Kindergarten children display a unique early centrally positive mismatch response followed by a late mismatch negativity (MMN) reflecting risk for dyslexia through attenuation for tones and a different topography for phonemes. The longitudinal results clarify questions about MMN development, and which processing deficits in children at risk relate to dyslexia. Fast (SOA=0.38s) oddball sequences with frequency and phoneme deviance (standard: 1000Hz/"ba"; deviants: 1030 & 1060Hz/"da" & "ta") were presented during 43-channel ERP recordings to the same children in kindergarten and 2nd grade. MMR response segments were defined by GFP minima (MMR: 102-300ms; late MMN: 398-589ms). We focused on how development and dyslexia affect frontocentral amplitude and topography in 12 children with dyslexia and 19 controls identified by the 2nd-grade reading test. Developmental effects were found in the MMR, which for tones developed into a more adult-like frontal negativity, but remained frontally positive for phonemes in 2nd grade (p<0.05). Effects of dyslexia were found in the late MMN with attenuated frontocentral negativity in children with dyslexia compared to controls (p<0.05), particularly for the late tone MMN conditions in kindergarten. The results suggest that the positive MMR develops earlier into an MMN for tones than for phonemes, and that the tone processing deficit in kindergarten children at risk also relates to dyslexia. Thus, MMR recordings may help predict dyslexia in kindergarten. Supported by grants SNSF 32-59276 and Stiftung "wissenschaftliche Forschung", Universität Zürich.

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L. M. BLACK & J.P.H. VAN SANTEN. Neuropsychological Subtyping of Developmental Language Disorders.

Eighty-two children with developmental language disorders (DLD), aged 3-5, were given standardized measures assessing a wide range of neurocognitive functions, including language, cognitive, and memory skills. They were also given measures of social-emotional functioning (e.g., CBC and PIC) and visual and vocal affect perception (Fein, et al., 1985; Berk, et al., 1983). Using the neurocognitive measures, DLD children were subtyped with a method (van Santen et al., 1994; Black, 1989, 1994) based on a quantitative model that describes the clinical judgmental process as comprising two steps. First, each score in a score profile is interpreted as a subjective probability that the underlying neuropsychological function is impaired. This process depends on a score's absolute value and on its value relative to other scores of the child (the "relative inefficiency" concept). Second, a child is assigned to the subtype that best matches its probability-of-impairment profile, where subtypes are specified as "up" (intact) or "down" (deficit) patterns. Using the same neurocognitive measures, children were also characterized dimensionally, with a Receptive +

Expressive (or overall level) score (R+E) and a Receptive-Expressive differential score (R-E). Significant differences between subtypes were found on emotional and affect measures. Differences between subtypes involved both the overall level and the specific pattern of neurocognitive impairment. Correlations of the R+E and R-E scores with emotional and affect measures corroborated these findings. These results underline the importance of taking into account heterogeneity of DLD for research and for making intervention decisions, and provide validation of a method for subtyping this population.

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Paper Session 14/3:00 – 4:30 p.m.

Rehabilitation

Chair: Ron Ruff

T. BARSKOVA & G. WILZ. Rehabilitation After Stroke:

Psychometric Properties of the Patient Competency Rating Scale. Background and Purpose: Research on long-term effects of stroke therapy and rehabilitation requires further standardized instruments for the assessment of patients' recovery regarding psychosocial functioning. To our knowledge, it is the first study, which investigates the psychometric properties of the Patient Competency Rating Scale (PCRS) to determine the suitability of the instrument for measuring change in psychosocial capacities after stroke. Methods: The study used a longitudinal design with an interval of one year between two measuring times. One hundred and fifty-one stroke patients and their caregiving partners filled out the PCRS. Some other stroke outcome measures were used to assess the criterion validity of the separate PCRS-subscales. Examination of the factor structure employed both exploratory and confirmatory factor analysis techniques. The reliability of the PCRS-subscales was evaluated with Cronbach's alpha. Results: Modifications of the initial hypothesized four-factor structure were necessary to adequately fit the data. The modified subscales showed good reliability and criterion validity for stroke survivors' assessment as well as for caregivers' assessment of the patients' functioning at both measuring times. Conclusions: The modified PCRS can be recommended for use in longitudinal studies to evaluate long-term effects of therapy and rehabilitative measures on stroke survivors' recovery regarding psychosocial functioning.

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D. CLAROS-SALINAS & G. GREITEMANN. Vocational Neurorehabilitation – Therapeutic Approach and Outcomes.

Objective: to evaluate initial placement and 1-year employment outcomes of a clinical vocational therapy program for persons with brain injury. Method: Patients, who showed cognitive disorders according to a neuropsychological test battery in at least one attention-, memory- or intelligence subtest and whose work place was preserved, were individually prepared for their reintegration. The approach of neurological vocational therapy comprised different intervention levels: (i) proving resources, (ii) job-related training of impaired cognitive performance and (iii) the anticipation of possible compensation and adaptation strategies on the job. The outcome of those patients who were recommended to reintegrate to their former place of work was evaluated about 12 months after discharge. Results: Out of 120 patients (58 female; age median: 47; 73 patients with cerebrovascular etiology; median time post onset: 8,5 months), 89 patients were recommended to return to work mostly by starting a

graded work trial. 66 patients managed to restart work. By comparing the cognitive test data of the 66 patients, who successfully returned to work, to those of the 54 patients who did not manage to return to their former places of work, significant differences in various subtests were found: the successful subgroup performed better. A discriminant analysis showed that a few attention and memory tests discriminated best between the two subgroups (70 % correct re-classification with crossvalidated cases). The outcome of vocational reintegration was not influenced by age, etiology or occupational group whereas effects of gender and education could be observed.

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B. OLK, H. HILDEBRANDT, A. KINGSTONE. Volitional Orienting in Patients with Right-Hemisphere Lesions.

In everyday life, visual events can often attract our attention reflexively - such as when a person steps suddenly into a room. Disengaging our attention requires volitional control. Our study focused on volitional orienting in patients with right-hemisphere lesions (with and without neglect). Typically, these patients respond more slowly to stimuli located on their contralesional left side, in particular if their attention has previously been directed to the ipsilesional side ('disengage deficit'). Using a cueing paradigm, our study investigated and compared patients' ability to employ three different kinds of predictive spatial cues that either engage volitional and reflexive attention, or cues that demand volitional control alone. The results confirm that unlike healthy participants, patients' response pattern was modulated by target location with slower responses to targets appearing on the contralesional side than on the ipsilesional side, which was particularly the case for patients with spatial neglect. Importantly however, both patient groups, with and without neglect, showed reliable cueing effects, indicating that they were able to exploit the cues to guide their attention and respond faster to expected targets. The results further suggest that the applied tasks are highly sensitive even to deficits that are not apparent in standard clinical assessment and could therefore enrich clinical evaluation and guide rehabilitation.

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I. BOMBIN, A. BILBAO, A. BIZE, C. GONZALES. Cognitive Rehabilitation Following Acquired Brain Injury: Efficacy and Prognostic Variables.

Introduction: Acquired brain injury produces among other consequences, disturbances in cognition, emotion, and behaviour. Such disturbances very frequently compromise the patients' independent functioning. Objective: The aim of this presentation is to describe how cognitive, emotional, and behavioural rehabilitation is developed at the first state brain injury rehabilitation centre in Spain (CEADAC); to discuss the efficacy and limitations of our methodology; to identify prognostic variables at admission; and to determine which and to what extent cognitive variables at discharge predict future outcome in community functioning. Methods: 150 patients with acquired brain injury (mainly TBI and CVA) consecutively admitted in CEADAC were assessed at admission and discharge after intensive multidisciplinary rehabilitation. Cognitive assessment at admission and discharge was carried out by means of an extensive neuropsychological battery. The mean time of rehabilitation was 7,74 months (SD 3,92). One hundred patients, of the initial sample of 150, were interviewed with their families 6 months after discharge to assess independent functioning in community. Results: Overall, patients who underwent rehabilitation treatment significantly improved from admission to discharge. However, significant differences arose between patients. Variables at admission that predicted cognitive functioning at discharge were GCS at brain injury, time without treatment, and years of education (adjusted R² range 0.190-0.430). Functioning of all major cognitive domains at discharge

strongly predicted independent functioning 6 months after discharge (adjusted R2 range 0.348-0.789). Conclusions: The conceptual and clinical framework of the rehabilitation programme developed at CEADAC will be discussed, as well as the role of prognostic variables.

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M. PERDICES, R.L. TATE, L. TOGHER, S. MCDONALD, R. SCHULTZ, K. SMITH, S. SAVAGE, K. WINDERS. Variability of Methodological Quality in Reports of Neuropsychological Interventions: A Cause for Concern.

Background: Evidence-based clinical practice relies upon the results of well-designed and conducted research studies such as randomised controlled trials (RCTs). Evidence from other disciplines has found that methodological rigor among RCTs is variable (Moseley et al, 2000). This has not been examined for neuropsychological therapies, and it formed the aim of the present study. Method: The database, PsycBITETM (www.psycbite.com), lists objective methodological quality ratings (MQRs) of published reports using non-pharmacological interventions targeting psychological consequences of acquired brain impairment. A range of research designs is covered, including RCTs, non-RCTs and Case Series (CS). Maximum MQR scores for RCTs, non-RCTs and CS are 10/10, 8/10 and 2/10 respectively. Reports are indexed on four domains: problem area (n=22), intervention type (n=29), neurological group (n=14) and age group (n=3). Results: By February 2006, 1,302 empirical studies were indexed, including 606 using group research designs (298 RCTs, 128 nonRCTs, and 280 CS); MQRs were available for 40%-50% in each group. Mean MQR scores (and SD) were as follows: RCTs=4.3 (1.6), nonRCTs=2.7 (1.1), and CS=1.6 (0.7). Within RCTs, mean MQR scores also varied considerably with problem area (eg, quality of life=5.0 vs executive problems=1.5), type of intervention (eg, motor skill=6.0 vs memory=3.1) and neurological group (eg, stroke=4.5 vs degenerative disorders=4.0). Analogous patterns were evident for non-RCTs and CS. Conclusion: Methodological quality of RCTs is clearly superior to that of other research designs. Nonetheless, MQRs for these research designs are modest, reflect relatively poor internal validity, and substantial variability among problem areas, intervention type and clinical population.

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J. BERNABEU, A. CANYETE, C. FOURNIER, G. ALMERICH, F. MENOR, V. CASTEL. Neuropsychological Late Effects and Rehabilitation in Pediatric Oncology.

Purpose: To clarify treatment effects (cranial radiotherapy, methotrexate, etc.) on CNS cognitive and behavioral functioning, to find out differences between CNS tumors, leukemia and healthy children in neuropsychological profiles. Method: 109 children were studied: 25.7% benign brain tumor, 28.6% malign brain tumor, 31.4% leukemia, 14.3% healthy-control. 63.3% boys, 36.7% girls. Assessment was performed with our neuropsychological protocol, about 5 hour testing per child. It includes 25 tests to obtain 54 neuropsychological processes in 9 cognitive areas (general cognitive abilities, motricity, visual perception, non verbal abilities, language, memory, attention, executive functions and academic abilities). Achenbach scales for parents, teachers and self-report were used for psychopathological assessment. We also measured reaction times, vigilance, impulsivity and inattention with Connors' CPT-II. Statistical analyses (parametric, non-parametric and ANOVA) were carried out by using SPSS 12.0 package. Results: All clinical patients showed deficit in neuropsychological assessment. Significant results: 1.CNS treatment appears to be related with ADHD inattentive subtype, white matter damage is suggested. 2.Malignant brain tumor obtained the worst scores. 3.The longer time from diagnosis, the worst scores in cognitive general abilities, visual perception, memory and attention areas. 4.Leukemia patients present mild deficit in all areas

excluding non-verbal abilities, motricity and visual perception. Language processes are more affected (receptive vocabulary, denomination, semantic fluency, VIQ) Conclusions: Neuropsychological assessment offers cortical and subcortical cognitive and behavioral functioning. Knowing specific diagnose-related neuropsychological late effects allow us to design target-oriented rehabilitation procedures (drugs, training, advising, follow-up, etc.) to improve/compensate/palliate them.

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SYMPOSIUM 13/5:00 – 6:30 p.m.

Fatigue and Sleep after Traumatic Brain Injury

Host: Jennie Ponsford

J. PONSFORD, C. ZIINO. The Experience of Fatigue Following Traumatic Brain Injury: Its Measurement and Predictors.

Numerous outcome studies have found fatigue to be a common problem following traumatic brain injury (TBI). This study examined the validity of subjective fatigue scales following TBI, and the relationship between self-reported fatigue and demographic factors, injury-related factors and mood. Forty-nine TBI participants and 49 controls completed three subjective fatigue measures, including the Fatigue Severity Scale (FSS), Visual Analogue Scale – Fatigue (VAS-F) and a questionnaire examining causes of fatigue. TBI participants reported a significantly greater impact of fatigue on their lifestyle on the FSS relative to controls, and reported numerous activities as more frequent causes of fatigue. There were, however, no significant group differences on subscales of the VAS-F. Greater time since injury and higher education levels were associated with higher subjective fatigue levels. Injury severity, age and levels of anxiety and depression were not found to be significant predictors of subjective fatigue severity in TBI participants.

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D. PARCELL, J. PONSFORD, S. RAJARATNAM, J. REDMAN. Self-Reported Changes to Sleep Following TBI.

Sleep disturbance can significantly disrupt daily functioning and quality of life in uninjured individuals, and even more so in those with TBI. Yet, despite being reported by over 50% of people with TBI, sleep changes have received little attention, both clinically and research-wise. An understanding of sleep changes post-TBI should represent an important aspect of rehabilitation. Our studies, involving multiple methodologies, aimed to explore subjective and objective changes to sleep in the chronic stages of TBI in the hope of identifying causes of these sleep changes and potential treatments. Here we present findings from the questionnaire-based study of subjective sleep changes. The cohort was 63 community-based individuals with TBI and 63 age- and gender-matched controls. Measures included the Epworth Sleepiness Scale, Morningness-Eveningness Questionnaire, a week-long sleep-wake diary and Hospital Anxiety and Depression Scale. The results confirmed previous findings of increased reported sleep-changes following TBI including an increase in the number of nighttime awakenings and longer sleep onset latency. Changes were more frequently reported by people with milder injuries. Increased levels of anxiety and depression, and longer time since injury were also more frequently associated with reports of sleep changes, and employment status did not explain differences in sleep patterns for these participants. Overall, the TBI group tended to report higher levels of daytime sleepiness and poorer nighttime sleep quality. It is recognized that the

subjective sleep experience may not be consistent with objective sleep changes; however, for treatments to be effective the patients' subjective experience of sleep must be addressed.

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C. ZIINO, J. PONSFORD. The Coping Hypothesis: Is Fatigue Following Traumatic Brain Injury Associated with Disorders of Attention?

Many studies have reported fatigue as a common symptom following traumatic brain injury (TBI), but its causes remain poorly understood. It has been argued that fatigue is due to additional compensatory effort expended by brain injured individuals in meeting the demands of everyday life in the presence of cognitive deficits. The present study aimed to investigate this hypothesis by exploring selective attention and vigilance, and their relationship with subjective and objective fatigue measures following TBI. Forty-six participants with moderate-severe TBI and 46 controls completed subjective fatigue scales (the VASF, Fatigue Severity Scale and Causes of Fatigue Questionnaire) and a complex selective attention task before and after a 45-minute vigilance task. Participants also completed the Telephone Search and Telephone Search while Counting tasks from the Test of Everyday Attention and the Symbol Digit Modalities Test. TBI participants performed at a lower level on the vigilance task, responding more slowly and making more errors. TBI participants also performed more slowly on a range of selective attention tasks and made more errors on a complex selective attention task. Higher subjective fatigue ratings were associated with more missed targets on the vigilance task and greater increases in diastolic blood pressure over the duration of the task for TBI participants. A subgroup of TBI participants who showed a vigilance decrement also reported disproportionate increases in subjective fatigue. Higher fatigue ratings were also associated with poorer performance on several selective attention measures. Findings support a relationship between attention deficits and subjective fatigue ratings following TBI.

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D. PARCELL, J. PONSFORD, S. RAJARA TNAM, J. REDMAN. The Impact of TBI on the Circadian Timing of Sleep and on Sleep Architecture.

Whilst previous research has shown increased incidence of some sleep disorders and changes in Rapid Eye Movement (REM) sleep following TBI, findings have varied, possibly due to methodological differences. This paper will report results of two studies focusing on objective aspects of sleep, which have been conducted in 10 TBI participants and 10 age- and gender- matched controls. The first focused on the circadian timing of sleep and found no group shift in the timing of melatonin production for the TBI participants. In the second study overnight polysomnography was visually scored. Participants spent two nights in a sleep laboratory (one night adaptation, followed by one night sleep recording), with the scheduled sleep opportunity determined from habitual sleep-wake times. Significant changes to sleep architecture were evident, with an increase in the percentage of stage 4 (S4) sleep and a lower percentage of REM sleep in the TBI group. Recent studies of neural plasticity may provide a rationale for these results, which are not anomalous from previous research. Stemming from these findings, implications for treatment are raised.

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Symposium 14/5:00 – 6:30 p.m.

Cortical Regulation of Impulses and Social Values

Host: Theodor Landis

M. REGARD. The Neurology of Impulse Control Disorders.

An array of manifestations of impulse dyscontrol in patients with brain damage will be presented to discuss the correlation between side and site of lesion and impulse control. The finding of hemisphere dependent disorders, namely disinhibited, maniforme-like behaviour dysfunctions as addicted gambling or eating, and inhibited, depression-like behaviour dysfunction as compulsion, suggest an asymmetrical cortical regulation of impulse control. This observation from lesion studies is in line with experimental evidence from functional brain imaging and transcranial stimulation studies revealing distinct correlations between right and left frontal areas and behavioural dyscontrol.

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E. FEHR. The Neural Basis of Social Norms.

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Symposium 15/5:00 – 6:30 p.m.

High Level Cognitive and Social Impairment following Early Brain Insult

Host: Vicki Anderson

A. GOMES, V. ANDERSON, R. JACOBS, M. GREENHAM. Attentional and Social Outcomes Following Pre-Natal and Acquired Brain Lesions: The Relationship between Attention and Social Functioning.

Attention deficits and problems with social skills are commonly reported following childhood brain injury, with worse outcomes associated with earlier brain lesions. However, little is known regarding the influence of age at injury and the nature and severity of cognitive and behavioural impairments following childhood brain insult. The aims of this study were to compare the outcomes in attention and social functioning in children with pre-natal and acquired brain lesions, and to investigate the possible relationship between cognitive and behavioural elements of attention and social functioning. Seven children with developmental lesions (pre-natal), and seven diagnosed with ischaemic stroke (acquired), aged 8-14 years, were assessed on measures of cognitive attention, behavioural elements of attention, social adjustment and social skills. As expected, the whole group (N=14) displayed clinically relevant levels of impairment in elements of cognitive and behavioural attention. Results also indicated considerable levels of impairment in social functioning. The hypothesis that the pre-natal group would have worse outcomes in all domains was largely supported, with the pre-natal group displaying more numerous and clinically severe impairments in attentional and social domains. There were no significant relationships between the cognitive components of attention and social functioning, possibly due to limited statistical power rather than absence of effect. Impairments in behavioural attentional skills were associated with higher social difficulties, 'fewer' social skills and increased problem behaviours. Results suggest the prevalence of attention deficits and social problems following pre-natal and acquired brain lesions is significant. In addition, attentional skills appear critical to adequate social functioning.

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M. SPENCER-SMITH, P. ANDERSON, R. JACOBS, V. ANDERSON. Timing of Brain Insult and the Development of Executive Functions: Are Skills Differentially Affected by Brain Insult at Different Developmental Stages?

Early brain insult results in diverse sequelae, including deficits in executive function that limit a child's capacity to function efficiently in day-to-day activities. This study aims to assess development of executive function following early brain insult, identifying critical time periods in development when an insult will have minimal or deleterious consequences. Previous research attempting to identify determinants of development following brain insult has been able to account for a surprisingly modest proportion of variance in outcome. This study refocuses the investigation by examining developmental processes that may underlie this variance. Critical periods outlined in Kolb and colleagues' (2000) neurological development model and Dennis' (1989) cognitive development model will be used as a framework for identifying critical periods in development associated with better executive function outcome following cerebral insult. It is likely that a child's development following brain insult will be best described by integrating these models, accounting for developmental, physiological and cognitive aspects.

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H. LEVIN, G. HANTEN, J. MAX, J.V. HUNTER, X. LI, P. SWANK, L. EWING-COBBS, M. DENNIS, D.S. MENEFFEE, R. SCHACHAR. ADHD Symptoms Following TBI in Children: Relation to Response Inhibition.

We studied the relation of pre-injury attention deficit hyperactivity disorder (ADHD) to ADHD symptoms following traumatic brain injury (TBI) in children and investigated the relation of postinjury symptoms to response inhibition. We administered the Schedule for Affective Disorders and Schizophrenia, Present and Lifetime Version (K-SADS-PL) to 148 pediatric TBI patients at baseline, 6, 12, and 24 months post-injury and compared the findings for subgroups with a pre-injury diagnosis of ADHD (n=34) and those without pre-injury ADHD (n=114). Inhibition was assessed using stop signal reaction time (RT). Postinjury symptom levels were higher and more stable in children with pre-injury ADHD, whereas symptom levels fluctuated more in children without a pre-injury diagnosis of ADHD. Number of hyperactive, but not inattentive, symptoms increased with TBI severity. Age-related decline in inattentive symptoms was specific to children with preinjury ADHD, whereas hyperactive symptoms decreased with age in both groups. Total symptom and inattentive symptom severity, but not hyperactive symptoms, were related to stop signal reaction time. Similarly, inattentive and total symptom severity were related to go RT and the variability of go RT. Although the number of ADHD symptoms pre-injury and at 2 years post-injury were related for the combined groups, this relation was not significant when the data of each group were separately analyzed. Pre-injury diagnosis of ADHD has important implications for the temporal course of ADHD symptoms following TBI, their modulation by SES and age, but not TBI severity. Implications for planning clinical trials for pediatric TBI and clinical management will be discussed.

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S. EREN, V. ANDERSON, C. CATROPPA and F. MUSCARA. Long-term Social Outcome Following Traumatic Brain Injury in Children.

Traumatic Brain Injury (TBI) is a common childhood condition and may have a profound and long-term impact on cognitive, psychological and social functioning. Relatively few studies have focused specifically on the social outcomes associated with childhood TBI and have relied largely on parent ratings of social functioning. The aim of the current study was to investigate the impact of head injury severity on long-term social outcome and examine child and parent perceptions of social functioning. A total of 30 adolescents and young adults who sustained a closed head between the ages of 8-12 years were examined 7-10 years post-injury, ranging between 16-22 years of age at the time of assessment. Measures of social functioning included parent and adult versions of the Sydney Psychosocial Reintegration Scale (SPRS), Social Skills Rating System (SSRS) and the Adaptive Behaviour Assessment System (ABAS). Findings indicated that adolescents and young adults who suffered a moderate or severe TBI during childhood displayed poor social outcome in comparison to those that suffered a mild TBI. Child and parent perceptions of social outcome will also be discussed.

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Paper Session 15/5:00 – 6:30 p.m.

Neuropsychiatry and Schizophrenia

Chair: Robert Bornstein

A. TAUB, A.C. LOPEZ, C.C. D'ALCANTE, M.E. MATHIS, D. FUENTES, G. MACEDO, E.C. MIGUEL, M.Q. HOEXTER, F.S. GOUVEA, M. CANTERAS, P. MALLOY, B. GREENBERG, G. NOREN, S. RASMUSSEN. Neuropsychological Outcome Following Gamma Knife Capsulotomy for Obsessive-Compulsive Disorder: A Pilot Study.

Gamma-knife surgery is a new treatment option for those patients with obsessive-compulsive disorder refractory to pharmacotherapy and behavioral therapy. The procedure involves cross firing of approximately 200 narrow beams of 60-Cobalt irradiation producing two lesions on the anterior limb of the internal capsule. Neuropsychological studies are needed to evaluate the possible morbidity of the procedure. Aim: To compare neuropsychological performance of refractory obsessive-compulsive patients submitted to gamma-knife surgery before and one year after the procedure. Methods: The patients were assessed with a battery including measures of attention (Trail Making Test), naming (Boston Naming Test), visual memory (Benton Visual Retention Test), verbal memory (Logical Memory subtest of the Wechsler Memory Scale) and intellectual functions (WASI) and the mean scores were compared using non parametric tests. Results: Despite the small size of the sample, (N=4) we observe a tendency to improvement of the intellectual functioning of the group (p=0,06) specially on tests that measure visual-constructive abilities (p=0,068) and verbal expression (p=0,068); a tendency (p=0,06) of improvement in an attentional task requiring self-monitoring and maintenance of simple sequences (Trail A). Three patients showed an expressive improvement on global IQ post surgery, ranging from 8 to 18 points. Discussion: Patients showed better performance on simple attention tasks, which had an impact on other more complex functions. As it is crucial to determine

whether this better performance is primary or secondary to the amelioration of the psychiatric symptoms, we plan to carry out follow-up studies to investigate this.

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P. CUMMING. Expression of Normal and Pathological Traits through Dopamine Neurotransmission, as Measured by PET. Changes in brain dopamine are linked to diverse neurological and psychiatric pathologies.

