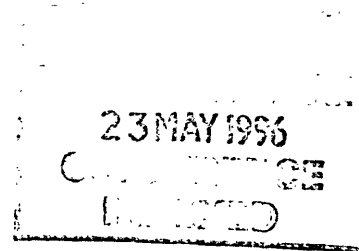


Abstracts Presented at the Nineteenth Annual International Neuropsychological Society Mid-Year Conference

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WEDNESDAY AFTERNOON, JUNE 19, 1996

Poster Session 1/June 19, 1:40–5:45 p.m. To June 20,
9:00 a.m.–5:45 p.m.

CHILD NEUROPSYCHOLOGY

P. VAN VUGT, I. FRANSEN, & W. CRETEN. Line Bisection Performances of 650 Normal Children.

Six hundred fifty right- and left-handed subjects, aged 7–12 yr, performed a visual line bisection task with their preferred hand. A stimulus-independent neglect index was calculated. Results were IQ- and attention test score-independent. Test instruction in a language different from one's mother tongue negatively influenced bisection performance, but impact from reading habit or ability could not be demonstrated. In vertical bisection, a general and significant upward displacement was found, whereas in horizontal bisection, subject (sex, age, handedness) and stimulus characteristics (orientation, length, position) yielded different neglect indexes. Results are compatible with selective right hemisphere activation for visuospatial tasks and may support the hypothesis of greater hemispheric specialization in males than in females.

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C. GARCIA-SÁNCHEZ, A. ESTÉVEZ-GONZÁLEZ, E. SUÁREZ-ROMERO, K. VERGER, & C. JUNQUÉ. Fronto-Striatal Dysfunctions in Attention Deficit Disorder.

We investigated possible fronto-striatal dysfunctions in attention deficit disorder (ADD). The neuropsychological performance of 25 ADD and 35 control teenagers, selected clinically (DSM-III) and experimentally (through CPT and PASAT), with normal IQ was assessed using a wide-ranging battery of premotor, prefrontal, memory, and visuospatial functions. Mega-Z scores demonstrated a profile that showed greater impairment in premotor (and motor speed) and visuospatial functions. Declarative memory was relatively preserved. Premotor functions were more impaired than dorso-lateral prefrontal functions. Our results are consistent with fronto-striatal dysfunction, especially in ADD subjects without hyperactivity.

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S. KESTI & M. KORKMAN. Gender Differences in Language, Visuospatial Skills and Learning in Children Aged 3 to 10 Years.

In previous studies women have been found to have an advantage over men in language abilities, whereas men have demonstrated more advanced

visuospatial skills. The aim of this study was to explore possible neuropsychological gender differences in children. NEPSY subtests assessing language, visuospatial skills, and learning were used. Subjects were 318 Finnish children, 3–10 yr of age, with 20 boys and 20 girls per age group. Significant gender effects were found in 5 out of 16 subtests. Girls outperformed boys in word segmentation at ages 7 and 10, in phonological word fluency at ages 7 and 9, in comprehension of instructions at age 5, and in delayed recall of names at ages 5 and 7; boys outperformed girls in evaluation of directions at ages 6 and 9.

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R. LINDBLOM-IKONEN & M. KORKMAN. Relative Contributions of Motor Skills and Visuospatial Perception to Performance on a Copying Designs Test in Normal Children.

The aim of the study was to assess the relationships between copying skills and manual and perceptual functions in children at three age levels. Normal Finnish children in three age groups were studied: 3–5-yr-olds ($n = 68$), 6–8-yr-olds ($n = 60$), and 9–12-yr-olds ($n = 99$). The dependent variable was the Copying Designs subtest from the NEPSY. Independent variables were two manual motor subtests and two perceptual subtests. In the youngest age group copying design skill was predicted first by motor skills and second by visuospatial perception. In the intermediate age group only the visuospatial variable explained a significant part of the variance. In the oldest age group the variables explained the variance in the copying skill to a very modest degree.

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K. KONRAD, S. GAUGGEL, & H.T. JANSEN. Long-term Sequelae After Pediatric Brain Tumors and the Effect of Irradiation.

In this study the neurobehavioral outcome of 39 patients with brain tumors (ages 6–20 yr) was assessed. Twenty patients had undergone cranial irradiation plus surgery with either chemotherapy or without chemotherapy, whereas the rest had received only surgery with or without chemotherapy. Groups were comparable with respect to sex, age at diagnosis, and tumor location. Mean scores for both groups were below age-based normative means in all cognitive and behavioral areas. The radiation group showed worse performance in memory tests and greater attention deficits than non-irradiated patients; furthermore, radiated patients described themselves as having a worse quality of life, and their parents reported a stronger impact on the family.