Results of new imaging studies with positron emission tomography (PET) demand a reassessment of simple binary models of dopamine function, suggesting instead that dopamine influences behavior by modulating the response to instructions from other brain pathways. For example, PET experiments in laboratory pigs show that individual vulnerability to amphetamine-induced dopamine release correlates with a predisposition to investigate novel objects (novelty seeking). While the novelty seeking personality trait is not itself pathological, it is characteristic of people seeking treatment for compulsive gambling, and has also been linked to tobacco addiction. Results of another recent PET study show that, while brain dopamine synthesis was entirely normal within a population of male alcoholics, the individual dopamine levels correlated precisely with intensity of alcohol craving at the time of scanning. The "normal" dopamine system of alcoholics may respond to abnormal instructions, contributing to aspects of the disease, without having a causative role. Elevated brain dopamine synthesis has been reported in several PET studies of untreated patients with schizophrenia. Positive schizophrenia symptoms may arise from an inherent propensity to amplify a cognitive disorder arising in the cerebral cortex. In support of this conjecture, Professor Park has presented at this conference a PET study linking the dopamine system to "paranormal belief" in healthy schizotypal individuals. The predisposition for illness may thus be present, but schizotypal individuals will not without instructions cross the Rubicon.

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POSTER SESSION D/1:00 - 4:30 p.m.

K. LUTZ, P. BÖSINGER, L. JÄNCKE. Processing Knowledge of Results in an Interval Reproduction Task.

Knowledge of results (KR) can influence learning of motor tasks by motivational effects, level of encoding, or just the possibility to update the motor system with additional information. The precision of time reproduction is a paradigm that has been shown to be not significantly influenced by KR, despite the fact that motivation to perform the task is reported to be considerably greater when KR is present. Using fMRI we investigated the processing of KR during a temporal reproduction task with a condition in which an uninformative stimulus served as control. Performance data shows no influence of the feedback on mean accuracy. Functional imaging data show that presentation of the informative feedback compared to uninformative feedback additionally involves the right medial occipital gyrus. On a less conservative significance level, the left anterior cerebellar cortex, right posterior insular cortex, right somatosensory association area, and cerebellar vermis tended to be more strongly activated by informative than uninformative feedback. The activation level in the right inferior temporal pole shows a positive correlation with reported deviation, but the better the reported result the higher the bold response was in right caudate nucleus, left IFG (pars orbitalis), and right medial occipital gyrus. The data give evidence that when KR indicates a good result, premotor and motor structures are involved more strongly than when KR indicates bad

performance. No classical motor or premotor region shows activity related to the explicit feedback of larger errors. This suggestively indicates that in the context of interval reproduction premotor structures may be activated for consolidation rather than updating a motor plan.

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K. LUTZ, S. KÖNEKE, K. BRÜTSCH, C. SCHMIDT, L. JÄNCKE. Perceiving Movement Directions of Multiple Objects: An fMRI Investigation of Highly Skilled Handball Players and Controls.

For the present task, objects moved independently with the same speed in random directions over a computer screen. While moving for 8 seconds they changed directions randomly between 2 and 10 times. At the end of the movement phase, one square was marked and subjects (n=24) were asked to indicate the direction in which that square had last moved. If the choice was correct, the number of moving objects increased by 1 up to a maximum of 10 otherwise the number decreased by 1 down to a minimum of 2 objects. For investigating which brain areas are involved in performance of this task, we analysed only trials which had been answered correctly. During tracking of the objects, fMRI signal was increased relative to a fixation baseline bilaterally in the superior parietal lobules, bilateral inferior occipital gyri, bilateral inferior pre-SMAs, bilateral dorsal premotor areas, bilateral transverse occipital sulci, right inferior frontal gyrus (pars orbitalis), bilateral supramarginal gyrus, bilateral globus pallidus, bilateral nucleus ruber, and right inferior frontal gyrus (BA 44). When the decision has to be made, fMRI signal was increased relative to a fixation baseline in the following areas: bilateral pre-SMAs (anterior to the area activated during the tracking phase), bilateral temporal pole, bilateral inferior frontal gyrus (pars orbitalis), bilateral cerebellar nuclei, bilateral supramarginal gyrus, right middle occipital gyrus. We see an overlapping set of areas, active during observation of movements as well as memory retrieval of a set of recently seen movements. These comprise visual, supplementary-motor, and prefrontal areas.

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S. BAUMANN, M. MEYER, L. JAENCKE. The Neuroplastic Enhancement of Auditory Evoked Potentials in Musicians is not an Attention Effect

Instrumental tones and in some instances simple sine wave tones were shown to evoke stronger auditory evoked responses in musicians compared to non-musicians. This effect was taken as an example for plasticity in the auditory cortex elicited by training. Up to the present, however, it is unknown whether an enlarged cortical representation for (instrumental) tones or increased neuronal activity provoked by focused attention in musicians is responsible for the reported difference. In an attempt to systematically investigate the influence of attention to the processing of various tones we compared auditory evoked potentials recorded from musicians and non-musicians. During the EEG recording the participants were involved in tasks requiring different attention levels to specific sound features such as pitch or timbre. Our results demonstrate that attention does not affect the found differences between musicians and non-musicians at the AEP N1 component. We can also show that attention effects can not explain the reported stronger P2 components in musicians. Current density mapping of the mentioned components further indicates that the differences between musicians and non-musicians originate, at least partially, from the auditory cortex. These results support the theory that the increased AEP on tones found in musicians is a consequence of an enlarged neuronal representation for specific sound features of these tones. Finally, we can show novel electrophysiological data demonstrating that musicians differ from non-musicians specifically in early attention focusing to specific sound features.

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N. PICÓ-AZANZA, L. NIETO -VINYALS, R. SÁNCHEZ-CARRIÓN, A. ENSEÑAT-CANTALLOPS, A. GARCÍA-MOLINA, T. ROIG -ROVIRA. Integrated Psychological Therapy in Traumatic Brain Injuries.

Introduction: The majority of the people than have suffered a traumatic brain injury (TBI) have many deficits in social skills, as a consequence of a combination of cognitive, affective, physical, behavioural and neurological symptoms. Objective: This study investigates the feasibility of applying the Integrated Psychological Therapy (IPT, Roder and Brenner 1996) program to the remediation of social skills deficits following head injured. Patients and Methods: The sample was composed of nine patients (mean age=23.78, SD=3.0) with severe TBI (GCS<8). The patients participated in social skills group therapy during 24 one-hour sessions in Institut Guttmann. IPT is composed by the following subprograms: cognitive differentiation, social perception, verbal communication, social skills and interpersonal problems solving. Multidimensional Scale of Social Evaluation (Caballo 1987), Cognitive (EMES-M) and Motor Scale (EMES-M), Fear of Cognitive Evaluation (FNE) and Social Avoidance and Distress Scale (SAD, Watson and Friend 1969) were applied before and after treatment. Results: Patients showed significant higher scores post-treatment, in EMES-C ($p=0.008$), and in EMES-M ($p=0.008$) total factor score. In reference to SAD ($p=0.02$) and FEN ($p=0.008$), the subjects showed a significant lower score in the post-treatment than in the first test. Conclusions: After the IPT program, we observed a significant improvement in the social skills self-report of the TBI patients. They referred a significant improvement in social skills as well as lower anxiety in interpersonal situations. The results of this preliminary research suggest that despite cognitive impairments, IPT program can be used successfully to remediate social skills deficits consequent to severe head injury.

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P. BÄSS, R. I. SCHUBOTZ, L. HÖFEL, D. Y. VON CRAMON, & T. JACOBSEN. Evaluative Judgment in Patients with Lesions of the Orbital Prefrontal and Ventromedial Prefrontal Cortex and Healthy Controls.

Recent research emphasized the importance of ventromedial and orbital prefrontal cortex in evaluative judgment (e.g. Jacobsen, Schubotz, Höfel & von Cramon, 2006; Zysset, Oswald, Ferstl & von Cramon, 2002). An open question is how patients with lesions restricted to these brain regions would master tasks requiring evaluative judgment. The present study aimed at analysing the performance of 13 patients with anterior prefrontal lesions and matched healthy controls. First ly, the participants were asked to judge 200 novel graphic patterns in a binary response paradigm (symmetric, not symmetric; beautiful, not beautiful). Secondly, another experiment focused on verbal sentences (agreement/ rejection of semantic/ self-related). Behavioral data were assessed in both studies. The results showed differences in the patients' performance in relation to the presented stimulus material. In the case of the judgment of novel figural patterns, neither differences in reaction time nor in judgment strategies between the both groups could be observed. Otherwise, the patients needed more time for their responses in the verbal judgment task. In both experiments, no reaction time differences between evaluative (beautiful or self-related) vs. non-evaluative (symmetric or semantic) judgment could be found. Both experiments showed faster responses for an agreement as compared to a rejection. Taken together, the object of the judgment, which is related to the use of memory processes (verbal sentences vs. novel patterns) and the stimulus format (verbal vs. figural), appears to influence the performance of patients with orbital and ventromedial prefrontal lesions in evaluative judgment.

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G.R. TURNER, M. MANDIC, A. RESTAGNO, & B. LEVINE. Characterizing Alterations in Neural Substrates Subserving Executive Control & Storage/Rehearsal Processes in Working Memory after Diffuse Axonal Injury.

Working memory paradigms have been used to investigate alterations in neural activity following brain trauma. However, no investigation has independently manipulated executive-control and storage/rehearsal processes within working memory, in vivo, in this population. Moreover, few neuroimaging reports of functional reorganization following brain damage stratify participant samples based on the presence or absence of focal lesions, making it difficult to dissociate contributions of focal cortical contusions (FCC) and diffuse axonal injury (DAI). We employed a modified Alphaspan task wherein participants alphabetized or maintained 3 or 5 letter sets during a delay while undergoing fMRI scanning. Participants included persons with moderate/severe brain-injury in the chronic-phase without evidence of FCC on MRI and age/education-matched controls. Participants with DAI and controls demonstrated the predicted pattern of greater left DLPFC activity during alphabetization, consistent with the hypothesized role of this region in executive control processes. However, DAI participants demonstrated greater activation in areas associated with verbal rehearsal during alphabetization whereas controls exhibited greater activation in more posterior visual processing areas suggesting (i) differences in strategic approach to task performance or (ii) neuroplastic change within a wider network subserving executive control following DAI. Controls demonstrated increased activation in areas implicated in storage/rehearsal during higher memory loads whereas DAI participants failed to demonstrate significantly altered activity during this load manipulation – suggesting neural activation may 'plateau' earlier with increased processing after DAI. These preliminary conclusions implicate DAI – without FCC – in altered neural activity patterns associated with executive control and storage/rehearsal processes within working memory.

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S. RAO, K. BOYER, A. BERGIN, J. MADSEN, C. MACMILLAN, S. KORNDÖRFER, J. GONZALES - HEYDRICH. Behavioral and Emotional Functioning in Patients with Epilepsy Treated with Vagal Nerve Stimulator: A Naturalistic Follow Up Study.

Patients with intractable epilepsy (IE) are at greater risk for developing psychological disorders. There are no controlled studies of the psychological effects of Vagal Nerve Stimulator (VNS) implantation for pediatric IE. Twelve patients (male=7, female=5, age=13±5) with complex neurobehavioral conditions and IE received VNS (n=8), Ketogenic Diet (KD) (n=3), or a modified anti-epileptic drug regimen (AED) (n=1). Patients were administered the Nisonger Child Behavioral Rating Form (NCBRF) at treatment initiation (V1) and 1 (V2) and 2 months (V3) afterwards; scores were compared, regardless of treatment, between each time point using the Wilcoxon Signed Rank test. Seizures did not decrease significantly following treatment initiation. NCBRF problem behavior scores decreased significantly ($P=0.016$) between V1&V2 (45+35, 34+33) and continued to decline, but did not reach significance at V3 (23+16, n=7). Further analysis indicated specific significant declines in hyperactivity ($P=0.005$) and conduct problems ($P=0.016$) between V1&V2. No subjects' problem behaviors increased between V1&V2. A repeated measures linear regression indicated that, after controlling for seizure frequency, there was a significant relationship between time in weeks and total problem behavior scores ($P<0.0001$). There was a significant main effect of seizure frequency on problem behavior scores, as well as a significant interaction of seizures and time; however the strongest effect was of time. Patients experienced a

significant decrease in problem behaviors following new treatment initiation. These preliminary data suggests that the functional impact of VNS, KD and AED treatments may extend beyond seizure control. This study will continue recruiting and following patients for all treatment groups.

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A. WÜTHRICH. Ambulant Neuropsychological Rehabilitation Following a Mild Traumatic Brain Injury and/or Whiplash Associated Disorder: Neuropsychological-Oriented Psychotherapy, Neuropsychological Training and Art Therapy.

This poster introduces the concept of care behind an ambulant neuropsychological rehabilitation program developed by Dr. phil. A. Wüthrich in Basel (Switzerland) which is designed for patients recovering from mild traumatic brain injury (MTBI) or whiplash associated disorder (WAD). This concept is based on an individual case study and incorporates neuropsychological training and art-therapy, in addition to neuropsychological-oriented psychotherapy. The main focus of the therapeutic measures include: optimizing pre-injury abilities; initiating and supporting necessary changes in behaviour, interpersonal interaction and other basic habits and routines; recognizing problems and developing alternative strategies related to impaired cognition and problem-solving capabilities; as well as treatment of psychosocial and emotional difficulties. Recommendation for Neuropsychological Rehabilitation: The therapy has to be particularly tailored to the everyday life and specific family, work or educational setting of the individual patient. The main aim is the development of new skills, ways of thinking and behaviour through dealing with actual situations. Supporting patients as they face the uncertainty and complexity of post-injury reality especially means to accommodate the patient's own lack of knowledge and experience in coping with such circumstances.

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A. WÜTHRICH & B. HAFNER. Self-Evaluation of Attention Deficiency of Patients Following Mild Traumatic Brain Injury and / or Whiplash Associated Disorder.

Within the scope of a selective survey to assure the quality of neuropsychological and psychological therapy, sixty-six patients were asked concerning their perception of deficiencies of their own attention. These patients were assessed using a newly-developed self-evaluation questionnaire featuring everyday attention (FEAA-S) introduced by Bühner, Schmitz-Atzert, Richter & Grieshaber (2002). The assumption was that the outpatient sample of the survey would indicate a greater extent of impairment compared to the inpatient sample and a sample of students assessed by Bühner's research group. Results: Patients in the ambulant setting showed a significant greater extent of perceived attention impairment than the patients in the stationary setting and than the students of the research group. Conclusion: Self-evaluation descriptions of attention deficiencies seem to greatly depend upon the situational context of the self-evaluator. In ambulant settings patients are confronted with their abilities and disabilities to cope with everyday life and therefore have a greater awareness and concern about their new impairment. Also, neuropsychological therapy focuses on such deficits and aims to develop strategies for alleviating these difficulties. Thereby, in such a context there is a greater probability that impairment will be thematized. In contrast, the patient's experience of attention deficiency and impairment in the protective surroundings of stationary rehabilitation clinics is not at all comparable to what will be encountered in everyday life.

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S. RAU, A. SAEMANN & A. WÜTHRICH. Method and Effectiveness of Artwork.

Based on individual artistic work with patients with mild traumatic brain injury (MTBI) and/or whiplash associated disorder (WAD), two case studies demonstrate the method and effectiveness of therapy through painting and material modeling. The developmental steps of the patients are demonstrated in their artwork. The aim of the therapeutically-guided, artistic activity is a process of supporting the development of such capabilities as taking initiative and persevering, as well as constructive, spatial thinking. Thereby, the resulting artwork is not decisive, but rather the generative process in itself is to be emphasized.

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I. LIMA & A. WÜTHRICH. Depression After Mild Traumatic Brain Injury and/or Whiplash Associated Disorder: Artefact or Reality?

Introduction: There is considerable disagreement in scientific literature as to the posttraumatic sequelae of mild traumatic brain injury (MTBI) and whiplash associated disorder (WAD). When symptoms persist, often this is assumed to be due to an inadequate emotional reaction. Thereupon, depression or adjustment disorder is pronounced as the diagnosis. Sufficient grounds of such diagnoses are generally considered to be the existence of some symptoms or results of self-evaluation questionnaires. Method: In this study sixty patients were assessed using the Beck Depression Inventory (BDI) to examine the appropriateness of self-evaluation questionnaires in identifying depression. As a "gold standard" a structured interview (Diagnostisches Interview bei psychischen Störungen, DIPS) was conducted among the same sample of patients. Results: Over 50% (n=31) of the patients had a total score of 18 and more according to the BDI, a result which would be assessed as clinically-relevant depression; however, on the basis of the DIPS interview, depression could only be distinguished in less than 7% (n=4) of these same patients. Further, two of the patients were assessed as having post-traumatic stress disorder and two patients were diagnosed as having pain disorder. Conclusions: An overlap of symptoms exists between diagnostic criteria of depression and symptoms attributable to MTBI and/or WAD. Overdiagnosis can be evoked through using self-evaluation questionnaires, as most of these do not address the specific considerations required under such circumstances. Structured interviews are therefore required for making a diagnosis of depression after MTBI and/or WAD in order to avoid overrating the incidence of emotional sequelae.

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J.B. SUFFIELD, A.L. SIEGENTHALER, G. ISABELLE, & B. UTTL. Mild Traumatic Brain Injury: Is There a Relation between Pre -Injury Life Stress and Vocational Outcome?

Many factors are thought to contribute to outcome from mild traumatic brain injury (MTBI). Some of these factors include age, education, psychiatric history, severity of injury, compensation / litigation status, premorbid substance abuse, and previous head injury. It has also been suggested that high life stress is a risk factor for prolonged recovery. We investigated this hypothesis amongst workers with MTBI, referred by their compensation board for a 2-hour neuropsychological intake interview and education session. As a measure of premorbid stress, we administered the Recent Life Changes Questionnaire (RLCQ), also known as the Holmes/Rahe Social Readjustment Rating Scale. This measure asks respondents to identify stressors (e.g., illness, promotion / demotion at work, pregnancy, divorce, financial changes, etc.) experienced within a specified time period -- in this case, the year before injury. Outcome measures included the number of support services recommended after

the initial interview, return to work, and days to return to work. Amongst more than 200 consecutive referrals, we observed no clear relationship between scores on the RLCQ and vocational outcome. The contribution of other factors such as age, gender, severity of injury, comorbid injuries, extent of presenting symptoms, psychiatric history, and previous head injuries is considered. We discuss the implications of these findings for models of early intervention and rehabilitation of MTBI within a workers' compensation environment. Correspondence: *J. Braxton Suffield, Dr. J.B. Suffield & Associates, Suite 700, 1816 Crowchild Trail NW, T2M3Y7 AB, CA. E-mail: dribs@telus.net*

S. SHAVEL-JESSOP, P. RANKIN, & F. VARGHA-KHADEM. Intellectual Outcome after Hemispherectomy.

Hemispheric specialization for verbal and nonverbal functions is well documented in adults. In contrast, there is a dearth of evidence for such specialization in children with extensive unilateral lesions. Here we report on verbal and nonverbal intellectual outcome in two patient groups with epilepsy and unilateral lesions sustained during different stages of development (congenital, early < 5 years, late > 5 years). The first group sustained hemiplegia inducing lesions with epilepsy but did not undergo neurosurgery (N=52, left cerebral lesions N=24) and the second group (N=36) received hemispherectomy for the relief of intractable seizures (left hemispherectomy N=19). The interaction between lesion side and age at injury was examined using discrepancy scores between verbal and nonverbal IQs. Mean full scale IQs for the non-surgical groups were in the low average range, whereas those for the hemispherectomy groups were over two standard deviations below the normal mean. Despite this difference, a similar profile was indicated in verbal and nonverbal IQs in both patient groups: Verbal IQ was relatively better preserved compared to nonverbal IQ in the congenital and early groups irrespective of side of injury, and in the late right group. The reverse pattern was found in the late left group where verbal IQ was significantly impaired relative to nonverbal IQ. Thus, in the two late hemispherectomy groups there is evidence of a double dissociation mirroring the pattern of hemispheric specialization reported in adults. These results are discussed in terms of ontogenetic specialisation and the implications for evaluating children for epilepsy surgery.

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R. EVERTS, C. KIEFER, F. KAUFMANN, K. LIDZBA, M. WILKE, W. PERRIG, G. SCHROTH, M. STEINLIN.

Reorganisation of Cognitive Functions after Unilateral Stroke in Childhood - A Functional MRI (fMRI) and Diffusion Tensor Imaging (DTI) Study.

Purpose: To study functional and structural recovery after paediatric stroke by combining two complementary imaging methods and to know more about plasticity of cognitive functions in children after stroke.

Methods: Children after unilateral stroke and healthy controls were examined with fMRI and DTI. Four paradigms activating unilateral areas were performed (language tasks: left hemisphere (LH), visual search tasks: right hemisphere (RH)). Results: 11 children (aged 0.7-15.5, 9 boys) were examined. The control group consisted of 20 healthy, right-handed German-speaking children (aged 6.9-20.5, 11 boys). Controls showed an increase of laterality of language and visual search functions throughout childhood and adolescent. Children after LH stroke (n=6) showed bilateral language activation and a strong shift of cingular activation to the RH. Different patterns of reorganization occurred for visual search after RH stroke (n=5): there was a shift of parietal RH activation to frontal RH areas but no activation in the undamaged LH. There is a significant shift of cingular activation to the LH. DTI of patients compared to controls showed an alteration of the white matter in the anterior corpus callosum corresponding strongly with the functional shift detected in

cingular areas. Conclusion: In healthy children, laterality for language and visual search is increasing throughout childhood and adolescence. After stroke children may show a contra- and ipsilateral reorganisation of LH functions (language). However, RH function (visual search) tend to reorganise solely within the RH. Functional reorganisation found in cingular areas corresponds clearly with structural changes in the white matter detected with DTI.

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L. KAUFMANN, N. ZIEREN, B. FIMM, S. ZOTTER, D. KARALL, S. SCHOLL-BÜRGI, L.-B. ZIMMERHACKL, E. HABERLANDT. An Explorative Analysis of Attentional Profiles in 9 to 12 Year-Old Children with Temporal Lobe Epilepsy, Metabolic Diseases and ADHD.

Background: Great importance is attached to the attentional performance of school-age children. Attentional problems are frequently reported in different pediatric patient groups. Main aims of this study were a) to compare attentional abilities across various neuropsychiatric populations and in comparison to matched controls; and b) to assess whether our patient groups exhibit dissociable attentional profiles. Method: We employed a PC administered child-friendly test series tapping alertness, selective attention, visuo-spatial attention, attentional flexibility, inhibition, divided and sustained attention, and vigilance (KITAP; Zimmermann, Gondan, & Fimm, 2004) to 85 children that were matched on age, sex, handedness and intellectual abilities. Inclusion criteria were clinical diagnosis of temporal lobe epilepsy (n=19), metabolic diseases (n=12), attention-deficit hyperactivity-disorder (ADHD; n=19) and healthy controls (n=35). Results: Our data provide first evidence of dissociable attentional profiles (regarding both response accuracies and latencies) in different pediatric patient groups relative to controls. The most reliable discrimination could be achieved between children diagnosed with ADHD and controls, while the remaining patient groups (temporal lobe epilepsy and metabolic diseases) displayed more variable response patterns. Group differences between ADHD and controls became significant regarding tasks tapping fronto-executive attention network (inhibition, divided attention, attentional flexibility) and vigilance, while tasks tapping the posterior attention network (visual scanning) did not differentiate between groups. The latter results nicely fit the anatomo-functional attention model proposed by Posner & Peterson (1990). Finally, across all tasks standard deviations of response latencies were found to have high discriminative power in identifying ADHD children.

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J. KÜST, U. JACOBS, H.KARBE. Driving Ability after Neurological Disease: A Quantitative Analysis.

Despite the importance of driving ability after neurological diseases, there are nearly no databases available on indication specific risks. Especially in countries with no obligation to inform traffic authorities about neurological diseases, like in Germany, data gathering is restricted. At the end of neurological rehabilitation we often consider patients as able to get back to work, but we are hazy about their driving ability. In our study, we examined therefore the driving ability in 694 neurological patients according to the German national laws on driving after diseases ('Fahrerlaubnis-Verordnung FeV'). We conducted a specific neuropsychological as well as a neurological assessment. The neuropsychological assessment consisted mainly of tests on visual perception and attention functions. The neurological examination included assessment of motor handicaps, seizure disorders and drugs influencing reaction-time. According to the medical criteria 45% failed the assessment, according to the neuropsychological criteria 53%. For 61% of the patients, not driving was a great handicap for reaching their work place. Even more important, 44% of the sample had to drive during their work. The work-related driving tasks e.g. included visiting clients or sourcing of

material. The high incidence of limited driving ability at the time of discharge from neurological rehabilitation indicates a high need of specific driving rehabilitation programs. However, our data open opportunities of successful driving rehabilitation, because the most limiting factors in our sample were attention deficits, which can be rehabilitated with appropriate therapeutic methods.

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U. BAAS, K. GUTBROD, P. WURTZ, R. MÜRI, W. PERRIG. Personal Neglect: A Disorder of Body Representation?

The aim of the present study is to examine whether neglect of the left body is due to a disturbance of body representation (c.f. Mesulam, 1985). In a study of Coslett (1998), three patients with left-sided neglect had to evaluate whether central presented single hands – presented as palm or back of the hand – were a left or a right hand. He showed that these patients had particular difficulties with the evaluation of left hands. Coslett (1998) argued that hemispatial neglect could be associated with a disorder of body representation. However, his patients were only tested for visual and not for body neglect. Thus, it is unclear whether these difficulties in the so-called “body-schema” are specifically linked with left-sided body neglect or hemispatial neglect in general. Therefore, we study patients with or without personal and/or extrapersonal neglect using a similar design as Coslett (1998). Additionally, reaction times were measured. Preliminary results from 23 right brain-damaged patients show that (1) Coslett’s results that left visual neglect is associated with a left-sided body representation disorder could not be replicated, but that (2) personal neglect is associated with difficulties in evaluating left hands. Thus, personal neglect seems to be – at least partially – due to problems in representation of the left body half (Mesulam, 1985), rather than due to an attentional disorder for incoming somatosensory stimuli (Semenza, 1991).

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E. HESSEN, M. LOSSIUS, I. REINVANG, & L. GJERSTAD. Neuropsychological Function in Seizure-Free Epilepsy Patients.

Persons with epilepsy are at increased risk of cognitive deficits as a result of various factors like aetiology, structural brain lesions, seizure frequency, seizure type, age at onset of epilepsy, hereditary factors, psychosocial factors and possible adverse effects of anti epileptic drugs (AED). Even though the majority of epilepsy patients are seizure free previous studies on the relationship between epilepsy related variables and cognitive function have been conducted on patients with active epilepsy. In the current study 159 adult epilepsy-patients on AED’s and without epileptic seizures for at least two years were investigated with a neuropsychological test battery in addition to a neurological examination, MRI and EEG. The major findings of the study were that the group has education and employment status similar to the population mean in Norway and neuropsychological function in the normal range. The most important risk factors for neuropsychological deficits were presence of known aetiology or pathological MRI.

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N. FERRI, O. RENAU, M.C. GARCÍA, J. FERRI, J. CHIRIVELLA, L. DE LA CUEVA, E. NOÉ. Psychosis Following Traumatic Brain Injury: Genetic Influence and Functional Neuroimaging Data.

Objective: To determine the influence of genetics (APOE ϵ 4) in the appearance of a Psychotic Disorder Due to a Traumatic Brain Injury (TBI) and the utility of functional neuroimaging techniques (FDG-PET) in the understanding of this disorder. Methods: The initial sample included 169 patients who had suffered a TBI referred to our

hospital for neuropsychological rehabilitation. Definitive sample included 116 patients who were out of posttraumatic amnesia during the follow-up period. Patients with psychosis secondary to TBI should meet DSM-IV diagnostic criteria. Apolipoprotein E (APOE) genotype was determined by amplifying genomic DNA extracted from a blood sample. FDG-PET data of all psychotic patients were compared to a paired sample of non-psychotic patients. Results: Three patients developed post-traumatic psychosis. Psychosis showed an acute onset with a good therapeutic response to atypical neuroleptics in two patients. Delusions and disorganized thoughts were present in three patients. Only, one subject showed auditory hallucinations. APOE genotype was available in 71 patients and FDG-PET in 72. Genetic analysis of non-psychotic patients showed the presence of an APOE ϵ 4 allele in 11 of the 68 non-psychotic patients who were analyzed. All three psychotic patients were APOE- ϵ 4 carriers. FDG-PET showed a moderate right-frontal hypometabolism in 100% of the psychotic patients and in 28 of the 69 non-psychotic patients ($\chi^2=0.04$, $p<0.05$). Conclusions: Post-traumatic psychosis seems to have a multifactorial origin with genetic predisposition. We suggest that both the presence of an APOE ϵ 4 allele and right frontal hypometabolism, may act as predictors of post-traumatic psychosis.

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N. LULL, G. GARCÍA, E. NOÉ, L. DE LA CUEVA, J. CHIRIVELLA, J. J. LULL, R. SOPENA, M. ROBLES. Association between Neurological Outcome and Thalamic Metabolism in Patients with Traumatic Brain Injury: An FDG-PET Study.

Introduction: Since acceleration-desacceleration forces generated during a closed traumatic brain injury (TBI) have a centripetal progression, severity of TBI, in terms of neurological and functional outcomes, is directly related to the depth of the lesions. Thus, more severe TBI affects predominantly subcortical structures. Objective: It is hypothesized that patients with thalamic hypometabolism after TBI represent a subset of subjects highly vulnerable to neurological and functional disability. Methods: Nineteen patients (mean age 28.4 ± 11.5 SD) with severe TBI underwent 18F-FDG-PET 285.4 days (331.6 SD) after the TBI. Six patients were diagnosed as being in vegetative or minimally conscious state according to the Loewenstein Communication Scale while thirteen patients were not. FDG-PET images were normalized in intensity and a metabolic group template was created from all subjects. Thalamic tracing was automatically generated with a region of interest mask. A comparison between the two groups was carried out by a two sample voxel-wise T-test, under the General Linear Model (GLM) framework. Results: The two-sample T-test revealed significant differences in glucose metabolism in the thalamus between the two groups. Patients with poor neurological outcome (vegetative or minimally conscious state) showed the lowest thalamic metabolism. These differences were greater in the inner regions of thalamic nuclei. Three main maxima were found in MNI-Talairach space coordinates: (-6,-20,2) $p<0.000$, (-14,-28,12) $p<0.001$ and (-18,-10,14) $p<0.001$. Conclusions: FDG-PET may be an important ancillary tool to evaluate neurological outcome after TBI. Persistent vegetative state may be the result of functional or anatomic disconnection between the cerebral cortex and thalamic nuclei

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M. RINGLI. Effects of Musical Training on Auditory Mismatch Negativity (MMN) in Suzuki Children.

Recent studies using the auditory mismatch negativity (MMN) reported superior preattentive auditory processing in adult musicians compared to musical novices. So far little is known about the effect of long-term musical training on the preattentive auditory functions in children. In this study we recorded the MMN evoked by violin and pure sine-wave tones in a group of 7.5 – to 12-year old children who

either participated in Suzuki violin lessons or have not subject to musical training. Deviant tones differed from standard conditions in intensity, duration, and frequency. Suzuki children showed larger MMN amplitudes and shorter latencies to timbre tones than to pure tones, where amplitude and latency did not significantly differ between conditions in the control group. In addition, MMN amplitudes to timbre tones in Suzuki children clearly surpassed amplitudes in controls, but were not different in the pure tone condition. No significant differences between groups were found for latencies in any condition. These findings indicate a profound influence of instrumental training on preattentive auditory discrimination processes, which can even be shown in the brain of children this age. Moreover our data implies that musical experience affects auditory function not generally but in a very specific manner. Stronger effects for amplitudes than for latency may point to different developmental levels, indicating greater influence of musical training on accuracy than speed of auditory discrimination processes.

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L. DE BEAUMONT, M. LASSONDE & H. THEORET. Impaired Intracortical Inhibitory Systems after Incident Concussions.

Objectives: Using transcranial magnetic stimulation (TMS) paradigms, this study prospectively investigated motor cortex integrity as a result of having sustained incident concussions. **Methods:** Five multiple concussion Football players who had been tested more than nine months prior to testing agreed to be retested as a result of having sustained another concussion. We examined motor systems excitatory and inhibitory mechanisms using transcranial magnetic stimulation protocols: 1) Resting motor threshold; 2) Intracortical inhibition (paired-pulse ICI) and intracortical facilitation (paired-pulse ICF) in a paired-pulse paradigm; 3) Excitability of the corticospinal system at different TMS intensities (input/output curve); and 4) Intracortical inhibition (ICI) in a cortical silent period (CSP) paradigm. TMS-induced motor-evoked potentials were recorded from the first dorsal interosseous muscle of the right hand. **Results:** While repeated-measure ANOVA revealed equivalent resting motor threshold, paired-pulse intracortical inhibition and facilitation, input/output curves, and neuropsychological test scores at testing date 1 (Time 1) with that obtained at testing date 2 (Time 2), the length of the cortical silent period was found to be significantly prolonged as a result of incident concussions $F(1, 4) = 8.795; P = 0.041$. **Discussion:** This result is particularly relevant as it shows that the detrimental effects of incident concussions on intracortical inhibitory systems of the motor cortex are cumulative. Moreover, it further strengthens the possible association between having sustained incident concussions and the later development of neurodegenerative diseases such as Dementia Pugilistica.

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A. BLICKENSTORFER, R. KLEISER, T. KELLER, B. KEISKER, R. RIENER, S. KOLLIAS. Cortical Correlates of Functional Electrical Stimulation (FES) of Wrist Extensors and Flexors: A fMRI Feasibility Study.

Functional Electrical Stimulation (FES) is used in the rehabilitation therapy of patients after stroke or spinal cord injury (SCI) to improve their motor abilities. Its principle lies in applying repeated electrical stimulation on the relevant nerves or muscles. Applying FES in an MR-environment is challenging due to electric currents that can cause imaging artefacts and has been limited explored. In this feasibility study we report cortical activation patterns in healthy subjects undergoing fMRI during FES stimulation. We stimulated the wrist extensors muscles (WEM) and flexors (WFM) while BOLD-fMRI was performed. We used two designs: (1) Block design: one block consisted of an alternating 1s stimulation of WEM and WFM, the other block was a rest condition. One block lasted 21s and consisted of 7 scans. (2) Event-related design: alternating 1s stimulation of the

WEM and 1s stimulation of the WFM every 18-20s. The subjects reported no discomfort and the obtained fMRI images were free of artefacts. The analysis revealed in both block design and event related design an activation pattern mainly in the contralateral primary motor cortex (MI), primary somatosensory cortex (SI) and premotor cortex; the ipsilateral cerebellum; bilateral secondary somatosensory cortex (SII), the supplementary motor area (SMA) and anterior cingulate. FES can be safely applied in an MR-environment. The technique can be used for assessing plastic changes associated with FES rehabilitation treatment in patients after stroke or SCI. Correlation of these changes with motor output and electrophysiological measurements will offer a better understanding on the mechanisms of motor recovery.

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J. KALLAI, J. JANSKY, F. NAGY, K. KARÁDI, A. CSATHO, E. JAKAB, S. KOMOLY, T. DÓCZI. Description of Perceived Spatial Configuration of Large Scale Place in Epileptic Patients with Hippocampal Atrophy.

The rate of hippocampal HP sclerosis links to poor ability to remember paired words associations and short prose passages. Similar poor verbal performance was found in patient with temporal lobe damage without HP lesion or sclerosis, and patients with sclerosis in either the left or right hippocampus as well as extrahippocampal lesions in the left temporal lobe interfered with the ability to learn the word pairs, but not with more semantically complex tasks. Our study focused on studying material-specific spatial memory deficits and verbal memory performances differences in epileptic patients with left or right HP atrophy. The subjects were instructed to give a report on finding a way among navigation cues after completed and negotiated an arena maze and to describe objects, scenes or configuration of a surrounding in this standard task. A critical issue in spatial context description is the formation of mental representation of experienced space that depends upon an ability to pick up and collect spatial information on the affected environment. **Results:** Account of spatial language may distinguish three basis of reference (1) the viewer (deictic, egocentric, peripersonal), (2) objects (intrinsic, landmark based), (3) external sources (extrapersonal, allocentric) references to describe spatial feature of the context. We found that the spatial description of a standard environment differ between subject with left or right hippocampal sclerosis. The deictic verbal report patters dominated in subject with intact left but damaged right hippocampus. However, an allocentric describing patter was found in subject with intact right and damaged left hippocampus.

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E. GEISER, S. MORENO, M. BESSON, L. JANCKE, M. MEYER. Implicit and Attention Driven Processing of Speech Melody.

The present experiment investigated the neural correlates of speech melody processing in implicit and explicit processing conditions. French three-word sentences manipulated according to a 2*2-design including four experimental conditions (prosodically correct vs. prosodically incorrect and semantically correct vs. semantically incorrect) were presented to subjects in an fMRI experiment (Astesano, Besson, & Alter, 2004). The prosodically incorrect sentences were constructed by cross-shifting the intonation of question vs. statement sentences. The semantic mismatch-condition was constructed by replacing the verb of the correct sentences by a semantically incorrect verb. Subjects were to perform either a semantic (implicit processing condition) or a prosodic (explicit processing condition) acceptability judgment. Behavioural results suggested a clear effect of task for reaction time as well as for the performance rate. Subjects performed significantly faster and better on the semantic task. Region of Interest (ROI) analysis performed on the functional data suggest an involvement of the inferior frontal

gyrus (IFG) and anterior insula in the processing of prosodic mismatch which is differentially lateralized in explicit and implicit processing conditions. Implicit processing occurs in the right hemisphere while explicit processing is processed in the left hemisphere.

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H. BAILLIEUX, H.J. DE SMET, P. PAQUIER, P.P. DE DEYN, & P. MARIËN. Neurobehavioral Alternations in an Adolescent following Posterior Fossa Tumor Resection: The Cerebellar Cognitive Affective Syndrome.

Background: The posterior fossa syndrome (PFS) is a well-known clinical consequence of posterior fossa surgery. It consists of a variety of symptoms, including cerebellar mutism, behavioral disturbances and personality changes. Case-Report: The clinical, neuroradiological and neurobehavioral findings are reported in a 19-year-old left-handed patient, diagnosed with Attentional Deficit Hyperactivity Disorder (ADHD) at the age of 12, who underwent posterior fossa tumor resection. Although the patient did not develop cerebellar mutism after surgery, neurobehavioral alterations became apparent after an interval of normal postoperative functioning. Apathy, eye-lid apraxia and urinary retention closely resembled some of the typical characteristics of the PFS. During this phase, a SPECT scan of the brain showed a relative hypoperfusion in the frontal lobes, occipital lobes and caudate nuclei, reflecting the phenomenon of cerebellar-cerebral diaschisis. Long-term follow-up revealed persisting cognitive and affective deficits, resembling the cerebellar cognitive affective syndrome in adults. A follow-up SPECT study one year post-surgery revealed remission of the supratentorial deficits, but a decreased blood-flow persisted in the thalamic and caudate nuclei. Conclusion: The PFS might be considered a semiological heterogeneous condition with variable clinical expressions ranging from full-blown PFS to mild but significant neurobehavioral alterations. In addition, repeated SPECT studies during the immediate post-operative phase and during follow-up corroborate the view that the PFS might represent a diaschisis phenomenon reflecting the metabolic impact of the cerebellar lesion.

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S. SCHUBERT, A. PABST, S. GOEBEL, B. BESTMANN, R. BUHL, T. KUECHLER, R. FERSTL & H.M. MEHDORN. Development, Psychometric and Clinical Validation of an Instrument for Quality of Life Assessment in Patients with Intracranial Tumours.

Both benign and malign intracranial tumours lead to considerable neurological and neuropsychological disturbances resulting in decreased health related quality of life (HRQOL). Thus, apart from the assessment of survival and functional outcome the subjective well-being is exceedingly relevant. This effect of intracranial tumour diseases on HRQOL has not been documented in detail by the use of a standardized cancer-specific, symptom-specific and multidimensional questionnaire. We developed a self-report questionnaire-module for the use with the widespread used EORTC-QLQ-C30. This module was designed for clinical assessment of preoperative HRQOL in patients with any kind of intracranial tumours in German-speaking countries. Module development proceeded through several stages including the listing of possible symptoms on the basis of interviews of professionals and patients and research in literature, item formulation, field testing on 40 patients during their preoperative neurosurgical stay and subsequent item reduction, scale construction and assessment of the internal consistency (Cronbach's coefficient α) as well as split-half-reliability. Differences in responses of patients with left- and right sided intracranial tumours were investigated as well as differences between the responses of patients with benign to malign graduated tumours (WHO^o I to IV). External validation has been accomplished by means of detailed neuropsychological data and the Karnofsky Performance Score. Summarizing, the developed module proved to be a reliable and valid instrument for quality of life

assessment in German-speaking patients with intracranial tumours. Follow-up versions for postoperative and long term assessment are in preparation.

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A. JAVURKOVA, P. MARUSIC, M. TOMASEK, H. KRIJTOVA, J. ZARUBOVA, J. ZAMECNIK. Neuropsychological Findings in Patients with Hippocampal Sclerosis - Influence of Associated Malformation of Cortical Development in Temporal Pole.

PUPROSE: Presence of temporal pole pathology, mainly malformation of cortical development (MCD) in addition to hippocampal sclerosis (HS) might correspond to different aetiology of mesial temporal lobe epilepsy (MTLE). The aim was to compare neuropsychological findings in groups of MTLE/HS patients with and without associated microscopic MCD. METHODS: 34 patients with diagnosis of refractory MTLE were included - mean age 31,8 years, range 21-58. No overt pathology except of HS was revealed by MRI examination. Following anteromedial temporal lobe resection hippocampus and part of temporal pole were histopathologically examined. HS was confirmed in all cases and pathological changes in temporal pole classified. Patients with atypical language lateralization were excluded (n=7). Of the remaining, 16 patients had left-sided surgery; on histopathological examination MCD was present in 10 (left HS+) and was absent in 6 patients (left HS). Right-sided surgery was performed in 11 patients; MCD found in 3 (right HS+) and absent in 8 (right HS). Results of presurgical neuropsychological assessment were compared in distinct groups of patients. RESULTS: In comparison of left-sided groups: HS patients scored worse in general intellectual performance and verbal learning; HS+ patients showed lower performance in delayed verbal recall and had lower scores on contralateral application in intracarotid methohexital procedure (IMP). In comparison of groups with isolated HS (left vs. right), right-sided patients had lower performance in delayed visual recall and on contralateral application in IMP; they scored also lower for depression and neuroticism. CONCLUSIONS: The neuropsychological finding in MTLE/HS patients may be influenced by presence of associated microscopic MCD in temporal pole.

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I. SPEICHT, A. REICHL, U. HÜRLIMANN. Attentional Demands of Balance Control after Stroke.

The relationship between attention and postural control is an expanding area of research revealing the role of cognitive factors in the control of balance. The purpose of this study was to determine the effects of impaired attentional capacity on postural stability in a dual-task situation. Sixty-two subjects were tested: 15 young adults, 10 healthy older adults and 37 older stroke patients of the Department of Neurology. Subjects were asked to maintain steady stance during a no-task or a dual-task condition (fast forward digit counting task). Postural stability (amplitude, anteroposterior and lateral sway) was measured using the center of pressure (COP) displacement of a dual-plate static force platform. Stroke patients also performed tests of alertness and selective attention, additionally visual-spatial judgments of the subjective vertical were obtained. In the no-task condition the stroke patients, as expected, swayed significantly more than either of the two other groups. The addition of a concurrent cognitive task significantly increased the amplitude and ipsilateral direction of sway in the patient group but had no effect on the young or older healthy adults. Further analysis revealed that significant COP-displacements only occurred in the attention-impaired subgroup of the stroke patients without being associated with the subjective vertical orientation judgments. Results from this study show that impaired attentional capacity in stroke patients affects their postural stability during performance of a secondary cognitive task, while stroke patients with

overall attentional ability perform like healthy older adults. Implications for neurological rehabilitation are discussed.

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A. MLEKO, C. GOLDEN, S. TANNER, W. BURNS, J. REINEHR, & L. MARQUES. Impact on Age and Lesion Location on Neuropsychological Functioning in Pediatric Closed Head Injury.

The purpose of this study was to investigate the need to consider a combination of both age at injury and neuro-radiological results, when interpreting clinical findings of memory and learning impairment following pediatric brain injury. The relationship between age at injury and lesion characteristics on intellectual and memory outcome was investigated in a sample of forty-six children aged 6 to 16 years who has sustained a closed head injury (CHI). Neuroradiological analysis was based on a series of computed tomography (CT) scans that primarily focused on signs including the presence of frontal, extrafrontal, and diffuse axonal injury (DAI). A series of 2x3 ANCOVA's were conducted on intellectual and memory indices, controlling for injury severity. Results indicated that presence of DAI was indicative of lower performance on all indices except on WISC-III VC. A significant interaction between age and lesion location was present on the WISC-III FD. Processing speed deficits, which have been cited in a number of studies as being prevalent in CHI populations, were predominantly associated with DAI in the current sample. Findings suggest that the utilization of CT data and age at injury may be useful for rehabilitation specialists in understanding the short-term behavioral outcomes of CHI in children and in providing appropriate discharge recommendations. Implications for future research are discussed.

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K. GALARZA, J. FULMER, A. MLEKO, W. BURNS, & L. MARQUES. Efficacy of Cognitive Rehabilitation in Children with Serious Emotional Disturbance.

The present investigation examined the efficacy of two cognitive training devices, Captain's Log (CL) and NeurXercise (NX), in training attention, concentration, and memory in a sample of children with serious emotional disturbance (SED). The study consisted of a randomized repeated measures design. An initial baseline neuropsychological evaluation of attention, intelligence, achievement, and behavior was followed by a cognitive training protocol, which included counterbalanced administration of the CL and NX to assess practice effects of the cognitive training exercises. Baseline was reassessed and then followed by a second cognitive training protocol. Findings substantiate a high frequency of ADHD symptomatology among SED children. Correlational analyses demonstrated concurrent validity between behavior rating scales, intelligence, achievement, and continuous performance tasks, and two cognitive training devices, especially in the area of attention. A series of two-way ANOVA's indicated that individuals receiving NX first followed by CL performed better on several exercises. Significant main effects for group were found on CBCL Internalizing Problems and on training exercises including the Towers of Hanoi task (a NX exercise), Auditory Discrimination Rhythm task (CL Exercise), and Trail B task (CL exercise). While overall results do not suggest the superiority of one cognitive training device over the other, group effects suggest that NX may somehow prime individuals to better utilize training. Due to the heterogeneity of diagnoses of the current sample, these findings also indicate that CL and NX can be efficacious in a variety of child psychiatric populations. Clinical implications and future research directions are addressed.

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E.A. SHORES, A. LAMMEL, J. BATCHELOR, C. HULLICK, & M. FLYNN. Utility of the Revised Westmead PTA Scale in the Acute Assessment of Mild Traumatic Brain Injury (mTBI) – Further Analysis.

This study explored the diagnostic utility of the revised Westmead PTA Scale compared to the Glasgow Coma Scale (GCS) in the acute assessment of adult (aged 18 to 60) emergency presentations with mild traumatic brain injuries (mTBI). Eighty-two patients with recently sustained mTBI and post-traumatic amnesia symptoms were routinely assessed with the GCS and the revised Westmead PTA Scale during their hourly four-hour observation period while occupying a bed in the emergency department. Before discharge, patients were assessed with the Immediate Post-Concussion Assessment and Cognitive Test (ImPACT) to obtain independent scores on multiple aspects of their cognitive functioning. Data was compared to adult emergency presentations with ailments other than mTBI (N=88). Between-groups MANOVA revealed a significant multivariate effect of mTBI on test performance ($p < .001$). Multiple linear regressions were conducted on all measured aspects of cognitive functioning, revealing that the revised Westmead PTA Scale explained greater variance (28%) in cognitive scores compared to the GCS (<1%). Based on these findings, the revised Westmead PTA Scale is a better predictor of outcome than the GCS in patients with less severe head injuries. Using the revised Westmead PTA Scale as an early assessment tool may help clinicians to be more confident in patient assessment, management and care.

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E. DE NOBREGA, A. NIETO, J. BARROSO, F. MONTON, P. SANCHEZ, R. CORREIRA, I. GALTIER. Verbal Fluency in Cerebellar Ataxia: Differential Effect of Letter, Semantic and Action Cues.

The examination of verbal fluency in cerebellar ataxia is a controversial issue. The high presence of dysarthria and cognitive slowness in this population render it difficult, given that is a time-restricted test. In this study we attempted to determine the performance of patients with cerebellar ataxia in verbal fluency tasks taking into account the variables mentioned above. We used three different word retrieval cues in a sample of twenty-four patients and twenty matched healthy controls. Two of the cues are common in neuropsychological assessment protocols: letter and semantic cues. The third cue is a recently developed cue: the action fluency test (AFT). It consists on asking the subject to rapidly generate verbs within one minute. Control tasks were administered in order to dissociate motor dysfunction from cognitive impairment. Results showed that patients and controls performed similarly on semantic fluency task. In contrast, patients performed significantly poorer than controls on letter and action fluency tests. Correlational analyses showed that deficits can not be attributed to dysarthria or cognitive slowness. Despite executive processes are active for initiating and monitoring all verbal fluency tasks, letter and action fluency may place higher burden on strategic processes given that they require a greater unusual lexicon searching than semantic fluency does. Thus, deficits found occur in tasks where a major executive control is required. These deficits reflect the cerebro-cerebellar tracts deterioration known to occur in cerebellar ataxia and support the notion of the cerebellum's involvement in some aspects of language and prefrontal functions.

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P.SANCHEZ, A. NIETO, J. BARROSO, T.Olivares, V.MARTIN, M. A. HERNANDEZ. Cognitive Correlates of Brain Atrophy and Regional Lesion Load on MRI in Relapsing-Remitting Multiple Sclerosis.