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U. KIRK & S. KEMP. Developmental Patterns of Verbal and Nonverbal Rate-Based Production Efficiency.

Slowed or inefficient auditory and visual processing of temporal information has been associated with a variety of developmental language disorders, dyslexia, ADHD. Less is known about the role of slowed or inefficient production of temporal information in these disorders. The purpose of this study was to investigate the normal development efficient production in 68 children between the ages of 7 and 12 on production tasks involving language, visuomotor precision, successive and sequential fingertip tapping, and verbal and design fluency. Analysis of rate of production and time/accuracy ratios revealed four patterns of increased efficiency on these tasks. These patterns in the development of rate of production efficiency should be considered when evaluating children with language, reading, attention, and output disorders.

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J.G.M. SCHEIRS & F.A.A. VAN SCHIJNDEL. Handedness and Birth Stress in Children and Young Adults with Learning or Behavioral Difficulties.

It has been suggested that a relationship between the presence of pre- and perinatal complications and handedness does not exist or is very small in normal subjects. Such a relationship might however be stronger in diagnostic groups. Two hundred thirty-four children and young adults with learning and/or behavioral difficulties, but normal intelligence, served as subjects to investigate this relationship. Non-right-handers suffered more from birth stressors (rhesus antagonism and breathing problems), and they had more problems with spoken language. No relationship was found between handedness and a composite birth stress score. The problem of valid inference making is discussed in terms of statistical power of tests used when using this kind of data. In the diagnostic group investigated, effects of pre- and perinatal complications on the development of handedness are either absent or small.

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M.L. LORUSSO, V. MARTOCCHI, F. BURGIO, & R. GARGHENTINO. Somatosensory and Constructional Deficits in Children with Osteogenesis Imperfecta.

Osteogenesis imperfecta is a genetic disease characterized by elevated bone fragility. Studies of cognitive profiles report average intellectual levels and no specific neuropsychological deficits, but there are also reports of neurological problems as a consequence of basilar invagination. The present study investigated the presence of neuropsychological deficits in children with osteogenesis imperfecta, in somatosensory and constructional functions as a possible consequence of reduced exploration, manipulation, and somatosensory stimulation (due to the high risk of fractures). Data from neuropsychological assessment show below average performances in somatosensory tasks and graphic/constructional abilities, with normal results for visuo-perceptual tests. Findings support the hypothesis and sustain the importance of early experiences in structuring perceptual and executive functions.

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M. VAUGHN, G. HYND, J. HALL, & R. KAMPHAUS. Rasmussen's Syndrome: A Case Study.

Chronic focal encephalitis or Rasmussen's syndrome is a rare form of epilepsy, occurring primarily in children. It is characterized by severe, uncontrollable focal seizures that are resistant to anticonvulsant medications, which gradually impair neurological and intellectual functioning. A case of a 14-yr-old white boy who suffers from Rasmussen's syndrome is pre-

sented. His seizures, which began at age 5, increased in frequency and severity to approximately 80 to 100 times daily. Following unsuccessful treatments, including medications, a left frontal lobectomy at age 7, and temporal lobectomy at age 8, a left hemispherectomy was performed at age 10. Despite preserved social skills and to some extent good receptive language, other severe impairments characterized his recovery. The theoretical implications of his late hemispherectomy are discussed.

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M. NEWHOFF & H. HARRIS. Toward an Integrated Model of Reading Development: Narrative and Inferencing Abilities of Learning Disabled Children.

Reading impairment cannot be adequately explained without an explicit theory of reading development. Recent PDP theories of cognitive processing have led to aligned reading models; however, little research has been extended to these models. Concurrently, and equally important, narrative reading is now documented as a bihemispheric function. Finally, context has consistently been shown to aid the speed and accuracy of reading abilities in both the normal and lesioned brains. This study was an attempt to support a theory of reading development that housed all these points. The avenue was a comparison of story retelling and inferencing abilities, in response to read information, among learning disabled 11-12-yr-olds and normal children matched by chronological age and language age.

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F.F. LEFEVER, J. MENDEZ, & E.I. KUMKOVA. Temporal Ordering: Child and Adult Developmental Trends in a "Frontal" Function, Inferred from the Recency Test.

Derived from a procedure used with frontal patients, the Recency Test requires naming 10 items before and 10 after 60 s of counting backwards, discrimination of these items from 20 new items, and saying whether they were seen before or after counting. Boys and girls aged 6-10 did not differ, but had distinct subgroups: those with adult competence and those at "chance" levels. At 11-12 yr of age, girls performed much better than boys on tests, a divergence near puberty similar to that reported for EEG indices. Girls 11-16 yr of age had no "chance level" subgroup, but boys did until 13-16 yr of age. Boys and girls 13-16 yr of age were at least as good as adults aged 27-50 and superior to those aged 52-90. Better temporal judgment of first-set items and early items in each training series suggested a greater role for associative memory in normal children and adults than in neurological patients.