Cognition and magnetic resonance imaging correlations are established in patients with MS, but it is unclear whether the cognitive impairment depends on the lesion burden, or lesion distribution or atrophy. We aimed to assess global and specific neuropsychological impairments in early relapsing-remitting MS and to explore whether these cognitive impairments are dependent on the extent and severity of the burden of disease. We studied 52 patients with clinically definite RR-MS with Expanded disability status scale scores $< \text{or} = 3.0$. Subjects underwent a comprehensive neuropsychological battery assessing multiple cognitive domains from which a Global Cognitive Index Score (GCIS), Memory (MIS), Attention/Processing Speed (APSYS), Visual Perception (VPIS) and Motor Coordination/Programation (MCPIS) indices scores were derived, comparing the performance with 51 matched normal control subjects. Brain MR imaging analyses included the total brain and regional lesion load, as well as measures of atrophy (central atrophy and corpus callosum area). Results indicated that patients with impairments in APSYS ($n=19$), MCPIS ($n=17$) or MIS ($n=15$) had higher central atrophy. Patients with memory deficits (MIS) had higher lesion load on PD scans, especially in temporal and parietal regions. The temporal lesion load on PD-weighted MRI is associated with cognitive impairment in the majority of the calculated indices. Lesion load on T1-weighted images was only associated to MCPIS. In conclusion, central atrophy and temporal lesion load were the MRI parameters more associated with cognitive impairment. Analysis of regional cerebral lesion load may assist in understanding multiple sclerosis-associated cognitive dysfunction.

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R. WINKLER, M. SCHACHER, T. GRUNWALD, G. KRÄMER, M. KURTHEN, V. REED, H. JOKEIT. Mesial Temporal Lobe Epilepsy Impairs Advanced Social Cognition.

OBJECTIVE: While memory, language and executive functions have been extensively studied in patients with mesial temporal lobe epilepsy (MTLE), investigations into advanced social cognitive abilities have been neglected. In the present study we investigated the ability to detect social faux pas and studied possible mediating clinical and demographic variables in patients with MTLE compared to patients with an epilepsy not originating within the MTLE and healthy controls. **METHODS:** 27 MTLE patients (16 were investigated pre- and 11 postoperatively), 27 patients with an extra-mesio-temporal epilepsy (excluding frontal lobe epilepsy) and 8 healthy controls performed a shortened version of the Recognition of Faux Pas Test. Standardized tests to measure intelligence were administered. Only patients with intact reading comprehension abilities were included in the study. **RESULTS:** MTLE patients, both pre and postoperative, performed significantly worse in the faux pas test than patients with extra-mesio-temporal lobe epilepsy ($p < .001$) and healthy controls ($p < .001$). The latter two groups showed comparable performance. No statistical association was found between the MTLE patients' deficit in recognizing a faux pas and the variables IQ, age, age at seizure onset, and duration of epilepsy. **CONCLUSION:** We report for the first time that patients with MTLE are specifically impaired in recognizing faux pas, suggesting that MTLE as such is a specific etiology of deficits in higher-order social cognition.

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D. REWILAK, T. SCHWEIZER, C. O'CONNOR, G. TURNER, B. LEVINE, I. ROBERTSON, T. MANLY, S. KATERJI, J. WEEN, M. CUSIMANO, D. STUSS. Rehabilitation of Executive Functioning in a Patient with Focal Damage to the Cerebellum.

Evidence from anatomical and imaging studies suggests that damage to the cerebellum may result in impaired executive functioning. This is based primarily on the extensive reciprocal connectivity between the frontal lobes and the cerebellum. While the cognitive impairments following cerebellar damage are being slowly uncovered, the efficacy

of rehabilitation in this patient population is less understood. We describe the use of a specific rehabilitation technique known as Goal Management Training (GMT; Levine et al, 2000) in a 40-year old male, a senior bank executive, who suffered a right cerebellar arteriovenous malformation rupture. He was referred for a neuropsychological assessment by his neurologist, who made note of deficits in executive functioning. In keeping with these, the assessment, carried out three months post-rupture, identified weaknesses in sustained and selective attention, verbal abstraction, phonemic fluency (clustering and switching), and executive aspects of memory (source recall and response monitoring). Additional testing was carried out prior to rehabilitation in order to more fully characterize the patient's attentional and executive difficulties and to provide an index of baseline performance. Testing was repeated immediately following the seven-week rehabilitation program and again three months later to assess long-term functional outcome. Results indicated that our patient made and maintained significant gains on measures of sustained attention, planning, and organization. Most importantly, following rehabilitation, the patient was able to return to work part-time and progress to full resumption of his pre-accident responsibilities within three months.

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D. ALBERT, K. OPWIS, H.G. WIESER, M. REGARD. Subjective Memory Matches Objective Memory Performance Only After Left but not After Right Amygdalohippocampectomy.

To investigate the prognostic value of objective memory measures for subjective memory performance in patients with medial temporal lobe epilepsy undergoing selective amygdalohippocampectomy (AHE) we conducted a survey. 48 patients, seven years after AHE ($n=29$ left / $n=19$ right) and, 40 healthy controls rated their actual memory performance and their mood. Patient-ratings were compared to that of the controls and to their objective memory measures. We found that irrespective of lesion side patients rated their memory abilities lower than controls. Comparisons of subjective memory rating with objective memory performance (Rey Auditory Verbal Learning Test, Rey Visual Design Learning Test) showed a significant correlation for the left-sided AHE patients only for delayed verbal recall. Right-sided AHE patients underestimated their memory, i.e. their ratings were lower than their objective performance. We could not confirm the expectation that left-sided AHE patients would rate their memory performance and their mood lower than right-sided AHE patients. However their objective performance was significantly lower than that of the right-sided patient (verbal modality).

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K. KARADI, I. HALASI, J. KALLAI, M. FEHER. Effect of Different Sites of Lesions on the Severity of Spatial Hemineglect.

Lesions of several brain areas can cause spatial hemineglect, which shows that there is a spatial attentional network in the brain. There is an abundance of hemineglect theories; however there is a lack of studies of the degree of severity that can occur after lesions in given sites in this large-scale attentional network. The aim of this study was to assess the severity of neglect as measured by a standard Star Cancellation Test and to record the dispersion pattern of spatial neglect. A quantitative characterization of right/left and upper/lower distribution of spatial hemineglect can compare different sites of lesions. The results of lesion analysis show that different lesions can cause different severity and patterns of neglect. According to the Star Cancellation Test, the severity of hemineglect is higher in right parietal and temporooccipital lesion than in other lesion sites.

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E. STUCKI, F. KAUFMANN, W. PERRIG, M. STEINLIN, A. RIDOLFI, N. VON DER WEID. Neuropsychological Rehabilitation of Children and Young Adults after Paediatric ALL, Brain Tumor and Non-Hodkin-Lymphoma.

Purpose: To study the effects of individual neuropsychological interventions on cognitive outcome and quality of life in patients after paediatric cancer. Methods: Clinical phase III study with patients fulfilling the following criteria at study entry: (1) diagnosis maximally 11 years ago, (2) medical treatment completed, (3) > 6 years. After a neuropsychological assessment patients with neurocognitive deficits were randomly assigned to either the treatment group (a) who received six month of individual rehabilitation measures or the control group (b) who did not receive this treatment. Six months after study entry both groups were partially re-evaluated, after 12 months a second complete neuropsychological assessment was performed. Results: 44 patients (age 6 to 26; 21 males) attended the first assessment. 36 showed neurocognitive deficits. Group (a) consisted of 10 patients; group (b) of 26. The larger number of group (b) was due to unavailability for therapy (program of school, job, geographical, personal or other reasons). 12 months after study entry group (a) shows slightly more gains in intelligence quotients (IQ) compared to group (b). In addition individual benefits such as improvements in subtest results, school and job performance, etc. were found mainly in group (a). A detailed statistical analysis of group differences will be performed as soon as all assessments are completed. Conclusion: The treatment group (a) seems to profit from neuropsychological therapy. Nevertheless more patients would participate if neuropsychological assessment and therapy would begin sooner after medical treatment. Correspondence: *Elisabeth Stucki, MA, University of Berne, Dept. of Pediatrics, Children's Hospital, Inselspital, CH 3010 Bern, CH. E-mail: elisabeth.stucki@insel.ch*

J. L. MATHIAS, S.C. BOWDEN, & E. D. BIGLER. Is Performance on the Wechsler Test of Adult Reading Affected by Traumatic Brain Injury?

The validity of the National Adult Reading Test (NART) as a predictor of premorbid IQ when used with patients who have sustained a severe traumatic brain injury (TBI) has been questioned in recent years. This study examined whether Wechsler Test of Adult Reading (WTAR) performance is similarly affected by severe TBI in the first year after an injury. The WTAR scores of participants who had sustained a mild TBI, moderate TBI, or severe TBI, or an orthopaedic injury in the preceding 3 to 6 months were compared. Subsets of participants from each of these groups were also re-assessed 6 months later. The severe TBI group performed significantly worse than both the mild and moderate TBI groups and the Control group, despite the samples being matched on age, education, and effort. When the subgroups were re-assessed, there were significant group differences in WTAR performance, with the severe TBI group performing more poorly at Times 1 and 2. There was also a small overall improvement in WTAR scores over time. However, the WTAR scores of the severe TBI group did not improve to a greater extent than the other groups. These findings suggest that reading performance may be affected by a severe TBI and that the WTAR may underestimate premorbid IQ in this context. This may cause clinicians to underestimate the cognitive deficits experienced by these patients.

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A. DELANOË & V. DARDIER. Pragmatics and Emotions : Assessment of Children and Adolescents with Frontal-Lobe Damage.

The fields of pragmatics and emotional processing are of increasing interest at the international level. However, there are few studies concerning pragmatic and emotional disorders in young patients with frontal lesions. The purpose of this research is to assess the pragmatic and emotional skills of children and adolescents with frontal-lobe lesions in comparison to control subjects without lesions. The

pragmatic task is a narration, we analysed the use of complex syntax, complexity of the narrative structure, types and frequency of social evaluations (serve to engage the listener and provide the narrator's perspective on story events). The main results show that the patient's narrations are less structured than those of control subjects, for example they use less complex sentences. Patients also show deficits in pragmatic aspects of language in the structure of the story and use of social evaluations. Emotional skills are assessed with two tasks. In the first task, we analyzed a basic level of identification (label facial expressions), and in the second task, we analyzed their capacities to attribute emotions in context (to identify how one of the characters feels in illustrated short stories and to justify their answer). The main results show that patients do not respond differently from controls for the number of correct emotion attributions in the two tasks. However, the analyses of the justifications indicate that patients are less likely to provide a justification expressing complete inference and they tend more often to repeat a detail of the story.

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G. DESMARAIS, E.A. ROY, C.L. STRIEMER, S.G. BROWN, N.L. BRADLEY, A. CLARCK, B. VASQUEZ, and M.J. DIXON. Linking Encoding Approaches to Memory Deficits for Visual Information in a Patient with a Focal Lesion to the Right Frontal Lobe.

The aim of this study was to investigate frontal lobe function in RF, a 34 year old man who sustained a small, localized right frontal lobe ischemic stroke. Despite a generally successful recovery from the acute effects of the stroke, RF reported lingering problems with attention and memory. RF's abilities were investigated using the 3MS, the Rey-Osterreith Complex Figure Test, Line Bisection, the Hopkins Verbal Learning Test, Forward and Backwards Digit Spans, and the Digit Symbol Test. This initial evaluation revealed that though his memory for verbal material was normal, his memory for visual information was impaired. Despite normal copying of the Rey Complex Figure, RF's immediate and delayed recall of the figure were impaired. Investigating RF's initial copying of the figure revealed a disorganized strategy. Because performance on other tests were normal, this suggests that RF's difficulties in remembering the figure were not due to problems with attention or memory per se, but rather the consequence of RF's organizational strategy for drawing. This could affect his encoding of the information and prevent it from getting into memory. In other cases, Diamond et al. (1997) have provided a structure by showing patients the figure in a succession of pieces as they drew it. We will attempt to improve RF's performance using this structure, as it has helped increase recall performance in other patients, and could potentially help differentiate patients like RF from patients with more temporal-hippocampal damage.

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E. KARNER, S. BÖSCH, T. BENKE, M. DELAZER. Neuropsychological Findings in Familial Hemiplegic Migraine.

Little is known about the cognitive and behavioural impairments of familial hemiplegic migraine (FHM). Compared to classic migraine, FHM has different genetics, disease characteristics and neural correlates. Overlaps between subtypes of FHM and spinocerebellar ataxia suggest that the brainstem, cerebellum and possibly also other neural systems may be involved in the pathology of FHM. The present study investigates cognitive functions in six members of a family affected by FHM. All patients showed cerebellar atrophy in MRI. Neuropsychological examination tested a wide range of cognitive functions. Patients showed good verbal intelligence, good language abilities (comprehension and naming), good mental calculation and verbal memory. Impairments were found in visual memory (recall of figural information), in fronto-executive functions (verbal working memory, verbal fluency, planning, set shifting), in

divided attention, as well as in fine motor manipulations and syllable repetition. Depression and anxiety scales evidenced scores in the average, as did a questionnaire assessing quality of life. Though neuropsychological test scores were heterogeneous in few tests, a distinct pattern of perseveration and impairment emerged from the neuropsychological examination. This pattern is in line with the deficits associated to cerebellar dysfunction. A net of highly organized anatomical subsystems links prefrontal, posterior parietal, superior temporal and limbic cortices with the cerebellum and allows the production of intact motor, cognitive and affective behavior. Results of our study suggest that these cerebrocerebellar circuits are not fully functional in FMH patients.

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H. HOFER, H.J. ZNOJ, K. GUTBROD & R. MÜRI. Coping with Brain Injury: First Results of the Bernese-Psychotherapy-Study. Brain injury is the most frequent cause for a handicap acquired at the adulthood. To find back in life with a brain injury is a large challenge. Apart from the emotional handling of the impairment it is always a question of learning to live with the handicap. Adjustment disorders in the sense of complicated grief and depressive symptoms represent an important and frequently limiting factor for rehabilitation. In the present study, the coping process and the efficiency of psychotherapy in the management of grief after a brain injury will be investigated. An objective is to outline central aspects of the therapeutic process and to find out conditions under which psychotherapy after brain injury is helpful. We report on methodical problems and first results. Correspondence: *Helene Hofer, Dr. phil., Universitätsspital Bern, Inselspital, Abteilung für Neuropsychologische Rehabilitation, 3010 Bern, CH. E-mail: helene.hofer@insel.ch*

SATURDAY MORNING, JULY 29, 2006

Symposium 16/9:00-10:30 a.m.

Brain-Plasticity-Based Cognitive Remediation for Neurological and Psychiatric Applications: Novel Treatment Approaches

Host: Bonnie Connor

Existing approaches for treating age related cognitive decline, mild cognitive impairment (MCI), and psychiatric disorders generally rely on pharmacological therapies supplemented with behavioral training methods based on strategy learning and executive control. Brain plasticity, the brain's ability to adaptively reorganize itself throughout life, offers the potential for cognitive rehabilitation that may potentially offer new therapeutic approaches for several neurological and psychiatric disorders, including aging and schizophrenia. Essential design elements in brain-plasticity-based training include adaptive learning, intensive training, and strong engagement of neuromodulatory systems involved in learning and memory. Three studies using these training design principles with neurologically normal older adults, older adults with MCI, and patients with schizophrenia will be presented. Future directions and clinical applications for this promising behavioral treatment will be discussed. Correspondence: *Bonnie Connor, PhD, Research Scientist, Posit Science Corporation, San Francisco, CA, US. E-mail: BonnieConnor@positScience.com*

H. MAHNCKE. Brain Plasticity and Design Principles of Brain-Plasticity-Based Computerized Training.

Brain plasticity refers to the brain's lifelong capacity for physical and functional change. Competitive processes underlie all brain plasticity. The mechanisms of brain plasticity are inherently bi-directional leading to 1) positive consequences when the brain specializes to represent salient input under behaviorally demanding use conditions; and 2) negative consequences when the brain's machinery actively degrades due to reduced schedules of activity, noisy processing, weakened neuromodulatory control, and negative learning. Design principles of brain-plasticity-based training programs include

intensive training that is adaptive to correct and incorrect responses; appropriately designed stimuli that emphasize greater neuronal response coherence initially and that generalize to naturalistic settings; tasks that show meaningful impairment in the target population (age or clinical indication); and tasks that show improvements following training in the target population. Rationales for these design principles and approaches to implementation in computerized training will be discussed.

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B. CONNOR. Studies of Memory Enhancement in Neurologically Normal Older Adults using Brain-Plasticity-Based Computer Training.

Normal age related cognitive decline (ARCD) is associated with the negative consequences of brain plasticity. As people age, a self-reinforcing, downwards spiral of reduced interaction with challenging environments and reduced brain health is likely to significantly contribute to cognitive decline. Pilot studies have been carried out using a novel brain-plasticity-based computer training program to enhance cognition in normal older adults. This training program is designed to exercise auditory and language systems to strengthen the representational salience of speech input, improve signal-to-noise ratios, and drive neuromodulatory systems that control learning and memory. Studies have been carried out with community dwelling older adults ranging in age from 60 to 94. Subjects have been assigned to intervention, active control, or no contact groups. Treatment and active control groups trained on a computer for 60 minutes/day, 5 days/week for approximately 40 hours. Standardized neuropsychological outcome measures were administered pre- and post-training. The treatment group has consistently shown significant improvement on global cognitive tests and measures of auditory memory and attention. No such relationship was seen in the control groups. These findings open up new, non-invasive and non-pharmacological avenues for treating ARCD.

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N. BELFOR Studies of Memory Enhancement in Patients with Mild Cognitive Impairment (MCI) with Brain-Plasticity-Based Computer Training

MCI is a clinically defined condition in which an older individual suffers from a significant decline in memory or cognitive abilities but does not meet the standard criteria for dementia. MCI is generally thought to represent a transitional stage between the memory problems associated with normal age related cognitive decline (ARCD) and the clinically significant memory problems associated with dementia. Neurodegeneration is responsible for the progression each year of up to 20% of patients with MCI who convert to dementia. A randomized, controlled pilot study was carried out at University of California San Francisco and University of California Davis. Participants were assigned to use a preliminary version of a brain-plasticity-based computer training program designed to exercise auditory and language systems (intervention group); or to an active control group in which they read online newspapers, listened to audio books, and played a video game. Both groups worked on a computer in their homes for approximately 100 minutes per day, 5 days per week, for 4-7 weeks. Both groups received a standardized battery of neuropsychological assessments pre and post training. The intervention group showed improvement in immediate and delayed memory scores following training, while the control group showed slight declines in memory functions, consistent with the path of MCI associated memory decline. Scores on visuospatial functioning favored the control group, consistent with the visuospatial demands of the video game. These results suggest brain-plasticity-based training interventions may improve memory and cognitive function in patients with MCI.

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S. VINOGRADOV. Studies of Neurocognitive Rehabilitation in Schizophrenic Patients using Brain-Plasticity-Based Computer Training.

It is now axiomatic that schizophrenia is a neurocognitive disorder characterized by a wide range of information processing and neuropsychological deficits. These include impairments in early auditory and visual processing; attentional, working memory, and executive dysfunction; defects in episodic, semantic, and source memory operations; and abnormal social cognition. We propose that degraded afferent sensory information in schizophrenia leads to noisy, less efficient downstream cognitive operations, resulting in this wide spectrum of deficits. We report on the preliminary results of a randomized controlled clinical trial of 28 schizophrenic participants who have participated in 40-120 hours of an intensive, computerized, brain-plasticity based cognitive remediation program based on this model.

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Symposium 17/9:00-10:30 a.m.

Neuropsychology of Mental Disorders

Host: Thomas Beblo & Bernhard Weber

The symposium "neuropsychology of mental disorders" focuses on diverse mental disorders such as depression, posttraumatic stress disorder (PTSD), borderline personality disorder, and Alzheimer disease. The authors present neuropsychological findings and neuroimaging data that are relevant for both, scientific and clinical purposes. The symposium consists of four talks. Amrhein et al. report neuropsychological and neuroimaging (fMRI) findings in PTSD, Israel-Laubinger et al. present actual data about preview profit in major depression, Mensebach et al. focus on learning mechanisms in

borderline personality disorder, and Scheurich et al. report neuropsychological deficits and structural brain changes in Alzheimer Disease.

C. AMRHEIN, S. HUBER, D. HUBER, T. MEINDL, C. BORN, R. ENGEL, M. REISER, K. FAST What Differentiates Traumatized Individuals without PTSD from Patients with PTSD: Neuropsychological and Neuroimaging Findings.

One of the mechanisms in eliciting and maintaining PTSD may be the disability to deliberately control the processing of trauma-related stimuli. Therefore, our study examined the cognitive conditions in which emotional processing is disturbed, using a "directed forgetting" task with trauma-related and neutral words, in which both encoding instruction ("remember" vs. "forget") and attention (full vs. divided) were varied. fMRI brain activity was registered simultaneously, and neuropsychological functioning (attention and memory) was examined. Study groups included PTSD patients (n=13) and traumatized controls (n=10), matched for age, gender and education. We hypothesized that during divided attention, PTSD patients but not traumatized controls would remove their attention from the traumatic content, thus showing a reduced directed-forgetting effect, associated with an elevated prefrontal and a diminished hippocampal activation. Neuropsychological results showed deficits in tests of visual attention and visual memory in both groups, whereas other functions were not disturbed. In the directed forgetting task, traumatized subjects showed a directed forgetting effect (more correctly recognised "remember" than "forget" words) in all conditions, whereas in PTSD patients, this effect was absent for trauma-related words during divided attention. fMRI data for divided attention revealed that during the learning instruction, PTSD patients displayed a superior prefrontal cortex activation for trauma-related words, whereas traumatized controls showed an enhanced activation of the insula. These findings could be interpreted as active suppression of the traumatic content in PTSD patients, which in turn disturbs controlled encoding. In traumatized controls, however, a more controlled, self-related encoding process of trauma-related stimuli can be assumed.

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K. ISRAEL-LAUBINGER, V. GAPP, S. HORNING, T. WETTERLING, B. WEBER. Preview Profit in Visuomotor Pursuit Tracking in Major Depression.

Visuomotor pursuit tracking might be regarded as a complex coordination task depending on attention and other basic functions. In depressed patients results of conventional computerized attention tasks and visuomotor pursuit tracking have been shown to be confounded by computer attitude and computer experience. The present study aimed to find indicators for attention performance without computer specific bias. 45 patients with a recurrent depressive disorder (ICD-10 F33) completed identical visuomotor pursuit tracking tasks with and without a target preview of four seconds. The preview profit was calculated for simple (0.5 Hz, 80 sec.) and superimposed (0.25 and 0.5 Hz, 80 sec.) sinusoidal target oscillations. All patients showed a preview profit in the simple task, which was found to be significantly and negatively correlated to computerized attention tasks as well as to computer attitude and computer experience. In the superimposed task forty percent of the patients unexpectedly presented a deterioration of performance in the target preview condition and preview profit was not found to be correlated to computerized attention tasks or computer specific variables. In depressed patients with poor computer attitude/experience and low attention capacity simple visuomotor coordination performance could be shown to be enhanced by auxiliary foresighted planning. Preview profit in easier visuomotor coordination tasks seems to indicate an actual impairment of attention. A relation between the unreliable preview profit in a more difficult visuomotor coordination task and attention could not be confirmed. The 'preview loss' found in many patients cannot be conclusively explained by the present data.

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C. MENSEBACH, K. WINGENFELD, N. RULLKOETTER, C. STEIL, M. DRIESSEN, T. BEBLO. Inhibition of Distraction During Verbal Learning: No General but Selective Impairment in borderline Personality Disorder.

Investigations of verbal memory functioning in borderline personality disorder (BPD) led to inconsistent results. Recently, a study reported a decreased consistency of performance within neuropsychological functions, i.e. memory (Beblo et al., 2006). Further, investigations of attention suggested a specific impairment of BPD patients in conflict resolution, or more general, in cognitive control (Posner et al., 2002). With respect to these findings, we address the question whether patients with BPD show a deficit to inhibit distracting stimuli during task-processing. We hypothesized patients to show only under distraction impairment in verbal memory performance. 32 patients with BPD and 35 sex- and intelligence-matched controls were included into the study. A neuropsychological battery assessing verbal functions was obtained. The subjects completed a verbal memory task consisting of three conditions: (1) Learning without distraction, (2) Learning under emotional neutral distractions, and (3) learning under emotional negative distraction. Our results showed verbal memory functioning of BPD patients within normal range. Furthermore, no general decreased ability to inhibit distraction was found in BPD patients. However, if learning required the inhibition of distracters with emotional negative valence, memory performance decreased compared with controls. These findings argue against generalized inhibition deficits in BPD during learning, but argue for a selective impairment of inhibition for stimuli with emotional negative valence. The reduced inhibition for stimuli of negative valence in BPD patients is in good accordance with prior reported increased responsiveness to stimuli of negative valence.

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A. SCHEURICH, M.J. MÜLLER, A. FELLGIEBEL. Cerebral Ultrastructural Changes in Alzheimer Disease and MCI: Functional Relevance and Diagnostic Utility.

Investigating MCI patients with Diffusion Tensor imaging (DTI) we could demonstrate ultrastructural brain tissue alterations in the hippocampus and cerebral white matter regions that are typically involved in early AD. The sensitivity of DTI parameters for distinguishing MCI patients from controls was 71.4% at specificity of 80%. Combining neuropsychological testing, MRI volumetry and DTI in hippocampal areas demonstrated significantly lower left hippocampal volumes, higher mean diffusivity (MD), and lower fractional anisotropy (FA) in MCI patients. However, elevated diffusivity (MD) in hippocampal regions, particularly on the left side, was the strongest independent predictor of poor verbal memory performance whereas hippocampus size could explain rather low proportions of variation in memory function. Furthermore, color-coded DTI was used to identify posterior cingulate fiber tracts which are as part of the circuit of Papez regarded as important neuronal substrate. Fractional anisotropy (FA) and mean diffusivity (MD) differed significantly between MCI and controls, as well as between DAT and controls. Performance in the delayed verbal recall test of the entire study group correlated significantly with posterior cingulate bundle anisotropy and diffusivity. Therefore, the combination of macro- and microstructural parameters in hippocampal areas could be promising in early detection of neurodegenerative processes. Alterations of DTI parameters in posterior cingulate fiber tracts substantiate the involvement of white matter pathology in MCI patients. In addition, significant correlations to functional disturbances

(i.e. memory decline) points at functional relevance of ultrastructural deterioration.

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Paper Session 16/9:00-10:30 a.m.

Executive Functions and Brain Injury

Chair: Ferdinand Binkofski

M. SADEH. The Psychiatric Cerebellum.

Cumulative evidence points to the cerebellum's involvement in different cognitive domains, including language, visuo-spatial skills, memory, affect and emotion, and executive functions. There are numerous reports of mutism in children after neurosurgical removal of a Posterior Fossa Tumor (PFT), often appearing as part of a more general cognitive and behavioral syndrome, termed by Schmahmann as the Cerebellar Cognitive Affective Syndrome (CCAS). Some attribute these findings to damage to the vermis while others suggested that other factors are involved. It has been reported that children who develop CCAS post-operatively are apparently at a much higher risk of developing long-term linguistic deficits even after the symptoms related to the syndrome are alleviated. This study presents 2 children, diagnosed with medulloblastoma, who post-operatively developed CCAS. The first presented symptoms a few days post-operatively, the second after a few weeks. They both stopped speaking, were dissociative, suffered from pathological attachment to the mother, Obsessive Compulsive Disorder, stopped eating and dropped out of school. The first child, now 7 years post diagnosis, has just recently stopped using TPN for additive nurture. He has gone back to school, but still suffers from specific linguistic disabilities. The second child, now 7 months post diagnosis, has been currently hospitalized in the eating disorders ward. He dropped out of school 6 months ago and doesn't speak. For both children, the neuropsychological profile, MRIs, oncological status, psychiatric and family dynamics will be presented. The results will be discussed in relation to the existence of CCAS and its long-term effects.

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K. ANSON, J. PONSFORD. Who Benefits? Predicting Outcome Following a Coping Skills Group Intervention for Traumatic Brain Injury.

High rates of anxiety, depression and anger management difficulties are common following traumatic brain injury (TBI) and have been associated with maladaptive coping skills and poor psychosocial adjustment. In an attempt to improve adaptive coping and decrease emotional distress following TBI a cognitive behavioural group intervention program, entitled the Coping Skills Group (CSG), has been implemented at Epworth Rehabilitation Centre in Melbourne Australia. Thirty-three TBI outpatients completed the CSG evaluation study. All were identified as having emotional or adjustment problems and deemed to have sufficient cognitive and communication skills to participate in the program. The CSG was associated with a post-group increase in adaptive coping. However, there was variability between participants in response to the intervention (Anson & Ponsford, 2004). The aim of this paper is to explore the association between variables including participant self-awareness, cognitive impairments, presence of other stressors and time post injury and benefit from the CSG. The major finding of the paper is that better outcomes following intervention tend to be associated with greater self-awareness of injury-related deficits (Anson & Ponsford, 2006). Identification of

factors influencing outcomes from such interventions will allow future treatment resources to be directed more effectively.

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I. SANCHEZ-CUBILLO, J. I. QUEMADA, & J. M. MUNOZ CESPEDEZ. New Directions in Rehabilitation of Behavioural Disorders after Brain Injury: Lessons from a Case Study.

Behavioural disorders after brain injury have serious implications for the patients' rehabilitation process. Behavioural disinhibition, referred sometimes as the pseudopsychopathic or orbitofrontal syndrome, is one of the most difficult type of disorders with great influence on psychosocial outcome, including return to work, caregivers' distress and social adjustment. There is a well-documented relationship in the literature between this disorder and damage to the frontal lobes. Moreover, in the last years, growing evidence suggests that this disorder can be dissociated from deficit in executive functioning and other related processes like attention. Several theories have been proposed to account for this disorder. Among the most popular are the somatic markers' hypothesis and the theory of mind; other social cognition processes, like facial expression recognition have also been suggested to be relevant. In this study, a brain injured patient who demonstrated disinhibited behavioural change is assessed in tasks that measure executive and attentional functions, and social cognition processes. His performance was compared to that of a control, matched in education, age and premorbid behavioural characteristics. The results showed conserved executive and attentional functioning, but severe deficits in the social cognition tasks. These results support the growing evidence of a dissociation between executive functioning and social cognition. They also suggest that the rehabilitation procedures of these patients should include training in facial emotions recognition and theory of mind abilities. Some specific rehabilitation procedures are proposed as potentially useful in the intervention with patients that show behavioural disinhibition after brain damage.

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L.J. RAPPORT, R. BRYER, R.A. HANKS, & K. KOVIK. Fitness to Drive Following Traumatic Brain Injury.

Neuropsychological predictors of on-road driving evaluation performance were examined among 77 survivors of traumatic brain injury who sought to resume driving. Forty-three men and 34 women completed comprehensive driving evaluations, which included clinical examinations of motor and sensory-perceptual functioning, cognitive tests, and an on-road evaluation conducted by a driving rehabilitation specialist. Mean age of the sample was 40 years, mean years of education were 12.9, and median time post injury was 7 months (range = 1.5 months to 16 years). Sixty percent of the survivors passed the evaluation, which included 42 recommendations for return to independent driving and four recommendations that included various stipulations, such as mileage restrictions or annual reevaluations. Cognitive tests demonstrating strong relation to the on-road total score included Symbol Digit Modalities, Trails B, and the Stroop task, as well as brake reaction time. Modest relations were observed for Trails A, Judgment of Line Orientation, WAIS-III Matrix Reasoning, Brixton Spatial Anticipation, and the Useful Field of View. On-road performance was unrelated to age, education, gender, and a road sign reading test. Multivariate models indicated that cognitive tests can account for a substantial portion of the variance in on-road driving performance; however, incremental validity for tests other than Symbol Digit Modalities ($r = .67$) and Trails B ($r = .51$) was very small. Findings are discussed within the framework of the role of executive control in prediction of fitness to drive.

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R. MACKINLAY, B. FIGNER, & F. WILKENING. To Play or not to Play: Hot and Cold Executive Functions in Adolescent and Adult Risky Decision Making.

Adolescents often perform well on traditional decision making tasks, demonstrating a good understanding of risk and its consequences. However, in their day-to-day lives adolescents (particularly males) are prone to riskier behaviour than adults. One explanation for this age and gender discrepancy is that risky decision making is driven by 'hot' executive functions (EF) pertaining to affective processes (e.g., self-involvement, heightened response to feedback), mediated primarily by the orbitofrontal cortex and connected areas. In contrast, non-risky decision making is driven by 'cold' EF (e.g., computation, planning), mediated by the dorsolateral prefrontal cortex. We tested this hypothesis using hot and cold versions of decision making tasks - a computerized card game and a dice game. Participants must decide whether to 'play' or 'not play' (i.e., select more cards or roll the dice), taking into account the probability of a desired/undesired outcome and the magnitude of gain/loss. In hot versions, feedback is immediate following each choice and participants play to win for themselves. In cold versions, feedback is delayed and participants play on behalf of another person. Data from 70 adolescents (mean age 14.2 years, 29 female) and 50 adults (mean age 23.9 years, 32 female) has been collected (data from 20 more adults pending). Within each age and gender group, participants were randomly assigned to the hot or cold condition. Preliminary analyses indicate strong age and gender differences under hot but not cold conditions. In further analyses we explore relationships between cold versions of decision making tasks and traditional cold EF tests.

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Paper Session 17/9:00-10:30

Clinical and Cognitive Neuropsychology I

Chair: Dorothy Bishop

G. PAILOPOULOS & E. TAKO POULOU. Neuropsychotherapy in Children with Learning Disabilities.

Studies of the dyslexics have provided adequate evidence to suggest that dyslexia may be explained as a combination of low-level auditory and visual impairments, and it seems unlikely that working memory deficits are a major cause of reading comprehension difficulties. Twenty Greek dyslexic children (M age = 10 years) compared to age-matched normal readers and children with additional learning disabilities, examining the ability in the retention of sequences. Sequences of letters, numbers, and symbols in random order were presented to the participants, visually and then orally, and they were asked to reproduce the sequence forward and backward. It was observed that older children performed better than younger ($p = .004$). Group of the participants was significant ($p = .001$). The results data suggest that normal readers are better than dyslexics but dyslexics are better than children with additional learning disabilities. According to the results, dyslexics possibly have both visual and auditory problems; probably neuropsychotherapy is a useful treatment for these children. Neuropsychotherapy is the use of neuropsychological knowledge in psychotherapy. Twelve children and their families accepted to participate in neuropsychotherapy. Fundamental principles are the continuum of responsibility, emotional rehabilitation, self-awareness and sighting of the new self. Therapy journal, cue cards and self-presentation letters are the techniques of neuropsychotherapy. The first signs from the children and their families are positive. They participate with a crucial role, responsible for the success of the therapy, while they explore in every session the strengths and weakness of themselves.

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E. GERRITS & A. ZUMACH. Plasticity of Spoken Word Recognition of Children with Language Disorders.

The present study investigated the effect of a new personal miniaturised ear level FM system, the EduLink, on recognition of words in background noise of children with dyslexia and children with specific language impairment. All children had significant auditory processing problems. The FM system was developed to enhance the signal-to-noise ratio in school environments in order to improve speech understanding in the classroom. Spoken-word processing was measured with an auditory lexical decision task using priming and non-priming word pairs and non-word pairs. The stimuli were mixed with steady speech-weighted noise. Dependent variables were reaction times and accuracy of the responses. Five groups of each 10 children participated in a pre-test and post-test. The groups were children with dyslexia with or without the FM system, children with specific language impairment with or without the FM system and a control group of typically developing children. The children were 7 to 11 years old. After the pretest, bilateral miniaturised FM systems were fitted to the children in the two FM groups. After 6 months, all 5 groups were tested again in the post-test. The results will show whether children with language disorders and auditory processing problems have difficulties with lexical access and selection. Moreover, it will be revealed whether 6 months FM use has improved word recognition reflected in shorter reaction times and larger priming facilitation effects in the FM groups and thus whether a miniaturised FM system can be used to enhance speech perception of children with dyslexia and specific language impairment.

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M. LAGANARO, V. SCHWITTER, S. MORAND, C. CAMEN, A. SCHNIDER. Behavioral and Electrophysiological Changes During Recovery from Anomia in Two Acute Aphasic Patients.

In the present study we take advantage from our experience with intensive therapy for anomia through computer-assisted treatment in acute patients (Laganaro et al. 2004, in press) in order to analyze the electrophysiological correlates of recovery from anomia in a short period of time. Here we present two aphasic patients presenting with anomia two months post stroke. Both patients underwent two weekly periods of intensive computer-assisted treatment for anomia. EEG was recorded with 128 channels during a delayed picture-naming task at baseline and after each weekly period. Both patients increased their naming performance during this period. Changes in cortical activity are observed accompanying these behavioural changes. In comparison with the control group, waveforms analysis shows two different electrophysiological correlates of recovery, both starting at about 300 ms. In one subject differences with control decrease during recovery, while in the other subject differences with the control group increase from baseline to the last assessment. Comparison of topographical maps and inverse solution also show different patterns especially at baseline in one patient, and only in the last assessment in the second patient. These results seem to indicate that recovery tends to normal activity in one patient and towards a different treatment in the other patient.

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E. GEISER, C.F. SCHMIDT, L. JAENCKE & M. MEYER. The Neural Correlate of Rhythmic Speech Rhythm Processing.

The present study investigates the neural correlates of rhythm perception in speech processing. Attending to rhythmic aspects of speech facilitates speech perception and even infants are capable to perceive rhythmic differences in language (Cutler et al. 1994, 1999). The goal of our study was to differentiate brain regions related to explicit and implicit speech rhythm processing. Metric and non-metric German pseudo-sentences were compared in an auditory fMRI experiment. The "metric" sentences followed a regular meter and were spoken in such a way, that stressed syllables followed each other in an isochronous pattern. "Nonmetric" sentences followed an

irregular meter and were spoken with a normal conversational speech rhythm. One group of subjects was to decide which type of sentence they had heard (explicit processing). A second group performed a prosody task on the same stimuli (implicit processing). Group analysis, consisting of a one-sampled t-test across the specific contrast images of all participants, revealed activation in the supplementary motor area (SMA), for the explicit processing group in a contrast between sentences and baseline. SMA has previously been observed in timing-related functions in attentional processes (Nobre & O'Reilly, 2005). Our results suggest that the performance of the rhythm categorization task relies on this modality-unspecific brain areas related to the processing of timing. A direct contrast between the metric and the non-metric sentences in the implicit processing group revealed significant activation in the left planum temporale (PT) for the metric condition. The metrical condition is assumed to violate the perception of "normal", conversational speech. PT is a secondary auditory region which has been associated with the performance of various speech perception tasks, specifically the temporal processing of auditory signals (Meyer et al. 2005). Thus, these results suggest, that implicit processing of metric speech depends on more extensive temporal processing than conversational speech.

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S. KOENEKE, K. LUTZ & L. JAENCKE. Practise-Induced Increases of Maximum Finger Tapping Speed Depend on the Organization of Cortical Finger Representations.

It has often been demonstrated that practising movements results in performance improvement and functional reorganization in the neural sensorimotor system. The present fMRI study reinvestigates the arrangement of cortical finger representations in the human primary hand motor area and specifically explores whether this arrangement is changed by a 4-week-lasting elementary motor training. The aim of the training was to increase maximum tapping speed with the subdominant thumb. In two sessions, before and after training, fMRI data were recorded while subjects performed fast repetitive tapping movements with each finger separately. The functional arrangement of finger representations was analyzed by determining distances between finger-specific Center-of-Mass (COM) coordinates derived from activation clusters located in M1. First of all, the data indicate extensive overlap between finger-specific representations in M1, but nonetheless distinct centers of activation for movements of different fingers were identified. The observed arrangement of finger representations across the whole group of subjects did only partly correspond to somatotopy in the homuncular sense. Instead, our data rather support an individual organization of finger representations which is changed by training in an interesting manner: A) following intense left thumb practise, distances between the finger-specific COM coordinates determined from the contralateral right hemisphere were significantly reduced compared to pretraining measures and B) the smaller the distances between finger representations before practise, the larger the practise-induced speed gain. These results strongly suggest that a cortical organization that maximizes overlap and interlacing of neural tissue is favorable for selectively tapping a finger at maximum speed.

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Symposium 18/11:00 a.m.

Limb Apraxia and Manual Skill

Host: Georg Goldenberg

Limb Apraxia and manual skill.

Objectives: To explore the impact of apraxia on deftness of the ipsilesional left hand. Clarification of this issue has both theoretical and clinical implications. On a theoretical level it may help to elucidate the position of apraxia as a disorder of the interface between cognition and of motor control. On a clinical level the question is important for rehabilitation of patients with right sided hemiplegia who are forced to compensate the functional loss of the dominant hand with their non-paretic but apraxic left hand.

G. GOLDENBERG. Apraxia, Dexterity and Handedness.

Apraxia is predominantly a symptom of left hemisphere brain damage. This laterality coincides with dominance for speech and with motor control of the dominant right hand. Whereas theories which postulate a cognitive source of apraxic errors emphasize the link to language, theories which regard apraxia as a disorder of motor control emphasize the link with handedness. I will present two types of evidence which cast doubts on the necessity of the associations both with dominance for manual motor control and for speech. The first one is the observation of dissociations between different manifestations of apraxia in right-handed patients with left brain damage. Oral apraxia can doubly dissociate from limb apraxia. Within limb apraxia, disturbance of pantomime of object use can doubly dissociate from disturbance of imitation, and disturbed imitation can doubly dissociate between finger and hand postures. Analysis of lesion overlap in left brain damaged patients demonstrates that these dissociations correspond with dissociations between the locations of responsible lesions. They are hardly compatible with the view that apraxia is a general disturbance of motor control. The second piece of evidence concerns non-right handed patients. A review of the literature and evaluation of a new series of consecutive non-right handed patients with either left or right brain damage reveal that the laterality of lesions causing apraxia can dissociate from speech dominance as well as from control of the dominant hand.

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J. HERMSDÖRFER. Relationship between Deficits of Goal-Directed Movements and Apraxia Following Lesions of the Motor-Dominant Left Hemisphere.

Movement analyses during typical tests of apraxia, such as pantomiming tool use or imitation of meaningless gestures, have revealed spatial and kinematic deficits in apraxic patients. These movement deficits may be genuine to apraxia, but they may also reflect a particular role of the left brain for the programming and execution of goal directed movements. To study the latter hypothesis, ipsilesional motor performance was analysed in a variety of motor task, including prehensile and aiming movements. Ipsilesional performance of patients with left brain damage was typically more impaired when compared to patients with right brain damage. There was no clear relationship to apraxia. In another approach, pantomimed and actual tool-use was compared in apraxic patients. The different modes of movement execution induced different error types that were not correlated, providing further support for the idea that apraxia and deficits of goal-directed movements may be partially independent deficits following damage of the left brain. Event-related fMRI in healthy subject during different phases of tool-use actions (planning, maintenance, execution) confirmed the dominant role of the left hemisphere. However, the unfolding of the action was associated with topographical shifts of brain activation from left parietal to more frontal areas. It may be speculated that apraxia and deficits of movement kinematics may be related to these different activations.

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A. SUNDERLAND. Dissociations in Motor Skill in Ideomotor Apraxia.

Traditional descriptions of ideomotor apraxia suggested that impairment in gesture imitation and tool-use pantomime dissociated from normal ability on more naturalistic motor tasks, but this assertion was based on anecdotal evidence. More recent observational studies have shown associations between apraxia and impairment on functional tasks. Furthermore, experimental studies have shown subtle impairments when apraxic patients manipulate objects. This raises the question of whether there are any true dissociations in motor skill in apraxia or simply a gradation in performance depending on task difficulty. A single case is reported where grossly impaired imitation of gesture dissociates from normal dexterity during object manipulation, and preserved awareness of spatial location of the fingers dissociates from finger agnosia. The patterns of dissociation in this case are consistent with a model of ideomotor apraxia as a cognitive deficit which interferes with motor skill only when there is a task requirement or strategic decision to use conceptual knowledge to guide motor performance.

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Symposium 19/11:00 a.m.-12:30 p.m.

Aging and Language under Stress: Simultaneous Interpretation as a Test Case

Host: Loraine Obler

Aging and Language under Stress: Simultaneous Interpretation as a Test Case.

Simultaneous interpreting (quickly transferring an oral message from one language into another) is a complex cognitive skill that relies heavily on rapid processing in working memory. Professional simultaneous interpreters appear to suffer age-related decline in cognitive speed, but may counter this with the expertise concomitant with years in the profession. In this symposium we address this possibility from three perspectives: a survey of 47 post-graduate students of simultaneous interpretation aged 25-50, an experimental study of working-memory (WM) performance in younger- and older-adult professional simultaneous interpreters, and an fMRI study of an older professional simultaneous interpreter.

B. MOSER-MERCER. Expert Performance on a Complex Cognitive Skill and Well-Being: Age-Related Differences.

Simultaneous interpreting, the ability to transfer a message from one language into another orally and without delay, is a complex cognitive skill that relies heavily on rapid processing in working memory. While it is as yet unclear whether simultaneous interpreting involves the simultaneous performance of several language functions such as comprehension, production, and self-monitoring, or whether instead the skill is performed through rapid switching from one sub-task to another, there is sufficient anecdotal evidence for age-related decline in the speed with which simultaneous interpreting is performed. Decline in processing speed is the most evident characteristic of age-related decline in working memory function. With processing speed being the hallmark of a simultaneous interpreter's skilled performance, enabling him to interpret general discourse comfortably at a rate of up to 130 words per minute, decline in processing speed seemingly begins to affect interpreting performance at around the age of 65. Expertise seems to offset the effects of that decline for some time as many professionals continue to work until the age of 70 and beyond: This is consistent with the theory that constant management of two or three competing languages enhances executive functions

and protects from the mental decline associated with old age. This paper reports on a survey of 47 interpreting students (aged 25–50) in a post-graduate degree program, whose responses to a well-being questionnaire were analyzed according to the students' age-bracket (<30 or >30). Older students were considerably more sensitive to a variety of parameters that compromise well-being, such as adverse working conditions, stressors and discomfort, than younger students. Skilled performance may ward off effects of aging, but this comes at a certain cost to the individual.

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T.M. SIGNORELLI, L.K. OBLER, H.J. HAARMANN, M. GITTERMAN. Benefits on Aging Memory of Working as a Simultaneous Interpreter.

Short-term working memory is known to decline with advancing age. We asked whether working professionally as a simultaneous interpreter could retard age-related memory decline. We tested 10 older professional interpreters (aged 46-67, $x=56.7$), five older non-interpreters (aged 64-81, $x=71.4$), four younger professional interpreters (aged 30-38, $x=34.5$), and seven younger non-interpreter multilinguals (aged 28-41, $x=33.1$) matched for education level and age of English acquisition. Two cued recall tasks were administered in English, one requiring primarily phonological processing, the second primarily semantic processing. Participants saw four- and six-word lists containing either short (1-2 syllables) or long (3 to 5 syllables) words. The stimuli were presented one word at a time on a computer screen. Participants then recalled one of the words based on a phonological or semantic cue. Reported here are data on the more challenging six-item lists. Generally, participants performed better on shorter relative to longer syllable words, and on the semantic as compared to the phonological task. Overall, the young interpreters performed best evidencing curves over the six serial positions were least like the standard primacy-recency effect curves. The older interpreters and non-interpreters performed more like the young interpreters on recall of the last three positions of cued recall, and more like the young non-interpreters on the first three positions of cued recall. No advantage was noted for older interpreters over older non-interpreters. The older participants, however, tend to outperform the younger non-interpreters, suggesting that general rather than specific (i.e., interpreting) language experience may delay age-related memory decline.

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F. OSTROSKY-SOLIS, A. LOZANO, D. TREJO. fMRI Comparison of a Simultaneous Interpreter and a Matched Control.

With particular focus on dorsolateral frontal regions, fMRI and neuropsychological evaluation are employed to distinguish the memory and other cognitive performance of a professional simultaneous interpreter and a matched control.

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Symposium 20/11:00 a.m.-12:30 p.m.

A Methodological Approach for Assessing Neuropsychological Changes in the Preclinical Stage of Alzheimer's Disease

Host: Andreas Monsch

N.S. FOLDI, R.E.C. WHITE, J. REDFIELD, S. VEDRODY, L. KAPLAN, J. LY, J.T. BERGER, L.O. MACINA, I.H. GOMOLIN, K.I. LOMBARDI. Attentional Measures of Psychological Refractory Period and Covert Orienting are Sensitive Markers of Cholinesterase Inhibitor (Donepezil) Treatment in Alzheimer's Disease (AD).

Background: We investigated whether two attentional measures could detect early donepezil response in patients with AD. The psychological refractory period (PRP) captures the 'reset' time needed to respond to sequential stimuli. Covert orienting (CO) measures speed of orienting and disengagement, where targets are preceded by valid or invalid spatial cues. Methods: Thirteen AD patients undergoing de-novo, open-label donepezil treatment (9M-4F; mean age=78.5yrs, ± 6.8 s.d.; education=13.2yrs, ± 3.5 ; MMSE=22.6 ± 3.5 ; CDR=0.80 ± 0.25) were evaluated at baseline (T1), after 8.1 ± 2.4 weeks (T2), and 6 months (T3). ADAS-cognitive T3-T1 change score determined group membership (responders, $n=8$; non-responders, $n=5$), $t(12)=3.89$, $p=.002$. Groups were equated on age, education, disease severity. 1.PRP elicited from simple detection task, intertrial intervals (ITI) of 500, 800, 1100, 1500msec. 2.CO elicited from Posner paradigm. Speed was analyzed as median RT. Attention, language, memory, visuo-spatial domains were calculated from standard neuropsychological tests. Results: Screening or domain scores failed to capture T1-T2 change, $p>0.1$. ITI main effect ($F(3,33)=13.724$, $p<.000$) revealed the PRP. Group \times ITI (Huynh&Feldt $F(1.45,33)=3.43$, $p=.070$, trend) and Group \times Time \times ITI (H&F $F(2.75,33)=3.808$, $p=.023$, $\eta^2=.26$) interactions show that non-responders reacted significantly slower at 500msec compared to other ITIs, slowing further at T2. Responders maintained speed at T2. The CO Group \times Validity interaction ($F(1,11)=5.165$, $p=.044$, $\eta^2=.32$) suggests that non-responders show greater difficulty disengaging from invalid cues, independent of time. Conclusions: Despite comparable overall speed, non-responders, unlike responders, required longer 'reset' times and, after short-term treatment, were even slower. On orienting, non-responders had greater disengagement deficits. Thus, attentional measures can be sensitive to donepezil treatment, suggesting that such measures may capture early response to increased cholinergic availability.

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V.L. MARCAR. A Word of Caution Relating to the Interpretation of fMRI Data in Dementia.

Imaging brain function is increasing our understanding of the way in which the brain masters a diverse array of perceptual and cognitive task. Functional magnetic resonance imaging (fMRI) has emerged as the method of choice for imaging the brain at work. Functional MRI uses the blood oxygenation dependent (BOLD) signal as an internal contrast agent. The BOLD signal reflects the reduction in the deoxyhaemoglobin (HHb) concentration resulting from a vascular response triggered by the neuronal spiking activity (Heeger et al, Nat. Neurosci, 2000). This vascular response saturate quickly (Fox & Raichle, Ann. Neurol.,1985) and does not depend on the tissue of oxygen consumption (Thompson et al., 2003, Science).