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J.J. GONZALEZ, S. RUBIN, L. FOSTER, & G. HYND. Auditory ERPs in Subtypes of ADHD.

The DSM-IV categories of ADHD: Combined and ADHD: Predominantly Inattentive Type have been the focus of much debate. This study examined the issue of whether children diagnosed as ADHD: Combined or ADHD: Predominantly Inattentive could be distinguished based on Auditory event-related potentials, using the P300 paradigm. No significant latency differences were observed. Amplitude differences did differentiate the two ADHD groups from normals, with the ADHD groups having significantly lower amplitudes at Pz. At the Cz site, the amplitude was significantly lower in the ADHD Inattentive than the normals. Results of this study suggest possible differences in attentional processing among ADHD subtypes and normals. The results discuss cognitive models of attention.

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C. MCCARTHY, U. KIRK, & E. GOFF. Contributions of Visual-Spatial Functions to Arithmetic Skill in School-Aged Children.

The relative contributions of visual-spatial, memory, executive, and language functions to arithmetic skill were assessed in normally developing children aged 7 to 11. Six tasks, including four visual-spatial tasks, were related to performance on the Numerical Operations subtest (WIAT). These tasks included the Arrows, Block Construction, Picture Recognition, Route Finding, and Design Fluency subtests from the NEPSY and the Vocabulary subtest from the WISC-III. Visual-spatial tasks made more of a contribution to the young children's arithmetic performance of both simple and complex problems than they did to older children's arithmetic performance. Implications for neuropsychological assessment of developmental dyscalculia are discussed.

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S. RAZ, F. SHAH, M.D. LAUTERBACH, T.L. HOPKINS, & C.J. SANDER. Effects of Risk for Perinatal Hypoxia on Motor Function in Childhood: A Twin Study.

We explored the effects of differential perinatal hypoxic risk on motor function in 24 pairs of twins (3–10 yr of age) without gross sensory and motor deficits. Twins were considered discordant for early hypoxic risk based on both the Apgar score and respiratory support duration in the neonatal period. The outcome measure was the McCarthy Motor Scale score. We predicted that the performance of the co-twin considered to be at higher risk for hypoxic insult will fall short of that exhibited by the lower risk co-twin on this motor index of development. We found that although the bulk of the variance in motor function in childhood was explained by twin-set membership—a variable reflecting individual differences associated with genetic and environmental factors shared by members of each pair—hypoxic risk level did account for a significant proportion of the variance in motor function between the high- and low-risk co-twins.

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S. SCHMIDT, T. SNYDER, A. ROUGET, & E. GRAY. Empirical Analysis of the Selective Attention and Associate Behavior Checklists of the ANSER.

The ANSER consists of a set of questionnaires completed by parents and teachers. We studied two scorable components: "selective attention" (SA) and "behavior observation" (BO). The sample consisted of 111 children (6–11 yr of age) referred by primary physicians because of behavioral problems. There was a high internal reliability for all questionnaires (Cronbach's $\alpha > 0.8$). There were modest significant correlations between teachers and parents. Factor analyses of parent and teacher BO resulted in a common primary factor of "aggressiveness." Factor analyses of parent and teacher SA resulted in different factor structures. "Hyperactivity" and "inattention" accounted for most variance for parents and teachers, respectively. "Over-focus" was a common factor. The data show that the ANSER contains items highly predictive of atypical behavior.

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M. JENKINS, P. MALLOY, R. COHEN, S. SALLOWAY, R. NEEPER, J. PENN, & K. CHANG. Attentional and Learning Dysfunction Among Adults with History of Childhood ADHD.

Attentional performance and learning efficiency were measured in 40 outpatients presenting to an adult ADHD clinic. Measurements were contrasted for those with ($n = 22$) and without ($n = 18$) a history of childhood ADHD using DSM-IV criteria. The groups did not differ in age or Full Scale IQ. Group differences were observed on measures of attention (PASAT-R), learning (CVLT), and verbal response production (COWAT). The ADHD group also showed a trend toward worse performance on Digits Backward, Recurring Figures, and reciprocal motor alternation tasks. These findings suggest that individuals presenting with complaints of di-

minished attention and concentration can be differentiated neuropsychologically as a function of prior history of childhood ADHD.

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Correspondence: *David M. Mahalick, Doctors Office Center, 90 Bergen St., Suite 5300, Newark, NJ 07103-2499, USA.*

M.A. SEDO. "Quick Diagnostic Reading Test": Five-Minute Process-Oriented Exploration of Word-Reading Approaches in Normal and Disabled Readers.