In the past 20 years, the BOLD signal has provided researchers with a reliable tool to map the brain areas involved in perceptual and cognitive tasks of healthy volunteers. Recently fMRI has been used to investigate how neurological illness affects the ability of the brain to maintain the processing demands the perceptual and cognitive task placed upon it in daily life. The study by Bookheimer and colleagues

(NEJM, 2000) imaged the brain activity during a memory recall task, of a group of subjects, that were carriers of the familial Alzheimer's gene APOE ϵ 4, but which were free of symptoms. The authors compared their BOLD response to that obtained from a control group (APOE ϵ 3 group). The APOE ϵ 4 group exhibited both a increase in the extent of the cortex activated during recall and a larger BOLD signal amplitude. The researchers accounted for the former observation by suggesting that in order for the APOE ϵ 4 group to maintain their cognitive abilities, the neuronal network of brain areas involved in recall, compensated for the reduced neuronal density of individual areas by recruiting surrounding brain areas with related cognitive functions. The later observation was attributed to the fact that the recall task generated a higher processing load on the brain of this group. Based on the standard model of Marcar & Loenneker (NeuroImage, 2004) an alternative interpretation of the findings of the study by Bookheimer and colleagues is offered. The paramagnetic property of HHb results in a decline of the BOLD signal amplitude as its concentration increases. A reduction in the neuronal density will reduce the CMRO2 of the brain tissue and a lower HHb concentration during the recall task. The lower HHb level will lead to a general increase in the BOLD signal amplitude. The increase in the extent of activation can be accounted for by the increase in the BOLD signal amplitude, which essentially increases the signal to noise ratio, thus making it easier to detect activated regions by statistical means. The fMRI results of the Bookheimer study can be viewed as a consequence of the loss of neuronal density in the APOE ϵ 4 group rather than reflecting an increase in processing load and the recruitment of related brain areas to maintain cognitive performance. Correspondence: Val Marcar, Dr., University of Zurich, Psychological Institute, Neuropsychology, Treichlerstr. 10, 8032 Zurich, CH. E-mail: v.marcar@psychologie.unizh.ch

A. BLESSING. Emotion and Memory in Alzheimer's Disease.

J. HAENGGI. Computational Neuroanatomy Supports the Diagnosis of Dementias in Clinical daily Routine.

A variety of markers are used to diagnose dementias in vivo. Neuropsychological test performances in different cognitive functions are the central markers used in this diagnosis. Further markers of neurodegenerative diseases like amyloid- β 1-42 and 1-40, phosphorylated tau, and isoprostane concentrations can be found in the patients' cerebrospinal fluid. However anatomical markers like brain atrophy in locally distinctive brain regions are not yet used in clinical daily routine. Structural magnetic-resonance imaging (MRI) is widely used only to exclude other pathologies (e.g., tumours and vascular lesions) that could also explain the cognitive deficits observed in probable demented patients. At present, structural MR images are mainly investigated by visual inspection, hence only coarse structural differences are visible and use for differential diagnosis is thus very limited. But a large body of evidence from clinical computational neuroanatomical studies indicates that different neurodegenerative pathologies are accompanied by distinctive patterns of local brain atrophy. Therefore, these locally distinctive patterns can help to distinguish among patients with different neurodegenerative diseases. We propose to standardize features of the brain in the healthy elderly population as well as in populations with different dementias using computational neuroanatomical procedures. To accomplish this, we implemented a semi-automated software pipeline that measures volumetric grey matter differences on a gyral and subgyral level without operator interventions. At present, the volumes of 45 different structures per hemisphere including all cortical and subcortical grey matter regions in both the cerebrum and the cerebellum can be measured. Standardization should be done in a multi-centre study to get representative norms from populations in a broader environment. After standardization, univariate distributions or multidimensional spaces of these different morphological indices are computed and used to characterize new patients within these distributions/spaces using statistical indices similar to neuropsychological assessments, where single test performances are compared with standardized norms. In this way, computational

neuroanatomy increases the sensitivity and specificity of the diagnostic assessment of dementias in vivo.

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Paper Session 18/11:00 a.m. -12:30 p.m.

Clinical and Cognitive Neuropsychology II

Chair: Hendrik Niemann

H. KRINZINGER, G. WOOD, H.-C. NUERK, & K. WILLMES. Determinants of Solving Mathematical Word Problems in Early Primary School Years.

Solving mathematical word problems is seen as one of the most complex competencies children have to acquire during their formal education, starting in first grade of primary school (Geary, 2000). It requires not only arithmetic competencies, but also calls for good working memory capacity, reading skills, and problem solving abilities; findings concerning visual spatial abilities are not consistent (Lee, Ng, Ng, & Lim, 2004). To our knowledge, studies concerning the contribution of these abilities on solving mathematical word problems have only been carried out in adults and in older, but not in younger primary school children after their very first year of formal schooling. Additionally, nothing is known so far about whether the degree to which non-mathematical competencies influence solving mathematical word problems changes with development. To address these two questions, we examined simple mathematical word problem solving ability, calculation performance (simple addition and subtraction), reading comprehension, phonological working memory capacity, visual spatial abilities and fluid intelligence in about 140 German-speaking children after first grade as well as six months later. Employing structural equation modelling (SEM), we found fluid IQ to have the highest impact on mathematical word problem solving skills, followed by reading comprehension and phonological working memory capacity, whereas calculation performance and visual spatial abilities had no direct contribution at the end of first grade. Longitudinal SEM will reveal possible developmental changes among the initial relationships in mid second grade.

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M. KORVORST, F. DOMAHS, B. FIMM, & K. WILLMES. Lacking Zero: A Neuropsychological Study in a Case of Developmental Dyscalculia.

A case of developmental dyscalculia in a 21 year-old woman is described, being characterized by the use of unusual and elaborate compensation strategies and more specifically by the inability to represent the semantic meaning of zero. Patient NB showed a selective deficit in the Arithmetic subtest of the WAIS and a distinct prolongation of reaction times in a 2-back working memory task using numbers compared to letters. NB was tested for further numerical deficits with the Number Processing and Calculation (NPC) battery (Delazer et al., 2003) and showed a severe deficit in solving text problems as well as increased response latencies and error rates in all calculation tasks. A structural MR of NB's brain did not reveal any deviation from normal at the macroscopic level. In addition, reaction time measurements of multi-digit number naming with NB revealed a selective deficit for producing number names containing zero, resulting in very slow responses compared to a control population (N=29; cf. Meeuwissen et al., 2003). A similar weakness in producing utterances containing zero was evident in arithmetical tasks of addition and multiplication. The neuropsychological investigation leads to the conclusion that NB may suffer from a deficit best

described by the inability to represent zero at the semantic level and a failure to keep numerical information containing zero in working memory.

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W. SKRANDIES, G. SKIERA, S. KASTAUN & J. NITSCH. Cortical Plasticity Induced by Short-Term Training with Visual Stimuli: Effects of Retinal Position and Stimulus Type.

The visual system of human adults shows considerable functional plasticity. As we know from previous studies, sensory training induced by the repeated presentation of visual stimuli is followed by increased discrimination performance. What are the effects of stimulus type and retinal position on learning? We investigated learning with 3-D information contained in random dot stimuli (RDS) or with visual hyperacuity targets (vernier stimuli) at different retinal eccentricity in a total of 86 healthy young adults. Changes in discrimination performance were studied with RDS or vernier stimuli presented at different retinal positions. Stimuli were flashed simultaneously at 8 locations at an eccentricity of 1.15 or 2.3 degrees. In the vernier task, subjects were asked to detect target offsets while in the RDS task the target was defined by different disparity. Training was performed at a given eccentricity while stimuli at the other eccentricity served as a "no training" control. Passive viewing of visual targets resulted in a significant increase of discrimination performance that was observed only for the trained but not with the untrained stimuli (significant interaction between training and time, $F(1,81)=8.40$, $p<0.005$). Thus, learning is position specific: improved performance can be demonstrated only when test and training stimuli are presented to the same retinal areas. In addition learning effects were higher with stimuli close to the fovea ($F(1,81)=16.43$, $p<0.0005$) and with vernier stimuli ($F(1,81)=6.72$, $p<0.05$). Our data illustrate how perceptual training induces stimulus and visual field specific neural plasticity in adults within about 30 minutes of training. Correspondence: *Wolfgang Skrandies, Prof., University of Giessen, Institute of Physiology, Aulweg 129, 35392, D. E-mail: Wolfgang.Skrandies@physiologie.med.uni-giessen.de*

A.S. JANSARI, S.L. MILLER & J.J. TREE. The Whole IS the Sum of the Parts: When Configural Processing Fails in Prosopagnosia and George Michael has to be Recognised by His Goatee Beard.

Prosopagnosia is a rare condition that is characterised by the inability to recognise faces. Evidence suggests that this inability is due to impairment in 'configural' visual processing (e.g. Farah, 1994). Studies have also shown that prosopagnosics show a preserved ability to covertly recognise faces that cannot be overtly recognised (e.g. De Haan, Young & Newcombe, 1987). We report the case of a patient, DB, who, following a cerebral haemorrhage, suffers from cognitive impairments and most noticeably the inability to recognise faces. An ability to successfully recognise faces by identifying specific features was detected and further experiments were conducted that focused on DB's use of configural processing (e.g. naming of Navon figures and the Cambridge Face Memory Test (Duchaine & Nakayama, 2005)). Additionally, the ability to recognise faces covertly was measured by behavioural responses using an associative priming paradigm and by autonomic responses by recording galvanic skin responses (GSR). Explorations of configural processing showed significant impairments in the context of a preserved ability to recognise faces by means of individual features and cues, such as the use of George Michael's goatee beard and earring to correctly identify him. A trend towards ability to implicitly recognise faces that could not be explicitly recognised was identified, using both behavioural and physiological measures. The results offer support for the theory that face recognition relies heavily on configural processing and also suggests that recognition of global forms and configural processing are part of the same process. Theoretical and practical implications of these findings are discussed.

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Poster Session E/9:00 a.m. -12:30 p.m.

S. TEL, P. FABER, D. LEHMANN, H. KUMANO, T. TSUJUCHI, L. GIANOTTI, K. KOCHI & A. AKABAYASHI. Brain Functional Plasticity of EEG Theta Location Due to Meditation Experience.

Long experience with meditation supposedly causes permanent changes in brain state, i.e. reflects brain functional plasticity. We studied eight experienced QiGong meditators (age mean 41.5 years, $SD=10.4$) of the Feng-San Lee group. Their average meditation experience was 11.5 years ($SD=8.8$, range: 330). 19-channel EEG was recorded during initial and final eyes-closed resting and three meditations (10 minutes each): meditation #1 focused attention on breath counting; meditation #2 focused attention on 'thinking of nothing'; meditation #3 involved slow-paced arm movements synchronous with respiration ('QiGong'). EEG frequency band power for eight bands was computed. The scalp topography, i.e. the gravity center location of the power distribution was computed for each band, and correlated with the meditation experience (Pearson's rho). With increasing experience, the location of the theta band on the anterior-posterior brain axis was significantly more anterior (age-corrected $\rho=0.72$, $df=6$, $p=0.044$) across resting and the three meditations. If separately computed for resting and the three meditations, meditation #3 showed the highest significant correlation. The finding is reminiscent of the often-reported critical role of EEG theta in meditation (e.g. Hebert and Lehmann 1978). A significant anteriorization of theta EEG location is known during execution of the three QiGong meditations. Accordingly, experience enhances the meditation effect on the theta EEG location. Thus, our study demonstrated brain functional plasticity as result of meditation experience. Important is the observation that the increasing change of theta EEG location with increasing meditation experience was also evident during the resting condition without meditation.

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J. HUANG, R.CK. CHAN. External Feedback Influences Error Monitoring in Executive Inhibition Task.

Objectives: To examine whether external feedback would influence inhibitory control and error monitoring in healthy volunteers. **Methods:** Three tasks of executive inhibition paradigm-go-nogo task, stop signal task and semantic inhibition task were employed in study1, study2 and study3 to observe error detection and error regulation. In study1, the feedback type was manipulated in this study with no feedback treatment, correct feedback treatment and incorrect feedback treatment in which there was 30% possibility that a feedback indicating wrong would be given after the correct response and vice versa. In study2 and study3, inhibitory control was observed in treatments with and without external feedback. **Results:** Commission error RT was significantly shorter than Correct Go RT in study1a, study2 and study3. In study1a, RT in correct feedback was significantly longer than that in condition without feedback and with incorrect feedback. In study1b, external feedback had a marginal interaction with error regulation. Post-commission error RT was significantly longer than pre-commission error RT in study1a, study2 and study3. In contrast, post-omission error RT was significantly shorter than pre-omission error RT in study1b. **Conclusions:** 1. Errors committed in executive inhibition paradigm were mainly action slips; 2. Inhibitory error regulation was evident in post commission error slowing and post omission error speeding; 3. External auditory feedback might influence the process of inhibitory error regulation in go-nogo task while there was no evidence indicating the impact of external feedback on error detection.

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S. TABELING, B. KOPP, C. MOSCHNER, & K. WESSEL.
Frontal Lobe Functioning is Critical to Performance in Working Memory Span Tasks.

The performance of patients with lesions of the frontal lobes and of controls without brain damage was compared by means of a complex verbal working memory operation span task (Konsonaten-Trigramm-Test, KTT). The frontal group consisted of 24 patients with uni- or bilateral lesions of the frontal lobes of various etiologies (strokes, tumors of different nature or traumatic brain injuries). 24 patients with various non-cerebral diseases were included in the control group. Participants had to recall (retention interval 9 to 18 seconds) three consonants in correct serial order and they were required to perform a secondary task (counting backward) during the retention interval. Complex working memory span tasks such as the KTT provide good measures of a domain-general construct that is important to broad aspects of cognitive ability. The analysis of the patterns of errors of the two groups revealed several findings: First, the performance of the frontal lobe patients was generally inferior to the performance of the control group. Second, the frontal lobe patients demonstrated a propensity towards stronger perseveration than the control group. The results contribute to the conjecture that the frontal lobes are critical to the performance in working memory span tasks which require to maintain target information in active, accessible states in the face of interference and distraction.

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A. BURGSTALLER, P. BRUGGER, M. GARLICH, M. REGARD.
Hyperreligiosity: a Neuropsychological Study with Members of Religious Communities.

Substance and behavior addictions share the same functional and structural cerebral changes. We showed earlier that brain lesions involving the critical fronto-limbic areas increase the risk to become addicted ("Gourmand-syndrome", pathological gambling, kleptomania). A preoccupation with religious activities can also be regarded as an addiction, the best known case in neurology is "hyperreligiosity" in patients with complex partial seizures originating in the limbic temporal areas. Consequently, we assessed whether neurological, neuropsychological or EEG signs of brain damage were higher in a sample of members of two highly religious communities (experimental group EG, n=24) compared to a group of non-hyperreligious people (NG, n=20). Results show that the preselected group members according to religious activity largely corresponded to instrumental criteria (questionnaires) of "hyperreligiosity". While neuropsychological and EEG revealed only few significant differences (in executive functions, i.e. frontal dysfunctions), medical history of the EG included more signs indicative of brain dysfunction than that of the NG. A new study comparing hyperreligious people to a control group of neurologically healthy people, as in the earlier studies, will be needed to further explore the relationship between this manifestation of behavior addiction and brain state.

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S.M. JAEGGI, M. BUSCHKUEHL, A. ETIENNE, C. OZDOBA, W.J. PERRIG, A.C. NIRKKO.
How High Performers Keep Cool Brains in Situations of Cognitive Overload.

What happens in the brain when we reach or exceed our capacity limits while performing a complex working memory task? Are there individual differences in performing at capacity limits? We use functional magnetic resonance imaging (fMRI) to investigate the impact of increasing processing demand on selected cortical areas by means of a parametrically varied and challenging dual task. Low- and

intermediate performing participants respond with large activation increases in many cortical areas in the face of excessive task requirements along with decreasing performances. This finding is interpreted in terms of additional attentional and effort-related recruitment of resources, which seem either not relevant or even detrimental to performance. In sharp contrast, a relative decrease of activation is observed in the high-performing group with increasing demand in many cortical areas despite continuous correct performance, reflecting different and more efficient processing.

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R.S. BABB, P. JIRIK-BABB.
Cognitive Neuropsychology of Novel Thinking.

The theoretical idea of several executive systems subserved by distinct neuronal circuits is based on the findings of patients with dysexecutive problems. Both clinical-anatomic and functional imaging have enabled the identification of lesions responsible for different aspects of executive functioning, in particular those dealing with novel problems. Nonverbal information within semantic memory, as opposed to the more constrained nature of verbal thinking, is thought to arise in the right parietal and temporal cortical areas. This nonverbal information is passed to the prefrontal cortex, which allows nonverbal thinking enabling the generation of solutions to novel problems. The ventromedial prefrontal cortex is able to process simultaneously multiple executive functions, such as cognitive shifting, resulting in the ability to produce flexible thinking. This process is made possible in prefrontal and multimodal cortex areas by the modular, columnar organization of these areas. Thus, adjacent columns of the prefrontal cortex receive information from parietal, temporal and contralateral prefrontal cortex, enabling intracortical processing to occur. Further, the same prefrontal cortical area can be activated by different demands so that the area can solve a wide variety of problems. Projections back to the parietal cortex enable information to be available in a feedback loop, to further assist with more complex problem-solving. The possibility of processing novel, flexible, nonverbal thinking is what underlies processes such as the solving of mathematical problems in theoretical physics. The combination of electrical recording and brain imaging would open new avenues to study novel neurocognitive processes underlying creative thought.

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K. GALARZA, J. FULMER, A. MLEKO, W. BURNS, L. MARQUES.
Efficacy of Cognitive Rehabilitation in Children with Serious Emotional Disturbance.

The present investigation examined the efficacy of two cognitive training devices, Captain's Log (CL) and NeurXercise (NX), in training attention, concentration, and memory in a sample of children with serious emotional disturbance (SED). The study consisted of a randomized repeated measures design. An initial baseline neuropsychological evaluation of attention, intelligence, achievement, and behavior was followed by a cognitive training protocol, which included counterbalanced administration of the CL and NX to assess practice effects of the cognitive training exercises. Baseline was reassessed and then followed by a second cognitive training protocol. Findings substantiate a high frequency of ADHD symptomatology among SED children. Correlational analyses demonstrated concurrent validity between behavior rating scales, intelligence, achievement, and continuous performance tasks, and two cognitive training devices, especially in the area of attention. A series of two-way ANOVA's indicated that individuals receiving NX first followed by CL performed better on several exercises. Significant main effects for group were found on CBCL Internalizing Problems and on training exercises including the Towers of Hanoi task (a NX exercise), Auditory Discrimination Rhythm task (CL Exercise), and Trail B task (CL exercise). While overall results do not suggest the superiority of one cognitive training device over the other, group effects suggest that NX may somehow prime individuals to better utilize training. Due to the heterogeneity of diagnoses of the current sample, these findings

also indicate that CL and NX can be efficacious in a variety of child psychiatric populations. Clinical implications and future research directions are addressed.

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M. MATSUI, C. TAKAMIYA, T. KOBAYASHI, Y. KAWASAKI, M. SUZUKI, H. NISHIJO, J. NAKAZAWA, K. NOGUCHI, M. KURACHI. Brain Activation Associated with Theory of Mind: An fMRI Study.

Theory of Mind (ToM) which the ability to attribute mental states to others are important processes in social cognition. Brain imaging studies in healthy subjects have described a brain system involving medial prefrontal cortex, superior temporal sulcus and temporal pole in ToM processing. In this functional magnetic resonance imaging (fMRI) study, we used the picture sequencing tasks with both intentional story (ToM story) and physical story in order to allow comparison of brain activations in these two processes. Participants were ten right-handed healthy Japanese volunteers (male=5, female=5; mean age was 14.9 years, s.d.=1.4). Functional images were acquired using a 1.5 T Siemens Magnetom Vision. Our results showed that the ToM story compared to the physical story revealed increased activations in bilateral superior frontal gyrus, medial frontal gyrus, and right middle frontal gyrus. Correct responses in the ToM story were associated with enhanced activations of right middle frontal gyrus, bilateral superior frontal gyrus, right orbital gyrus, and left inferior frontal gyrus. These activations are common to a part of results in previous brain imaging studies on ToM and social cognitive functions using various tasks. The present study suggests that social cognition in a nonverbal task is especially associated with the medial and right middle frontal function. These results have implications for our understanding of disorders characterized by impairments of social cognition which are related to making references about mental states of others, such as schizophrenia and autism.

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E. STADELMANN, J. MARKSTEINER, H. OBERACHER, W. PARSON, H. HINTER-HUBER, E.M. WEISS.

No Association between COMT Genotype and Cognitive Stability or Cognitive Flexibility in Healthy Subjects.

Catechol O-methyltransferase (COMT) is one of the main enzymes in dopamine metabolism. A common functional polymorphism at codon 158 results in substantial differences in enzyme activity. Homozygosity for the low-activity (Met) allele is leading to a 3-4 fold reduction in enzymatic activity, compared with the high-activity (Val) allele. The COMT polymorphism is associated with prefrontal cognitive functions and was investigated as a candidate gene for schizophrenia, however without clear results. In this project the effects of COMT genotype on dissociable cognitive processes in hundred healthy students aged 19-40 years was examined. The focus was on tasks that require cognitive flexibility and stability, respectively. It was expected that the Met genotype is associated with better stability performance. The tonic / phasic dopamine theory underlies these aspects. Computerized neurocognitive measures investigating working memory (n-back task), inhibition capacities (Go/No-go task), problem solving and planning tasks (WCST, Visual discrimination learning task), and special mental flexibility tasks (probabilistic reversal learning task) were included. The Met/ Met genotype showed shorter reaction times than Val/Val genotype. No significant results between COMT genotype and cognitive stability or cognitive flexibility were found. This study demonstrates that different activity for COMT do not have a major impact on cognitive performance in healthy volunteers. It shows that genetic differences of COMT are more relevant in psychiatric diseases like schizophrenia.

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C. BLANK, B. KAJDA, I. MERTENS, S. RUIZ FERNÁNDEZ, B. PREIŁOWSKI. Changes in Ear-Advantage during a Dichotic Listening Task through Visual Stimulation.

Typically, in a dichotic listening task with syllables a solid right-ear-advantage (REA) is obtained, reflecting the left hemispheric dominance for language processing. Using visual stimuli from the International Affective Picture System (IAPS) to induce a negative emotional state, we were able to significantly reduce the REA. A tendency towards a reduction of the REA with neutral emotional visual stimuli (a control condition) was also observed. The latter suggests, that a simple explanation in terms of emotional priming and thus preferentially activating the right hemisphere is premature. Rather, our findings suggest that besides exploring the various emotional effects on dichotic listening, the influence of visual stimulation, perhaps even visual imagery as well as attentional factors due to bi-modal stimulation must be explored.

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S. NISHIYAMA, M. MATSUI, A. FURUICHI, M. KURACHI. Neuropsychological Examination in Agenesis of Corpus Callosum.

Congenital callosal patients can lead their basic daily life whereas acquired callosal patients hardly can do. Some previous reports have pointed patients of agenesis of the corpus callosum (ACC) show mild disconnection syndrome compared with patients of partial ACC. We investigated neuropsychological function in a case of ACC in detail. I.T. was a 27-year-old Japanese man who admitted to hospital with complaints of perplexity and emotional lability. The MRI showed ACC, hypertrophy of the anterior commissure, radial metamorphosis of the gyrus where the cingulate gyrus is located in normal brain, enlargement of the bilateral ventricles, the collateral trigones, and the third ventricle. We performed standardized neuropsychological tests battery including Wechsler Adult Intelligence Scale-Revised, Trail Making Test, Mirror Drawing Task, Kohs Block Design Test, Finger Tapping Test, Rivermead Behavioral Memory Test, Visual Perception Test for Agnosia, and an original visual laterality task for disconnection of corpus callosum. He demonstrated severe frontal dysfunction which was related to circumstantiality, loss of inhibitory control and inflexibility of thought. He also showed mild disconnection syndrome, compulsive manipulation of tools, diagnostic dyspraxia and mild problem of visuo-spatial processing, while his memory and attention were normal. It is suggested that the sub-nervous system as the anterior commissure does not always compensate the deficits of the callosal connections in early embryogenesis, so that his frontal dysfunction was severe. Normal memory indicates that his medial temporal function was intact.

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P. BRUGGER, A.U. MONSCH, D.P. SALMON. Random Number Generation Disrupts Verbal, but Facilitates Figural Fluency.

Random number generation (RNG) requires a subject to produce sequences of digits that do not show sequential dependencies. This goal is almost impossible to achieve because previous selections inevitably interfere with current selections. Neuroimaging evidence suggests a predominantly left dorsolateral prefrontal cortex mediation of RNG. To behaviorally investigate the contributions of left and right frontal lobes to RNG, we performed a dual-task experiment that combined RNG with verbal or figural fluency. Twenty healthy right-handed men a) wrote as many words beginning with "D" as possible and b) drew as many figures as possible according to a specific criterion (Regard's 5-point task). The same tasks were then performed again while simultaneously saying random numbers from 1 to 6 to the pace of a metronome (1 Hz). Each condition lasted 66 seconds and the order of conditions (verbal vs. figural fluency) was counterbalanced across subjects. A task (verbal vs. figural) X condition (single vs. dual) ANOVA of correct items produced revealed a main effect of task (more figures than words) and a significant interaction. Specifically, concurrent RNG suppressed the number of words generated, but led to the generation of a higher

number of figures. These results point to a left frontal lobe mediation of RNG. The higher number of figures produced in the dual-task condition compared to the single-task condition is interpreted as a functional release of the right hemisphere during simultaneous performance of a task recruiting left frontal functions.