Normal comprehension of semantic contents of text may hide a degree of neglect of structural (graphic and phonic) properties of the words. In non-phonetically written languages, this may present an obstacle to the rigorous testing of reading; that is, we do not really know when a given student is actually "blind" or "deaf" to the words as long as he or she is correctly following a well-perceived string of thought. The "Quick Diagnostic Reading Test" allows a quick experimental exploration of global "semantic access" and sequential "phonological assembly" by using minimum pairs of high-frequency sight words from the graded Dolch lists ("own-down," "key-they," "give-five," "love-move") and minimum pairs of low-frequency phonologically predictable words ("mat-mate," "mat-meat," "mat-smart"). The test helps to quantify the mastery of phonological generalizations in the reading of short and long vowel sounds, R-modified sounds, and consonant blends.

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J. VERMAAS, F.A.A. VAN SCHIJNDEL, & J. BERNDSEN-PEETERS. A Study for Dutch WRAT—Norms and Subtyping Dutch School Children.

The Dutch version of the Wide Range Achievement Test (WRAT), which was translated and adapted for Dutch children by H. van der Vlugt at the Neurological Ambulatory at Tilburg (TAN), is frequently used for neuropsychological assessment. The WRAT is used to identify children with possible learning disabilities. However, there are no Dutch validating studies with respect to the Dutch version of this test. In this study we analyzed WRAT data of 536 Dutch children to establish Dutch norms and learning subtypes. We identified several subtypes, including a learning disabled subtype. These results were in agreement with those found in earlier studies on the original WRAT.

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A. KALFF, M. DERIX, & J. JOLLES. An 8-yr-old Girl with a Specific Arithmetic Disability: A Case Study.

The nonverbal learning syndrome (NLD) is considered to be less apparent in children aged 7–8 yr than in older children aged 10–14. However, specific arithmetic disability with normal verbal function combined with psychosocial problems may be present in younger children, who may thus be at risk of developing NLD. The present case report describes an 8-yr-old girl with such a profile. The girl has a normal intelligence but clearcut and specific deficits in the realm of arithmetic and mental operations with numbers as well as time orientation and clock reading (performance 3 yr below chronological age). Dedicated neuropsychological training proved to be of value in training of time orientation and clock reading ability.

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G.W. HYND, J. HIEMENZ, J. HALL, M. VAUGHN, & H. CODY. Gyral Morphology in the Bilateral Perisylvian Cortex in Dyslexia.

Although many studies indicate that the region of the left planum temporale may be important in dyslexia, it has been suggested that gyral patterns may also be related to reading and neurolinguistic ability. This study examined the incidence of four gyral types in normal, ADHD, and dyslexic children. Significant differences existed in the left perisylvian gyral pat-

tern in the dyslexics. The dyslexics had fewer Type III and more unusual Type II gyral patterns in the left perisylvian region. The increased incidence of the Type II gyral pattern (lacking a posterior ascending ramus) seemed unusual and deserves further study in relation to associated neurolinguistic processes.

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EPILEPSY

A. DE SOMER, P. BOON, E. THIERY, G. VINGERHOETS, & L. DEFREYNE. Hemispheric Memory Differences in Intracarotid Amytal Testing of Epileptic Patients.

Material-specific memory performance was evaluated in 33 left hemispheric-language-dominant patients with a unilateral temporal epileptic lesion who underwent the Intracarotid Amytal Test (IAT) prior to planned neurosurgical intervention. Patients with a unilateral epileptic right temporal lesion perform significantly worse on memory tasks when using the right hemisphere. Patients with a left temporal lesion reveal no significant difference on the total mean recognition scores using the left or right hemisphere. The results can be explained by the differential processing of the items in the normal brain.

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M. HENDRIKS, J. MULDER, K. VAN BRONSWIJK, & H. VAN DER VLUGT. Performances on the Dutch CVLT and the Relation with Verbal Abilities for Patients with Idiopathic or Symptomatic Epilepsy, a Brain Tumor, or Healthy Controls.

In this study, the performances on the Dutch version of the California Verbal Learning Test (CVLT) of patients with idiopathic epilepsy are compared to those of patients with symptomatic epilepsy caused by several brain diseases, patients with a brain tumor without seizures, and a healthy control group. Most impaired were patients with symptomatic epilepsy and those with a tumor without epileptic seizures. More subtle deficits were found for patients with idiopathic epilepsy. Furthermore, we found a strong relationship between the performance on the CVLT and verbal abilities (based on WAIS subtest vocabulary) for all groups. We classified the patients with idiopathic epilepsy for their verbal abilities, and it was concluded that verbal deficits are responsible for their weak performance on the CVLT.

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M. MATARÓ, J. VIÑAS, E. ESCARTÍN, M.A. JURADO, M. JÓDAR, & C. JUNQUÉ. Neuropsychological Differences in Epileptic Patients with Seizures of Frontal and Temporal Lobe Origin.

The present investigation studied the neuropsychological differences of nonsurgical cryptogenic epileptic patients with seizures of frontal and temporal lobe origin that were classified according to clinical criteria. Sixty-one patients with partial seizures of frontal ($n = 15$) or temporal ($n = 36$) lobe origin and two matched control groups were administered a battery of neuropsychological tests composed by measures of intelligence, memory, and perceptual and frontal functions. The group with seizures of temporal lobe origin performed worse than the frontal group, even in frontal functions. These results agree with neurophysiological studies that found distant effects produced by the propagation of seizures.

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GENERAL ABILITIES

E. LANNOO, G. VINGERHOETS, & S. BRUYLANDTS. Neuropsychological Test Performance of Normal Healthy Flemish Subjects: Influence of Age, Gender, and Education.

Normative data on a large, neurologically intact, nonpsychiatric sample of adult Flemish subjects (male = 100, female = 88) are presented according to age and education. The neuropsychological test battery includes Dot Cancellation, WAIS Digits, PASAT, Stroop, Trail Making, Complex Figure, AVLT, and COWAT. Stepwise linear regression analyses revealed a significant effect of education on all measures except Dot Cancellation. Age contributed significantly to performance on memory tests and timed tests. Gender only accounted for a proportion of the variance in the copy score of the Complex Figure test, an interference score of the Stroop, and the results of the AVLT.

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M. LACY, L. BIELIAUSKAS, & K. CRAWFORD. IQ and Cognitive Screening Instruments.

The Mini-Mental Status Examination (MMSE) and the Neurobehavioral Cognitive Status Examination (NCSE) are two screening instruments widely used in medical settings to determine if more comprehensive neurocognitive evaluations are warranted. The influence of intellectual ability often is ignored in assessing performance on these measures. The current study assessed the relationship between IQ, as measured by the Peabody Picture Vocabulary Test (PPVT), and performance on the MMSE and the NCSE. Results indicated that PPVT IQ scores correlated significantly with MMSE total score and eight of the NCSE subtest scores. This finding suggested that level of intellectual functioning should be considered when evaluating performance on such screening tools.

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J. COCKBURN, P. HRUSZCZAK, & P.T. SMITH. Assessing Premorbid Intelligence in Young Adults: Some Observations on Use of the NART.

The NART was developed to estimate premorbid intelligence in dementia. Clinical use of the test has spread to other populations on the assumption that equations derived from the original standardization will hold. However, changes in education and vocabulary usage mean this may be incorrect, in particular for estimation of premorbid IQ in young people. Analysis of data from 77 healthy young adults (aged 18–36 yr) found low correlation ($r = .17$) between IQs from NART and the Cattell Culture Fair Test. Scores from a subset of 28 undergraduates (aged 18–24 yr) showed a similar pattern, with 15 students having NART IQ below 110. Further standardization of NART against WAIS-R in a young adult sample is recommended to support continued usage with young people after brain injury. Correspondence: *Janet Cockburn, Department of Psychology, University of Reading, Reading RG6 6AL, UK.*

A. ESTÉVEZ-GONZÁLEZ & C. GARCÍA-SÁNCHEZ. Analysis of Handedness and Sex Differences on the Raven's Progressive Matrices. The purpose of this study was to examine the nature of performance and, specifically, handedness and sex-related performance on the Raven's Progressive Matrices. A sample of 506 school adolescents was assessed: 456 right-handers (256 males, 200 females) and 50 left-handers (28 males, 22 females). Subjects were matched by age (range = 14–16 yr), years of schooling, and handedness quotients (56%). Sex effect was significant ($p < .01$), but handedness effect was not. Males performed better than females, but the performance of right- and left-handed subjects was not signifi-

cantly different. Our results confirm that males perform better than females in tasks of visuospatial functions, even in adolescence.

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LANGUAGE

M. LINDGREN & D.H. INGVAR. Reading and Writing Disability in Swedish Unemployed Young Adults—Assessment and Remediation. One thousand fifty-six unemployed Swedish men and women aged 18–25 yr were examined with structured interviews, pedagogical tests, and neuropsychological assessment. Of participants examined, 17% were considered to have reading and writing disability with such severity that this was a problem for them at work or in an educational program. Their performance in tests assessing perceptual ability, visuospatial capacity, psychomotor capacity, and nonverbal reasoning was within the average, compared to Swedish norms. In the pedagogical tests, in neuropsychological tests assessing verbal ability, and in Information (WAIS-R), their performance was below average. The results also revealed a discrepancy between nonverbal memory (above average) and verbal memory (below average). Methods for special counselling groups and special education for adults with reading and writing disability were developed.