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M.N. SCHUBIGER, P. BRUGGER. Stuck-in-set Perseveration in Healthy Subjects.

The majority of healthy adults will name "5000" as the correct result of the serial addition task $1000+40+1000+30+1000+20+1000+10$, provided the summands are briefly exposed one by one in this order. This was interpreted as a stuck-in-set perseveration, specifically a failure to inhibit counting in thousands at the very last step (where in fact a change in the hundreds is required). A similar failure to inhibit counting occurs in random number generation (RNG), where counting in steps of 1 is among the prominent biases. Neuroimaging experiments have shown that the prefrontal cortex is focally involved in controlling such stuck-in-set perseverations during RNG. We administered the serial addition task to 67 healthy subjects (age range 15 to 59 years; 40 women) who also performed a RNG task. Eleven subjects produced a non-perseverative error (e.g., 3070) and were excluded from further analyses. Of the remaining subjects, 36 (64.3%) produced 5000 ("perseverative group") and 20 (35.7%) 4100 ("nonperseverative group"). As predicted, the subjects from the perseverative group showed a significantly ($p < .002$) more pronounced counting bias in the RNG task than did the subjects of the nonperseverative group. There were no group differences in the repetitive behavior, counting in steps of 2 or backward counting. These results (1) document that perseveration can easily be elicited in normal subjects, (2) illustrate the conceptual distinctness between stuck-in-set perseverations and repetitive behavior, and (3) suggest that susceptibility to stuck-in-set perseveration is a personality trait with variable expression in the population and probably mediated by the frontal lobes.

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M.N. SCHUBIGER, T. LOETSCHER, P. BRUGGER. Asymmetries in Number Space Induced by Vestibular Stimulation.

Vestibular stimulation can shift lateral spatial attention. We investigated whether rotatory vestibular stimulation can also induce lateral shifts in "number space", where small numbers are supposedly "left" to large numbers. Forty healthy right-handed volunteers (20 women) were required to orally generate a random sequence of numbers between 1 and 30 at a metronomic rate of 0.5 Hz (eyes closed). There were two runs, whose order was counterbalanced across subjects: a baseline condition (head straight ahead; 40 responses) and a head-turning condition (rhythmic sinusoidal head turns approx. 80° to the left and right, respectively; 80 responses, i.e. 40 to either direction). Orthogonally, subjects were randomly assigned to two groups, a "ruler" and an "abstract" group (the former being told that imagination of a ruler with 30 units would facilitate performance, the latter without such instruction). Dependent variable was the number of "small" (<16) numbers generated under baseline, and left and right turning conditions. ANOVA with group and direction of head turning (baseline, left, right) as factors revealed a main effect of group ($F=8.4$, $p < .01$) with subjects imagining a ruler showing a more pronounced preference for small numbers ("pseudoneglect") and a main effect of head turning ($F=4.4$, $p < .02$). Compared to baseline, subjects generated significantly more small numbers after left-sided head turns and non-significantly less after right turns. These results demonstrate that (1) visual imagery instructions may enhance the "spatiality" of number space and (2) vestibular stimulation can modulate lateral biases in number space just as it reportedly does so in physical space.

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L. GRABHERR, C. JOLA, G. BERRA, R. MÖCKLI, R. THEILER & F. W. MAST. Motor Imagery Training Improves Hand Movement in Hemiplegic Patients.

BACKGROUND: Neuropsychological studies provide evidence that mental rehearsal of an action activates some of the same brain areas used during motor performance. The objective of this experiment was to evaluate and compare the effectiveness of two different types of training: mental imagery vs. conventional execution. **METHODS:** 25 hemiplegic patients (aged between 37 and 92) were randomly assigned either to the imagery (IMAG) or the execution (EXEC) training group. Both groups completed a baseline test before they received 6 training sessions, each of which was followed by a test session. The task was to rotate the hand around the little finger as accurately as possible to a predetermined end position. The deviation (measured in degrees) between the predetermined and the actual end position indicates the precision of the hand movement. **RESULTS:** Both training groups showed a significant increase in performance over the 6 test sessions ($F(1,23)=19.895$; $p < 0.001$). The variable training group (IMAG versus EXEC) interacted with the amount of test sessions ($F(1,23)=5.410$; $p < 0.05$) suggesting that the IMAG group profited more from the training than the EXEC group. The IMAG group was able to perform more precise hand movements after the sixth training session ($p < 0.01$) while there was no such difference after the baseline test ($p=0.876$) or the first training session ($p=0.969$). **CONCLUSIONS:** Mental rehearsal of a hand movement improved the accuracy of a motor action more efficiently than the conventional training. Mental imagery can be an effective means to improve motor rehabilitation in hemiplegic patients. Supported by SNF Grant 611-066052 (FWM)

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M. MARIANI, D. SHORE. The Effects of Gender and Degree of Familiarity on Spatial Orientation.

The present experiment investigated the effect of gender on the retrieval of spatial knowledge in a group of 24 male and 29 female students aged 18 to 43 ($M = 23.33$; $SD = 5.78$). Each participant was tested individually on their ability to study a map containing 14 labelled landmarks for 1 minute. Then, the participant was blindfolded and asked to point to different aspects of the environment, varying in degrees of familiarity (or exposure). Specifically, they were asked to indicate the orientation of 4 familiar cardinal directions (over-learned stimuli), 4 obscure cardinal directions (intermediately-learned stimuli), and 10 landmarks (novel stimuli). Response latency and accuracy of spatial orientation were measured. A 2 (gender) by 3 (level of exposure) between-within subjects ANOVA revealed a main effect in accuracy for degree of familiarity [$F(2, 102) = 54.99$, $p < .001$], whereby the accuracy with which participants responded increased with exposure to the environment. A separate 2 (gender) by 3 (level of exposure) between-within subjects ANOVA was conducted for response latency, also revealing a significant main effect for degree of familiarity [$F(2, 102) = 111.22$, $p < .001$]. Again, participants responded the fastest to over-learned stimuli, slower to intermediately-learned stimuli, and the slowest to novel stimuli. No gender effects were observed in either accuracy or response latency and no interactions were present. The findings can be attributed to unequal depths of processing. Moreover, the location of cardinal directions was likely consolidated in semantic memory, whereas landmark location was likely part of episodic memory.

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R. DAUNER, J. ZIHL. Parallel Visual Search in Subjects with Homonymous Hemianopia.

Subjects with homonymous hemianopia often have difficulties to explore the visual environment and to search for objects because their vision at a glance is restricted to one hemifield. Consequently, subjects use a serial (local) rather than a parallel (global) scanning strategy. It is unclear whether this impairment is due to the visual field loss or represents a genuine impairment. The visual search paradigm

is a useful tool to assess parallel information processing in space. Using this paradigm, we tested 51 subjects with left- or right-sided homonymous hemianopia. Eleven subjects (22%) were unable to search in parallel; the rest showed normal parallel search performance. Thus, hemianopia per se does not impair parallel visual search. Side of brain injury, time since brain injury, and visual field sparing were not found to play a significant role. In conclusion, our data support the view that the impaired parallel visual search cannot be explained by the homonymous visual field loss. Brain scan analysis revealed that brain injury in the impaired group extended into the occipital white matter and partly also included the occipito-parietal areas. Injury to the dorsal pathway appears therefore crucial for the persistent impairment in parallel visual search. Interestingly impaired parallel search was not restricted to subjects with right-sided injury indicating that parallel visual search in space does not show the expected right hemisphere lateralization.

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F. DOMAHS, I. ABLINGER, U. JANSSEN, W. HUBER & K. WILLMES. The Rehabilitation of Number Transcoding by Drill.

In the rehabilitation of number transcoding skills, only conceptual approaches have been investigated, whereas no drill programme has been reported until now. However, such an approach might prove beneficial, if conceptual knowledge is spared and gains in automaticity are strived for.

We present the case of DB, a young man who attended university to become a math teacher, when he had a stroke which led to a left parietal lesion. After two years of rehabilitation and recovery, DB was still moderately aphasic. Amongst other problems, he experienced difficulties to produce numerals, which he uttered slowly and dysfluently, often using a counting strategy. Nevertheless, the patient had preserved knowledge of number meaning. Indeed, he often corrected himself after having produced the wrong numeral. The patient underwent a drill training programme to re-automatize the retrieval of numerals. To prevent him from using the counting strategy, time pressure was imposed. After this training, DB was significantly faster and more fluent in retrieving number words. Furthermore, in most of the trials he used direct memory retrieval instead of the counting strategy. Improvements not only affected trained numerals but were also generalized to non-trained numerals (two-digit numbers). In addition to this, gains were reached in different types of tasks involving the output lexicon for numerals. Thus, we proved a drill approach to be successful under certain conditions in the rehabilitation of number transcoding. Importantly, improvements not only included the retrieval of single digit numerals, but also their combination within morphologically complex numbers. Correspondence: Frank Domahs, Universitätsklinikum der RWTH Aachen, Lehr- und Forschungsgebiet Neuropsychologie, Pauwelsstr. 30, 52074 Aachen, D. E-mail: domahs@neuropsych.rwth-aachen.de

E. HARALANOVA, Y.-B. NG, J. SEUBERT, C. VETTER, G. KERKHOFF, K. FINKE. Reversed Crossmodal Pseudoneglect in Left-Handers as Assessed with Motor-Free Visual and Acoustic Tasks.

Healthy subjects show a small, but significant tendency to err to the left when bisecting space— a phenomenon called ‘pseudoneglect’, which is thought to originate from the functional dominance of the right hemisphere for spatial functions. It has been found separately in the visual and auditory domain, but no study to date has directly compared performance in different modalities. Furthermore, it is unclear how degrees of brain lateralization influence the extent of pseudoneglect. OBJECTIVES: As handedness is an indicator of cerebral functional dominance, we expect performance differences between left- and right-handers in visuo-spatial tasks. We introduce innovative testing procedures to control for confounding factors related to unilateral brain activation and spatial anchor effects. METHODS: 24 left-handed (Oldfield, 1972) subjects performed two tasks: 1) VS: a PC-based, non-motor test battery for the assessment of visuospatial abilities 2). SSA (auditory subjective straight ahead): motor-free assessment of a subject’s ability to set an acoustic stimulus

to the subjective straight ahead position. RESULTS: Left-handers differed significantly from right-handers on both tasks. Also, left-handers showed a deviation to the right of the veridical center which was significant for several subtests of VS and marginally significant for SSA. Performance in SSA correlated with the degree of handedness. CONCLUSION: Our results suggest a strong effect of handedness on the extent of pseudoneglect which persists in absence of motor activity and across modalities. These findings are discussed with respect to their implications for brain lateralization as a powerful factor determining the extent and direction of pseudoneglect.

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K. ALAERTS, I. BAERT, M. STEYVERS, O. LEVIN, & SP. SWINNEN. The Role of Repetitive Afferent Stimulation by Means of Passive Movement: Evidence for Post-Intervention Potentiation as Indicated with TMS.

Repetitive stimulation of the afferent pathways has shown to generate persistent neuroplastic changes not only in sensory, but also in motor areas of the adult mammalian cortex. The existence of widespread cortical activation as a result of repetitive sensory stimulation with passive movement suggests that this intervention could play a role in the restoration of motor functions after brain injury. By using transcranial magnetic stimulation (TMS), we compared corticospinal excitability of flexor carpi radialis (FCR) and extensor carpi radialis (ECR) muscles before and after a 1 hr session of passive wrist movement (intervention group, n=11) and/or after a rest period of the same duration (control group, n=9). Corticospinal excitability was assessed by measuring the peak-to-peak amplitude and area of motor evoked potentials (MEPs). Our observations indicated a delayed increase of motor corticospinal excitability from the forearm muscles, as measured by changes in MEP size. A significant increase in MEP size was observed in the ECR (both, MEP amplitude and area $p < 0.05$). Effects were marginally significant for the FCR (MEP amplitude, $p \leq 0.056$). No such effects were observed in the control group ($p > 0.1$). To the best of our knowledge, this is the first time that the delayed effects of this intervention are monitored over a time period wherein we expect long-term potentiation (LTP) of corticomotor elements to emerge. Added to the current state of knowledge, our observations suggest that passive movement might serve as an alternative proprioceptive stimulation technique to promote brain plasticity.

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K. ALAERTS, L. DANNEELS, O. LEVIN, & SP. SWINNEN. Bilateral Facilitation of Corticospinal Excitability Following Repetitive Proprioceptive Stimulation Using Unilateral Passive Wrist Movement.

Studies using functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) have revealed that passive movement activates large parts of motor networks both in the contralateral and ipsilateral hemispheres in addition to the primary sensory area. This has recently been linked with the emergence of long-lasting modulations in the excitability of cortical circuits representing the targeted muscles of the stimulated arm. By using transcranial magnetic stimulation (TMS), we compared corticospinal excitability of flexor carpi radialis (FCR) muscles of both right and left forearms before and after a 30 min session of passive movement applied to the right wrist of five volunteers. Corticospinal excitability within each hemisphere was assessed by measuring the peak-to-peak amplitude of motor evoked potentials (MEPs). An increase in MEP size was observed in the right (ipsilateral) FCR immediately after the end of the 30 min session of training with passive movement, and sustained for 90 min after the cessation of the intervention (both, $p < 0.01$). Our observations also indicated a delayed increase of motor corticospinal excitability from the FCR muscle of the left (contralateral) forearm with a marginally significant facilitation

observed at 90 min after the end of the intervention ($p = 0.071$). No such effects were observed in a control test in which the same participants underwent a 30 min period of rest (all, $p > 0.2$). As such, our observations provide evidence for enhancement in the period of kinaesthetic stimulation by more than 90 min.

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C. LUCCHIARI & M. BALCONI. Decoding of Emotional Faces in Different Consciousness Conditions: An ERP Study.

Consciousness may be studied through a number of methodologies, both manipulating stimuli presentation or state of mind. In particular, it is possible to analyse conscious and unconscious processes through experimental approaches, in different cognitive domains, such as language and emotions. We analysed the emotional decoding process varying stimuli qualities (subliminal stimulation vs. supraliminal) and state of consciousness (hypnosis vs not hypnosis). Our purpose was to test the hypothesis that evoked-related potentials (ERPs), related to emotional stimuli, are qualitative similar both in hypnosis and in subliminal stimulation with respect to a normal situation (Schevrin, 2001). Moreover we expected to find a higher correlation between the decoding processing and emotional reactivity in hypnosis. To test our hypothesis we used an experimental setting in which subjects were submitted with emotional faces displayed by a computer station. We used four different images: three reporting a prototypical emotional expression and one neutral face. Neuro-physiological signals were recorded for each subject: ERPs, heart rate and EDA (electro dermic activity). Previous researches on ERPs showed that faces with emotional content elicit two negative variations at about 170 and 230 ms (Bentin et al, 1996; Marinkovic e Halgren, 1998) We sampled ten subjects in the hypnosis condition, ten subjects in a normal condition and ten in the subliminal condition. Our results, in line with our hypothesis, showed the expected variations. N170 and N230 ERPs were present in all conditions. Physiological parameters showed that hypnosis is really more effective in eliciting emotional response.

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A. HASEGAWA & H. UTSUMI. Executive Function and Cerebral Blood Flow on Dorsolateral Prefrontal Cortex in Cases of Subcortical Infarction.

This study was aimed to clarify the relationship between dysexecutive function and cerebral blood flow (CBF) in patients with subcortical infarctions. Participants of this study underwent neuropsychological assessment emphasizing executive tests and single photon emission computerized tomography (SPECT) using stereotactic extraction estimation (ISEE). These participants were categorized into two groups; 1) patients having cerebral infarction on basal ganglia (BG group: $n=5$) and 2) individuals having cerebral infarction on white matter (WM group: $n=13$). Student-T tests were utilized to evaluate between-group differences on various neuropsychological tests. The result of neuropsychological assessment revealed that the BG group exhibited significantly greater number of perseverative errors and less number of categories completed on the Wisconsin Card Sorting Test (WCST) when compared to the WM group. However, there were no group differences on the Controlled Oral Word Association Test, Trail Making Test: Part A&B, subtests of the Behavioural Assessment of Dysexecutive Syndrome, and the Ruff Figural Fluency Test. Moreover, the analysis of the SPECT displayed the BG group showing significant decreased CBF on parts of dorsolateral prefrontal cortex (DLPFC) (i.e., Brodmann area 8, 9, 44, 45, 46) in contrast to the WM group. Taken together, the result of neuropsychological assessment suggesting executive dysfunction and the analysis of the SPECT were consistent. The study indicates that individuals with BG lesions experience significant executive declines that may be associated with decreased CBF in the subcortical-frontal system. In addition, the WCST may be more sensitive to the DLPFC dysfunction than other executive tests.

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M. BALCONI, S. TUTINO. A Fighter is a Lion: Neuropsychological and Cognitive Processes in Decoding a Metaphor. An Analysis through Event-Related Potentials (ERPs).

We make use of metaphor in everyday life. This frequent use inspired numerous studies about production and mostly about decoding of figurative language. The aim of this study is to explore what model is apt to explain the metaphor elaboration, exploring both neuropsychological and representational levels involved in the comprehension. Previous results showed the presence of two morphologically similar peaks (N3 and N4) in responding to the linguistic stimuli. N3 seems to reflect a mechanism specialized in processing pictures and images, but some authors found evidence for its sensibility to semantic level of the speech. Federmeier and Kutas (2002) found the presence of N3 specifically for metaphor sentences but not for literal ones. N4, indeed, seems to reflect the mechanism of semantic integration of the discourse. In our study, 320 sentences (equally shared in literal and familiar metaphorical endings), were presented to 42 subjects for event related potential study (ERP). ERP analysis showed a complex N3-N4 for both the literal and metaphorical endings, with an increase in the later pick (N4) for the figurative one. In line with these results, we supposed that literal and metaphorical decoding engaged qualitatively similar processes. Nevertheless, metaphorical meanings require an integrative process. This suggests that differences between figurative and literal decoding are not in the nature of the processes, but only in the demands of conceptual integration that affects metaphor in greater measures.

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M. GUT, A. URBANIK, L. FORSBERG, M. BINDER, K. RYMARCYK, B. SOBIECKA, J. KOZUB, K. SIENNICKA, A. GRABOWSKA. The Effect of the Forced Right-Handedness on the Functional Asymmetry Pattern in the Human Brain.

Despite numerous studies on use-dependent plasticity, the effect of switching handedness on changes in the brain asymmetry is still not well known. Previous neuroimaging study showed that while in right-handers (RH) the activation pattern was unilateral, in left-handers (LH) and switched from left- to right-handedness (L-RH) more bilateral activation was observed. The aim was to determine if the brain activity pattern for motor functions in L-RH differs from that of RH and LH. Forty-one subjects: 12 RH, 7 LH and 12 L-RH participated in the experiments. Subjects performed two tasks (simple and complex) during fMRI scanning using either hand in sequence. During simple task performance of either hand in either group activation was contralateral, whereas during complex movements a bilateral activation was observed. However, groups differed as to the size of activation in the ipsilateral/contralateral sides. There were no significant differences between groups in activation volume in the right hemisphere, whereas in the left hemisphere the volume of activation was greater in RH than in LH and L-RH, especially during complex task. Moreover RH revealed greater activation volume in the left hemisphere during either type of task, while in LH the greater volume was shown in the right hemisphere, however their asymmetry pattern was less pronounced. In L-RH the difference between hemispheres was insignificant. The brain asymmetry pattern for motor functions in L-RH is similar to that observed in LH. This bilaterality is interpreted as the evidence that despite switching, the organization of motor functions in their brains remained unchanged.

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J.M. KAUFMANN. Voices and Faces: A Special Relationship?

Recently, an fMRI study showed that voices of familiar people activated the fusiform face area in a task that emphasized speaker

recognition (von Kriegstein et al., 2005, *Journal of Cognitive Neuroscience*, 17, 367-76). This finding was interpreted as evidence for a direct link between auditory voice and visual face processing areas. However, due to the limited temporal resolution of fMRI, top-down effects via supramodal units cannot be completely ruled out. In the present study the superior temporal resolution of EEG was used to investigate early cross-domain repetition effects, which would argue for a direct link between voice and face processing areas at the perceptual level. For within-domain face priming in a task, in which identity was irrelevant, a clear N250r was found, replicating previous studies (e.g. Schweinberger et al., 2004, *Neuroreport*, 15, 1501-1505). Interestingly, there was also a clear response in the time range of the N250r for familiar faces primed by corresponding voices. This contrasted with a lack of early cross-domain repetition effects for familiar faces primed by names, suggesting a different, maybe indeed special relationship between faces and voices. **Key Words:** Face recognition; Voice recognition. **Acknowledgements:** Supported by a British Academy Post-Doctoral Fellowship (BA PDF 0407) to J.M.K. **Correspondence:** Jürgen M. Kaufmann, Dr., University of Jena, Department of General Psychology, Am Steiger 3, Haus 1, 07743 Thüringen, D. E-mail: juergen.kaufmann@uni-jena.de

B. KEISKER, R. KLEISER, A. BLICKENSTORFER, M.-C. HEPP-REYMOND, & S.S. KOLLIAS. Differences in Cortical Activation During Static and Dynamic Power Grip Force.

Introduction: The relationship between brain activation and the generation of static and dynamic force is still controversial. We investigated using fMRI whether static force and dynamic force would produce differential recruitment of regions within the sensorimotor network. **Methods:** Whole brain fMRI was performed during a visually guided power grip task on a 3T Philips system (TE=40ms, TR=3000ms). Thirteen healthy subjects were asked to generate isometric force on a MR compatible dynamometer. In the static condition they had to reach a force of 10% or 20% maximal voluntary contraction (MVC) and hold this force for 21s. In the dynamic condition self-paced force pulses of 20% MVC had to be produced at a rate of 0.5Hz. Target and exerted force were displayed on a screen. **Results:** Under both conditions significant activation was found in the contralateral primary motor (M1) and somatosensory cortex (S1), the secondary sensory cortex (S2), supplementary motor area, lateral premotor cortex, hMT, and ipsilateral cerebellum. The contrast between the dynamic and static conditions revealed stronger activation for the force pulses in all the activated regions mentioned above. The contrast between the two static forces (10% and 20% MVC) did not reveal any significant difference in activation patterns. **Conclusion:** The present study confirms that the cortical activation in M1/S1 is less strong under static condition than during the generation of pulses of equally integrated force. Our data indicate that static and dynamic force modulates differentially the BOLD-signal, which is not coherent with neuronal correlates of grip force in motor regions.

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D. RODRIGUEZ SALGADO & M. RODRIGUEZ ALVARES. Pattern of Neuropsychological Impairment Associated with HIV Infection in Drug Users.

The objective of this study was to assess the pattern of neuropsychological impairment in asymptomatic HIV-positive drug users and to examine which deficits are related to HIV infection. 102 drug users in recovery, 54 asymptomatic HIV-positive subjects and 48 HIV-negative subjects, were evaluated with an exhaustive neuropsychological battery that assess 9 neuropsychological domains: abstracting ability, attention and visuomotor coordination, general verbal ability, visual memory, manual dexterity, constructional ability, motor speed, selective attention and verbal memory. Taking as a reference the performance of 23 HIV-negative subjects without a history of drug abuse it was set which drug users showed neuropsychological impairment. To assess their pattern of impairment it was determined how many subjects were impaired in each neuropsychological domain and the number of domains in which they

were. Differences between HIV-positive and HIV-negative drug users were analyzed. The HIV-positive group had significantly higher percentages of impaired subjects than the HIV-negative group in general verbal ability [$\chi^2(1) = 4.54$; $p < .05$], motor speed [$\chi^2(1) = 6.52$; $p < .05$] and manual dexterity [$\chi^2(1) = 4.54$; $p < .05$] domains. The percentage of subjects impaired in more than two neuropsychological domains was significantly higher among HIV-positive group (67%) than HIV-negative group (14%) [$\chi^2(1) = 33.88$; $p < .001$]. Although asymptomatic HIV-positive drug users seem to show an extensive neuropsychological impairment, only motor speed, manual dexterity and general verbal ability disturbances are related to HIV infection. These disturbances are consistent with fronto-subcortical type alterations, as described in the literature for HIV-positive patients.

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S. REMY & A. BERARDI. Sensation Seeking and Smoking in Young Adults.

Sensation seeking is a risk factor for addictive behaviours. In this study we sought to determine whether smokers are high sensation seekers. Thirty-eight smokers and 64 non-smokers matched on sex, age and education were studied (all $F < 1$). All participants were females, had between 18 and 21 years of age and were university undergraduates (range : 12-14 years of education). Smokers were selected on the basis of self report and were administered the Fagerstrom Test for Nicotine Dependence. Mean \pm SD on the Fagerström was of 1.71 ± 1.54 (range : 0-5), indicating that smokers ranged from non-dependent to moderately dependent. All subjects were administered the Sensation Seeking Scale (SSS) including subscales of Disinhibition, Thrill and Adventure Seeking, Experience Seeking and Boredom Susceptibility (Zuckerman, 1978). The SSS Total score and the four subscale scores were calculated. Results were analyzed using one-way ANOVAs. Smokers had higher scores than non-smokers on the SSS Total score (means : 23.24 ± 4.64 and 19.75 ± 5.77 , respectively, $p = .002$) as well as on the Disinhibition (means : 4.47 ± 1.89 and 2.94 ± 2.20 respectively, $p = .0005$) and Experience Seeking subscales (means : 7.66 ± 1.63 and 6.66 ± 1.70 respectively, $p = .004$). No other significant differences were found (all $p > .14$). These results suggest that non-dependent to moderately dependent smokers are high sensation seekers relative to non-smokers. Moreover, they suggest that only specific aspects of sensation seeking may be related to light and moderate smoking in young adults.

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S. REMY & A. BERARDI. Levels of Sensation Seeking and Suicidal Ideation in Young Adults.

The aim of this study was to determine whether females with suicidal ideation are high sensation seekers. Three groups of females were studied : 21 with suicidal ideation, 25 high sensation seekers and 19 low sensation seekers. All groups were matched on age and education (all $F < 1$). High and low sensation seekers never made a suicide attempt and were selected on the basis of their total score on the Sensation Seeking Scale-Form V (SSS). Mean total score on the SSS for all subjects who never made a suicide attempt was 21.98. Subjects with scores above the mean were considered high sensation seekers and subjects with scores below the mean were considered low sensation seekers. Results were analyzed using ANOVAs. High and low sensation seekers differed on all SSS subscales (all $p < .0004$; .006). Females with suicidal ideation had lower scores than high sensation seekers on the Thrill and Adventure Seeking subscale ($p = .01$), and higher scores than low sensation seekers on the SSS Total score ($p = .0007$), and on the Disinhibition ($p = .01$) and Experience Seeking subscales ($p = .01$). These results demonstrate that the SSS Total Score, as well as the Disinhibition and Experience seeking subscale scores in females with suicidal ideation are similar to those of high sensation seekers without evidence of suicide attempts.

Therefore, on selected SSS subscales, females with suicidal ideation have scores similar to suicide attempters who have been found to be high sensation seekers (Remy & Berardi, 2003).

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M. CHERNER, C. YOUNG, M. J. TAYLOR, M. HANASHIRO, D. FRANKLIN, D. SASAKI, R. K. HEATON, J. H. ATKINSON, I. GRANT, & the HNRC GROUP. Deficits in Motor Speed and Dexterity Among Polysubstance Experienced MDMA Users with Intact Cognitive Functioning.

Neuropsychological (NP) disturbances, particularly in verbal memory, have been reported in association with abuse of the recreational drug "ecstasy," or 3,4-methylenedioxymethamphetamine (MDMA), but findings have been inconsistent. We performed comprehensive NP testing examining 7 ability domains in 22 MDMA users (MDMA+) and 21 control subjects (MDMA-). Participants were free of other substance dependence and were excluded if they had neurologic, psychiatric, metabolic, or developmental confounds. All participants had negative urine toxicology on the day of testing. RESULTS: The groups had comparable age, education, and gender proportions. The MDMA+ group had more non-Hispanic white participants (95% vs. 62%, $p < .03$). On average, MDMA+ participants experimented with 8.6 (1.7) recreational substances, compared to 3.2 (2.3) for the MDMA- group. Median [IQR] lifetime MDMA use was 180 [106-518] estimated doses, with 120 [34-334] days of abstinence. There were no significant group differences in NP global deficit score or in 6 cognitive domains; however, the MDMA+ group had a higher mean deficit score in motor speed and dexterity [0.59 (0.91) vs. 0.10 (0.26), $p < .02$], which was not explained by use of alcohol or other stimulant drugs but was significantly associated with lifetime MDMA consumption ($\rho = 0.36$, $p < .02$). CONCLUSIONS: Isolated motor dysfunction among MDMA users in the context of otherwise intact cognitive functioning requires further investigation in this typically polydrug-experienced group. Dopaminergic and serotonergic modulation of nigrostriatal pathways may be implicated.

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J. JUÁREZ, I. GUTIÉRREZ-LARIOS & R. VALDEZ-AGUILAR. Naltrexone Therapy in Alcoholic Patients: A Comparison between Continuous and Intermittent Treatment.

There is evidence supporting that Naltrexone (Ntx) treatment combined with psychotherapy is a good pharmacologic strategy in the alcoholism treatment. However, desertion from naltrexone treatment is a frequent problem, which could be related with the reported side effects by the patients under naltrexone treatment. For the purpose to increase the therapeutic adherence and then the treatment successful on alcohol consumption, an intermittent naltrexone treatment was implemented and compared with the traditional continuous treatment in the present study. Fifty four male adults with alcohol dependency were assigned to two groups and submitted to either: a daily dose of 50 mg of Ntx during a continuous period of 12 weeks (CT) or a daily dose of 50 mg of Ntx during two weeks followed for one week without Ntx. This intermittent regimen (IT) was repeated until complete 12 weeks. Both groups had 90-minute psychotherapy sessions once a week throughout treatment. Significant decrease on alcohol consumption, craving and plasma levels of gamma glutamyl transpeptidase were observed in both groups at the end of Ntx treatment. The number of subjects showing side effects was decreasing along the 12 weeks of treatment in both groups; however, adverse symptoms disappear early and its intensity score were significantly lower in the IT than in the CT group. Alcohol drinking tended to increase after treatment in the two groups; however, the relapse period was shorter in the CT than in the IT. Considering the cost-benefit, the intermittent Ntx treatment seems to be more efficacious than the continuous treatment.

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M.J. KELLEY, J.P. STEVENS, & F. VANDERPOEL. Kava Cognitive Field Research and Documentary Development in Hawaii.

This poster will illustrate two research projects on kava in Hawaii: delineating kava's cognitive effects and generating funds with a commercial film on kava. Kava is a traditional beverage, in some Oceanic islands. Its anxiolytic effects are of equal magnitude to benzodiazepines but without the apparent problems of tolerance, dependence, and amnesia. By contrast, kava enhances cognition or has no known deleterious cognitive effects. In one project we are exploring the cognitive properties of kava. As kava is controversial in USA IRBs, owing to an FDA advisory, we adopted a survey strategy to assess acute cognitive effects by randomly allocating existing users of kava beverage at a kava bar to be tested either prior to or 15-min after their first bowl of kava. The thought is to identify robust effects on some measures of cognition, and then subsequently run more rigorous tests in controlled laboratory conditions. Preliminary data will be presented showing an absence of a significant influence on the Stroop effect, but a significant ($P < 0.05$) effect on reaction time. Our second project is to generate funds for research by developing a documentary on kava's positive effects, cultural history, and its current scientific research within Hawaii. Within a competitive market place for research funds, we are of the view that publicly "highlighting" kava's positive properties, and cultural heritage, is a productive for achieving funding. A DVD on our progress will be shown. Some preliminary footage is at www.kava.tv.

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S.K. LUCAS, M.A. REDOBLADO-HODGE, E.A. SHORES, J. BRENNAN & A. HARRIS. Prediction of Outcome 2-3 Years After Diagnosis of First Episode Psychosis – Exploration of Preliminary Findings.

By examining the early course of illness and increasing our understanding of the early stages of psychosis, we hope to improve longer-term outcomes in first episode psychosis (FEP). Identifying the indicators of prognostic outcome in FEP is also likely to be very helpful for identifying targets for rehabilitation, and when providing the families of these young people with information about the potential for recovery. The Western Sydney First Episode Psychosis Group began collecting data in young people (aged 13 to 25) presenting with newly diagnosed psychosis in 1999. Ninety-four participants were tested at baseline, and 53 returned for 23 year follow up. Initial analyses sought to identify factors that best predict functional outcome at 2 to 3 years after a first episode of psychotic illness, with outcome being assessed using two measures: the Social and Occupational Functioning Assessment Scale (SOFAS) from DSM-IV, and the Clinical Global Impression Scale – severity of illness measure (CGI). Premorbid Adjustment Scale in Adolescence and Verbal Comprehension Index (from the WAIS-III) were found to be the two most significant predictors for both outcome measures. The present study sought to further examine these results by breaking down these predictors into component parts. The issue of substance abuse in some patients was also addressed. Further clarification of results was achieved by this process, leading to a refining of the implications and further possible areas of focus for rehabilitation and cognitive remediation.

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M.S. KIM, Y.J. PARK, & T. YOUNG. The Effect of Attention Rehabilitation on the Cognitive Functions in Schizophrenic Patients.

This study has attempted to investigate the efficiency of the attention rehabilitation program on the improvement of the cognitive functions in schizophrenic patients. The computerized cognitive rehabilitation program (COMCOG) was administered to 12 schizophrenic patients (treatment group). 12 schizophrenic patients were also served as controls (control group). The rehabilitation program was administered to the treatment group for 16 sessions. For the evaluation of the cognitive functions, a number of neuropsychological tests were administered before and after the introduction of rehabilitation program. The results showed that the treatment group showed significant improvements on the d2 test, stroop test, the immediate recall of RCFT, and the perseverated responses of WCST compared to the control group. These results indicate that the rehabilitation program is effective for the cognitive enhancement, in particular for the improvement of attention and executive function, for the chronic schizophrenic patients. In addition, the negative symptoms and general psychopathology of schizophrenia were significantly reduced after rehabilitation treatment.

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A. BLESSING, H. REGEHR, F. SCHULZE-LUTTER, A. FRIES. Interpretation of Proverbs in at Risk Patients and Patients with First Episode Psychosis.

Bleuler (1911) regarded "concretism", a deficit in the comprehension of metaphors, as one of the fundamental symptoms of schizophrenia. Proverb interpretation is a widely used method to assess this aspect of schizophrenic formal thought disorder. The present study examined concretism with a multiple choice proverb test (MCPT) developed by Barth & Küfferle (2001) in first episode psychosis (FEP, N=15), at risk patients (AR, N=9) and healthy controls (HC, N=15). AR patients were defined by the presence of any one predictive basic symptom (Klosterkötter et al. 2001) rated at least '3' on the SPFA (Schulze-Lutter et al. 2001) or by meeting SIPS criteria for Ultra-High Risk state (Phillips et al. 2000). HC were matched to FEP by age and gender. Mean MCPT error scores of both patient groups were significantly higher than the mean score of HC (one-sided Mann-Whitney tests; $p=.004$ vs. FEP and $p=.032$ vs. AR). The difference between FEP and AR was not significant (two-sided Mann-Whitney test; $p=.379$). Groups did not differ on the HAWIE subtest 'similarities' ($p=.733$) but on a vocabulary test (VT) ($p=.038$) and in education ($p=.002$). Further analysis showed that MCPT error score differences between groups could at least in part be accounted for by differences in education and VT score. The result of the present study suggests that "concretism" is already present in some patients at risk of schizophrenia and in some first episode patients. Thus, the MCPT might facilitate identification of patients at risk of psychosis. Further studies with better matching are needed.

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E. ZACCHI, D. VENTURA, A. TAUB. Neuropsychological Effects Associated with Remote Chronic Exposure to Mercury Vapour.

Objectives: examine possible residual effects associated with long term exposure to mercury vapour. Methods: neuropsychological assessments of 26 former workers of fluorescent lamp plants who had been exposed to mercury vapor for 10.8 „b 5.9 years were compared with 20 referents. Time since the cessation of exposure was 6.4 „b 4.8 years and mean urinary mercury concentration was 2.1 „b 1.8 fY/gCr. Neuropsychological battery included attention (WMS Digit Span, Stroop Test), verbal (Buschke Selective Reminding Test - SRT) and visual (WMS Visual Reproduction) memory, manual dexterity (Grooved Pegboard), verbal fluency (FAS), visuo- spatial function (WAIS Block Design), executive function (Wisconsin Card Sorting Test) and semantic knowledge (WAIS Vocabulary) tests and depression (BDI) and anxiety (STAI) inventories. Thirteen ex-workers were re-examined after 1.5 years and their results were compared with the first assessment. Results: compared with the

referents, the ex-workers performances were poorer on the Stroop Test part 1 ($p=0.004$) and 2 (0.010), SRT for long term recall ($p=0.028$) and long term storage ($p=0.021$), FAS ($p=0.010$) and Grooved Pegboard dominant ($p=0.045$) and nondominant hand ($p=0.008$). Their scores for depression ($p<0.001$), anxiety state ($p<0.001$) and trait ($p=0.001$) were higher than the referent's. After 1.5 years, the 13 ex-workers had lower scores on Digit Span forward ($p=0.044$) compared with first assessment. Conclusions: The neuropsychological performance of these former workers suggest that occupational exposure to elemental mercury leaves residual effects that may have long term expression, causing slowed information speed, impairment in verbal memory spontaneous recall, manual dexterity, and increased symptoms of depression and anxiety.

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M. ALTGASSEN & M. KLIEGEL. Prospective Memory Performance in Individuals with Schizophrenia.

Prospective memory is defined as the ability to form intentions and to realize them independently after a time delay. Prospective remembering consists of different phases and cognitive processes, e.g. retrospective memory and executive functions. Prospective forgetting might contribute to the often highly disorganised life of patients with schizophrenia, as to remember to do certain tasks in the future is necessary to fulfil and handle everyday demands and to live a structured life. Consistently, all three studies assessing prospective memory performance in people with schizophrenia (Elvevåg, Maylor, & Gilbert, 2003; Kondel, 2002; Shum, Ungvari, Tang, & Leung, 2004) found a reduced performance of the clinical group in comparison to healthy controls. These impairments were related to schizophrenic patients' poor executive functioning. As prospective memory performance not only depends on executive functions, but also on retrospective remembering, the frequently observed retrospective memory impairment in patients with schizophrenia might also account for their difficulties with performing future actions. Therefore, the present study aimed at investigating the impact of retrospective memory and executive functions on prospective memory by manipulating the number of to be remembered prospective cues and including prospective inhibitions, respectively. Clinical and control group were compared with regard to their prospective memory performance. Moreover, various cognitive variables (e.g. working memory, inhibition, cognitive flexibility, verbal intelligence) were assessed and related to participants' prospective memory performance.

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M. KELLER, A.E. ZEHNDER, J. ROFFLER, D. WYSS, J. KESSELRING. Importance of Including a Driving Simulator in the Evaluation of Driving Abilities.

As part of the current clinical work flow the driving simulator is merely used as a therapeutic tool (Keller et al., 2003; Keller et al., 2004) because norm data are missing. We aimed at evaluating the importance of including a driving simulator in the conventional neuropsychological assessment procedure when a patients' driving abilities are being investigated. Neurological patients fulfilling the following criteria were examined: patients being cognitively impaired according to their neuropsychological test performance, but showing adequate driving performances in the driving simulator (i.e., no accidents, no conspicuous behaviour, adequate reaction capacity, speed and lead control). The study design included a thorough traffic-psychological investigation of the patients, two rides in the driving simulator, and by way of comparison a standardized trip with the car accompanied by the clinic driving instructor. Additionally, patients were given a questionnaire in order to subjectively evaluate their driving performance after the rides in the driving simulator and the trip with the driving instructor, respectively. Experience suggests that

isolated traffic-psychological assessments can only insufficiently reflect a patients' driving ability resources.

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J.C. ARANGO, N. MERRITT, J. BALZANO, G. VOELBEL, J. LENGENFELDER, H. ROGER, J. DELUCA. Influence of Hispanics Acculturation Levels on Neuropsychological Test Performance.

Today there is a controversy regarding whether neuropsychological tests are culture-free. Recent studies have even found that some neuropsychological tests that do not depend on verbal skills can be influenced by cultural factors. This study aims to (1) examine whether level of acculturation affects Wisconsin Card Sorting Test (WCST) and Digit Symbol Test (DST) performance and (2) determine the extent to which acculturation predicts such performance. Sixteen low-accultured and 25 high-accultured healthy Hispanics and 21 healthy Caucasian Americans were administered these two tests. There were no differences in age or years of education. Low-accultured Hispanics performed significantly worse than Caucasians on the WCST by having significantly more errors ($p < 0.001$) and perseverative responses ($p < 0.01$) and completing significantly less categories ($p < 0.05$). On the Digit Symbol Test, both the high- and low-accultured Hispanics performed significantly worse than the Caucasians ($p < 0.001$). The low-accultured Hispanics performed significantly worse than the high-accultured Hispanics on this test ($p < 0.05$). Regression analyses indicated that acculturation level, above and beyond age and years of education, accounted for a significant proportion of the variance in the WCST total number of errors, perseverative responses, and number of categories and the DST total score ($p < 0.01$). Despite being non-verbal assessments of cognitive ability, these test scores are impacted by cultural factors, as measured by acculturation. Because these tests are commonly used to evaluate cognitive dysfunction, careful attention must be paid to cultural issues in order to avoid misdiagnosis.

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M. SABUCEDO, J. BARROSO, A. NIETO, & M. RODRIGUEZ. Relationship Between the Frontal Assessment Battery (FAB) and Other Frontal Lobe Tests.

The Frontal Assessment Battery at bedside (FAB, Dubois et al., 2000) was designed to be a short and easy tool to detect the presence of frontal damage. Nevertheless there are few works that study its relation with other measures of frontal lobe function. In the present study we pretend to determine the relation of the FAB with other tasks that are classically employed to measure the functions of frontal lobe. Fifty neurologically normal individuals (university students) were examined. All subjects were assessed by FAB, Wisconsin Card Sorting Test (WCST), Stroop task, Control Oral Word Association Test (COWAT) and Semantic Fluency. Results show significant relations between FAB total score and some WCST indexes (number of trials, errors and "learning to learn" index), although these relations were low. There were no significant relations with verbal fluency tasks, neither with the interference Stroop score. Comparing FAB subtests with the scores of the other test we obtained similar results. The shortage of significant relations founded could be due to the high weight of premotor function in FAB total score. Thus, we consider that, though results should be confirmed with other samples, the Frontal Assessment Battery should not be used to substitute other tools that are usually employed to measure frontal lobe functions.

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A. HAHN, S. FISCHER & G. KERKHOFF. Comparison of the Self-Awareness of Deficits Interview and the Patient Competency

Rating Scale and their Relationship to Psychosocial Outcome in Patient with Acquired Brain Injury.

Impaired self-awareness of deficits (ISA) is often seen in patients with acquired brain injuries (ABI). Recent studies emphasized the importance of awareness in postacute rehabilitation. As therapists should consider the degree of awareness of their patients, various instruments for assessing ISA have been developed. The present study was conducted for two main interests: First [1] we compared two different measures of unawareness. Both measures, the Self-Awareness of Deficits Interview (SADI) and the Patient Competency Rating Scale (PCRS) are tools to assess ISA, therefore moderate to high correlations were expected. Second [2] we examined the impact of unawareness (prognostic value of the SADI and the PCRS) on the psychosocial outcome, evaluated by the Community Integration Questionnaire (CIQ) and the Satisfaction of Life Questionnaire (Fragen zur Lebenszufriedenheit (FLZ Module)). In addition, further relationships between the awareness measures (sensitivity to change), and the association with emotional distress have been explored. Data was collected at admission and discharge of a postacute day-treatment rehabilitation program. Thirty-nine patients with ABI, their therapists and their significant others participated. Preliminary results showed moderate correlations between the SADI total score and the discrepancy scores of the PCRS, which gives support to their convergent validity. But contrary to previous studies no relationship between the awareness measures and psychosocial outcome could be found in our first analyses. The importance of other variables (e.g. age, time since onset, affective state etc.), which may influence the results are discussed.

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S. DAWES, L. CYSIQUE, D. LAZZARETTO, L. M. MORAN, S. P. WOODS, R. K. HEATON, I. GRANT, HNRC GROUP.

Trail Making Test and the Relative Efficacy of Discrepancy Analysis in an HIV Positive Sample.

Discrepancies between Trail Making Test (TMT) Parts A and B are commonly derived for use in research and clinical practice; however, this interpretive approach fails to consider an individual's basic processing speed ability level based on TMT-A demographically-adjusted T-scores. If the TMT-A score level is not taken into consideration when deriving discrepancy scores, then under-detection of abnormal differences in low scoring individuals ($T < 40$) and over-detecting problems of high scoring individuals ($T > 55$) may occur systematically. The aim of this study was to derive normative standards for ability-based TMT discrepancy scores and to examine their classification accuracy relative to conventional TMT measures. A sample of healthy adults ($n=201$), mean age 39.6 years ($sd=11.5$) and education 13.6 years ($sd=2.6$) were examined to derive the normal distributions of discrepancy scores for the simple and ability-level based scores. The resultant normative discrepancy cut-scores which were then applied to a demographically comparable sample of 239 HIV+ individuals selected to approximate current prevalence estimates of HIV-associated neurocognitive disorders (36% impaired). Results showed that the conventional TMT-B measure provides better sensitivity (54% versus 25-26%, $p < .01$), but lower specificity (79% versus 83-89%, $p < .05$) than both derived discrepancy scores in classifying HIV-associated neurocognitive disorders. Findings from this study do not support the incremental predictive validity of the TMT discrepancy analyses relative to traditional TMT scores in classifying persons with HIV-associated neurocognitive disorders. Nevertheless further analyses are needed to examine the construct and incremental validity of the ability-based TMT discrepancy score as a marker of divided attention.

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S. DAWES, P.A. SUAREZ, C.Y. CASEY, M. CHERNER, T.D. MARCOTTE, I. GRANT, R.K. HEATON, & HNRC GROUP. Clinical Utility of a Clustering Method for Analyzing Neuropsychological Test Data in an HIV Positive Sample.

The belief that certain disorders will produce specific patterns of cognitive strengths and weaknesses pervades clinical neuropsychological assessment. For example, based upon group mean analyses, HIV-1 infection has been associated with poorer learning, motor abilities, etc. However these studies rarely determine how many individuals conform to the group mean pattern. Those few studies that have examined patterns of cognitive performance among HIV+ individuals find that there is more than one pattern of test scores. The current study presents a method for categorizing individual cases as members of one of six cognitive profiles identified through cluster analysis of 553 HIV+ cases. The cognitive profiles consist of tests measuring 6 underlying constructs defined by factor analysis: verbal memory, visual memory, executive functioning, speed of information processing, attention/working memory, and motor functioning. Because we were interested in differential patterns of performance, independent of level of performance, ipsitive scoring of the factors was used for the cluster analysis. The method employs the Mahalanobis distance (MD) to compute the multivariate distance between each case and the six cluster-based profiles which are described according to their relative strengths and weaknesses. Equations were then derived from a discriminant function analysis, which were used to match each case with a specific cognitive profile. The number of cases that were able to be reliably classified to the original cluster classification by the use of the MD was 90%. The method shall be illustrated with three demographically and disease-state matched cases that reveal different patterns of cognitive test performance.

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C. O'CONNOR, G.T. TURNER, S. KATERJI, T.A. SCHWEIZER, S. BLACK, D. STUSS, T. MANLY, I.H. ROBERTSON, & B. LEVINE. A Randomized Control Trial of Goal Management Training in Adults with Neurological Damage. Goal Management Training (GMT) is a rehabilitation approach that relies upon verbally-mediated, metacognitive strategies to systematically target disorganized behaviour resulting from executive and attentional impairments. The effectiveness of a brief GMT intervention has been demonstrated in a randomized control trial (RCT) of TBI participants (Levine et al., 2000). In the present RCT we sought to examine the effectiveness of GMT in a sample of fourteen neurological patients of mixed etiology (4 TBI, 7 stroke, 3 other). Patients were randomly assigned to either GMT (n=6) or control (n=8) groups. Groups met with a trainer for two-hour sessions once per week for seven weeks. The GMT involved the introduction and practice of self-instructional strategies using self-monitoring exercises, simulated real-world tasks, and homework assignments. The control group involved the same number of psycho-educational sessions, consisting of support and information, group activities, and homework assignments. Outcome measurements, taken immediately prior to and following the series of sessions, included self and other reports of cognitive and everyday functioning, and tasks of attentional control, planning, and complex, real-life simulations. Following the sessions, the GMT group demonstrated improvements on tests of planning and sustained attention compared to their pre-rehabilitation performance, whereas the control group scores remained unchanged. In addition, the GMT participants reported fewer problems with absentmindedness in everyday life, cognitive failures, and dysexecutive symptoms than they reported before the rehabilitation sessions. These results provide evidence for the positive impact of GMT on key neuropsychological and self-report indicators of goal-directed behaviour for adults with neurological damage.

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M. KELLER, J. KOOL, A. ZEHNDER, J. KESSELRING. Efficiency of Neurological and Neuropsychological Rehabilitation Evaluated with the Valenser Alltagsorientierte Therapie (VAT) Test.

In order to measure effectiveness of neurological rehabilitation in activities of daily living 27 patients (10 women, 17 men; average age 56.2 ± 14.4 years) with an acute neurological disorder were examined (stroke N = 20, brain injury N = 3, other neurological disorders N = 4). At entry at the rehabilitation clinic and 3 weeks later a standardised course (Valenser Alltagsorientierte Therapie; VAT; Keller et al., 2002) was performed. Acute neurological disorders did not date back longer than 6 months, severe aphasia were excluded, patients had to be mobile enough to perform the tasks and had to reach at least 27 out of 30 points on the Mini-Mental State Examination (MMSE). Neurological patients had lower scores in all items in comparison to healthy controls. Three weeks later all neurological patients showed significant improvements of results ($p = 0.002$) in spite of the high cognitive level (MMSE = 27) at the beginning of the rehabilitation period. In general this treatment was well accepted by the patients and was considered a welcome addition to specific therapies relevant to activities of daily living.

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