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M. PAI. Object Naming Via Line-Drawings and Photographs.

We used two sets of confrontation naming tasks (CNTs) composed of 30 objects and 15 nonoverlapping foils, one with line-drawing presentation (LP) and the other with colored-photographic presentation (PP), to assess 36 right-handed, cerebral damaged patients (19 with left hemispheric lesion [LH], 17 with right hemispheric lesion [RH]) and 20 normal controls. The results showed (1) the PP scores were better than LP scores for all groups; (2) the performance of the LH group on both sets was significantly inferior to that of the RH group or controls ($p < .01$); and (3) the performance of the RH group was worse than the controls on the LP set ($p < .05$), but not on the PP set. This demonstrated that a colored-photographic CNT is more appropriate for clinical practice, if the purpose of this task is to assess verbal naming ability.

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J.H. RICKER & B.D. HOUTLER. Language and Verbal Memory Following Stroke: Contributions of Laterality and Subcortical Involvement.

Language and verbal learning functions were examined in demographically matched patients with left (LH; $n = 30$) or right (RH; $n = 35$) hemisphere infarction, and in a control group of orthopedic inpatients ($n = 21$). Expected group mean differences were found on most language and verbal learning measures, with LH patients performing the lowest. Expressive and receptive language abilities were correlated with most indices of verbal memory in the LH group. This was not found in the other two groups. Within the LH group, expressive and receptive language abilities were found to correlate strongly with verbal memory. This was found with either cortical or subcortical lesions. Results suggested that language functions must be considered when assessing verbal learning, and that LH cortical and subcortical lesions may exert a similar influence on language and memory.

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J. JENSEN & S. LEVANDER. Dyslexia Is Common Among Swedish Prison Inmates.

Sixty-three prison inmates (aged 19–57 yr) with Swedish as native language were examined with interviews, pedagogical tests, and neuropsychological assessment. Twenty-six inmates (41%) were diagnosed as

dyslexics. As expected, the dyslexic group performed inferiorly on verbal tests compared to the normal readers among the prison inmates, but they also performed worse on tests measuring nonverbal ability. Previous studies report low IQ to be weakly associated with criminal propensity, supporting the interpretation that a double handicap (dyslexia and low IQ) increases the risk to enter a criminal career.

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D.J. CROCKETT. Factors Affecting Generative Fluency: An Examination of the Word Fluency Test.

This study examined the relationship of neuropsychological dimensions to the ability to maintain fluency on a controlled word association task. Dimensions were based on a battery of neuropsychological tests. The number of words generated over time was related to education, age, gender, and occupational status. When controlling for these variables, fluency was related to naming, problem solving, sequencing, resisting distraction, and perseveration. Among the memory measures, fluency was related to proactive interference, word pair recall, and reproduction of a complex design. Among verbal comprehension tests, only rote memory and vocabulary predicted fluency. Demonstration of a diverse set of factors contributing to the prediction of this ability indicates that it may be determined by multiple sites within the brain.

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A. REIS, M. GUERREIRO, & A. CASTRO-CALDAS. The Illiterate Brain: The Influence of an Untrained Phonological Input Buffer in Oral Repetition and Digit Span of Transcortical Aphasics.

In previous studies with non-brain-damaged illiterate subjects, we reported poor performance in oral repetition of nonwords. This was interpreted on the basis of a poor training of phonological segmentation in the acoustic analysis of speech, which is crucial for the process of learning to read and to write and as a sign of a nonfunctioning phonological input buffer. Illiterate subjects perform digit span tests through a semantic route. A digit span test was presented to literate and illiterate transcortical aphasics. Although the performance was similar in the sensory and motor variants in literate patients, it was significantly worse in the sensory variant in illiterate patients. These results suggest that series of digits are repeated in this group through a semantic route (unavailable in this type of aphasia), and that probably we need a trained phonological input buffer to repeat them otherwise.

Correspondence: *Alexandra Isabel Dias Reis, Laboratório de Estudos de Linguagem, Centro de Estudos Egas Moniz, Hospital Santa Maria, 1600 Lisboa, Portugal.*

C. PONT & M.-D. MARTORY. Treatment of Linguistic Cues in Complex Sentences by Left- and Right-Brain-Damaged French Native Speakers.

This study investigated the way brain-damaged people treat linguistic cues when assigning an antecedent to an anaphoric pronoun in complex sentences. The performances of seven nonfluent aphasics, six fluent aphasics, and six right-brain-damaged subjects were compared to those of matched control subjects. As previously described for French native speakers, our control subjects rely heavily on morphology, followed by semantic cues, with relatively less use of syntactic information. Broca's and Wernicke's aphasics show a similar linguistic profile (morphology > semantic > syntax) that is globally diminished with respect to controls. Right-brain-lesioned subjects yield the same profile, although the overall scores do not suggest as severe an impairment as aphasics. These results are discussed in relation to Bates' competition model.

Correspondence: *Cecile Pont, Department of Clinical Neurosciences and Dermatology, Hôpital Cantonal Universitaire de Genève, 1211 Genève 14, Switzerland.*

PERCEPTION

L. JONES-WOODWARD, R.F. KAPLAN, L. GORN, & J. LIEDERMAN. Differentiating Perceptual and Motor Components in Neglect Using the Same Test Material.

Dissociations of perceptual and exploratory motor components of neglect have led to inferences of processing differences related to lesion location. Such interpretations are based on the use of different test materials. We devised a method that compares line bisection, with and without a hand response, using identical test materials. We studied 13 right-hemisphere stroke patients. For patients with large hemispheric lesions or lesions limited to the parietal lobe, perceptual complexity increased neglect independent of hand use. In three patients with discrete frontal or basal ganglia lesions, use of the hand reduced neglect in the more complex conditions. Correspondence: *Richard F. Kaplan, Department of Neurology, NEMC, 750 Washington St., Boston, MA 02111, USA.*

C. LAFOSSE, C. PLETS, & E. VANDENBUSSCHE. Hemianopic Hallucinations Caused by Occipital Lobe Damage.

We studied a woman who described visual hallucinations in her right superior visual field following ischemia in the left occipital cortex. Performances on several tests measuring visual perception were within normal limits. Neither clinical interviews nor the MMPI indicated evidence of psychopathology that would predispose her to hallucinate. We analyzed her descriptions and drawings of her experiences, and we classified them with descriptions of other cases using a Hierarchical Classes (HICLAS) analysis. HICLAS analysis gives us preliminary evidence that correspondence exists between the experienced hallucinations and neural regions being pathologically activated. Patient complex visual hallucinations proceed from global to more fine-grained local images with increasing size.

Correspondence: *Christophe LaFosse, Laboratory for Neurology and Psychophysiology, Medical School, Campus Gathuisberg, Herestraat 49, B-3000 Leuven, Belgium.*

B.J. WILLIAMS, J.V. FILOTEO, L.M. RILLING, & J.W. ROBERTS. Single-Feature and Dual-Feature Visual Search in Patients with Parkinson's Disease.

Nondemented patients with Parkinson's disease (PD) and a group of age- and education-matched controls were administered a modified version of the Visual Search and Attention Test. This task measures subjects' speed at localizing visual targets based on either a single-feature search (form) or a dual-feature search (form and color). The results indicate that PD patients were impaired on the single-feature search conditions, but were not impaired when required to search for the target based on both color and form (i.e., the dual-feature search condition). This pattern of results suggests that PD patients may be impaired in selective attention processes, whereas they may not be impaired in divided attention functions.

Correspondence: *J. Vincent Filoteo, Department of Psychology, University of Utah, 502 Behavioral Science Building, Salt Lake City, UT 84112, USA.*

AGING

M. PONTON, I. TAUSSIG, & M. MARES. Block Design Performance by Normal Spanish-Speaking Elderly: A Comparison of the EIWA and the WAIS-R.

There are two Wechsler Block Design (BD) subtests for adults, and both are commonly used measures in dementia assessment. To assess performance by normal Hispanic elderly on these tests, 247 Spanish-speaking subjects were administered the BD from either the EIWA ($n = 121$) or the WAIS-R ($n = 126$) as part of a larger neuropsychological battery. The two groups were age-matched and considered "normal." Results indicated that while age correlated negatively with performance on both BD tests, edu-

cation had a positive correlation. However, matched subjects had significantly lower scores ($p < .0001$) on the WAIS-R than on the EIWA's BD, even when raw scores for the seven identical items of these two BD versions were compared. The advantages of using the EIWA BD are discussed. Correspondence: *Marcel O. Ponton, Department of Psychiatry, Harbor-UCLA Medical Center, 1000 W. Carson St., Building F-9, Torrance, CA 90509, USA.*

S.S. RUBIN, K.J. STAUB, & M. HORVAT. The Effects of Physiologic Age on Auditory P300: A Preliminary Report.

Previous research on age effects and P300 has focused on chronological age grouping. Numerous discrepancies in amplitude and latency shifts have resulted. In the current investigation, subjects were divided into two groups based on information concerning physiologic age variables such as smoking history, cholesterol levels, musculoskeletal pain, self-rating of health, and physical activity levels. With both "physiologically older" (PO) and "physiologically younger" (PY) groups having the same mean chronological age (64 yr), differences existed in their P300 waveform morphology. In comparing the P300 of the PO group to that of the PY group, the POs demonstrated lower P300 amplitude at Fz, Cz, and Pz and longer P300 latencies at Cz and Pz sites.

Correspondence: *Scott S. Rubin, 565 Aderhold Hall, University of Georgia, Athens, GA 30602, USA.*

CORPUS CALLOSUM

F. GAO & S. LEVINE. The Effect of Cognitive Load on Interhemispheric Processing.

Using a dual-task paradigm, the present study investigated the hypothesis that dividing processing between the hemispheres becomes more advantageous as cognitive load increases. In the experiment, participants completed a letter matching task and a concurrent memory task. Results indicated that this hypothesis is too simplistic. A within-hemisphere advantage was found in the no memory load condition, a nonsignificant across-hemisphere advantage was found in the low-load condition, and a within-hemisphere advantage was found in the high-load condition. These findings indicate that the effect of cognitive load on interhemispheric processing may depend on both the type of the cognitive load and the way in which it is imposed.

Correspondence: *Fan Gao, Department of Psychology, University of Chicago, 5848 S. University Ave., Chicago, IL 60637, USA.*

A. PEGNA & E. MAYER. Dichotic Verbal Versus Musical Extinction in a Patient with a Partial Callosal Lesion.

The possible relationship between verbal and musical extinction in dichotic tasks has been studied in a patient with a lesion localized in the posterior part of the trunk of the corpus callosum. Results show total extinction of the left ear for verbal stimuli. This effect was insensitive to instructions to attend to the other ear. In musical tasks, we found (1) in two tasks, a strong right-ear advantage, contrasting with expectations from the literature; and (2) a disappearance of the lateralization effect when the patient was asked to attend to each ear separately. These results suggest that the corpus callosum is responsible both for information transfer and attention allocation between hemispheres.

Correspondence: *Alan Pegna, Neuropsychology Unit, Department of Clinical Neurosciences and Dermatology, Geneva University Hospital, CH-1211 Geneva 4, Switzerland.*

Z. QAYOOM, C.-A. HAUERT, & E. MAYER. Tactile Detection and Localization in Two Patients with a Partial Hemispheric Disconnection of the Corpus Callosum.

We report two patients with a partial corpus callosal disconnection syndrome of vascular origin that spared primary sensory functions of the hands

bilaterally. A tactile finger localization paradigm that tests ipsilateral and contralateral function was used to study interhemispheric transfer. The results showed deterioration of callosal transfer. One of the subjects had an additional deficit of left hand ipsilateral localization. Because there was no primary sensory deficit, we suspected that he had difficulty accessing tactile representation for the left hand in the left parietal operculum (Gerst-

mann syndrome). Alternatively, the deficit may be due to a hemispheric attentional shift that caused a disregard for the left side of space. These results show the necessity to dissociate tests for sensory detection from the process of tactile localization.

Correspondence: *Zarina Qayoom, Department of Clinical Neurosciences and Dermatology, Hôpital Cantonal de Genève, 1211 Genève 4, Switzerland.*

THURSDAY MORNING, JUNE 20, 1996

Symposium 1/9:00–10:40 a.m.

ATTENTION DEFICITS IN CHILDREN

Organizer and Chair: **L.M.J. de Sonnevile**

C. NJIOKIKTJEN. Neuropsychological Aspects of Attention Deficits. The pathogenesis of attention deficit–hyperactivity disorder (AD-HD) might be viewed from three interrelated angles: structural aspects of brain damage or dysfunction; biochemical aspects, namely pathway systems, linked to neurotransmitter functions; and neuropsychological aspects pointing to brain dysfunction. Within the differential diagnosis of learning disabilities we distinguish, among others, primary AD-HD plus partial cognitive deficits, with emphasis on nonverbal dysfunction, and learning disabilities with secondary ADD with emphasis on verbal dysfunction. The difference between these two subcategories is emphasized. We contrasted 50 children with average verbal IQ (≤ 100) and low performance IQ (at least 25 points lower) and 50 dysphasic/dyslexic children with average PIQ (≤ 100) and low VIQ (at least 25 points lower). The percentage of AD-HD children (methylphenidate responders) among the first group was more than three times as high, whereas a convincing right hemisphere syndrome could not be shown.

Correspondence: *Charles Njokiktjen, Division of Pediatric Neurology, Department of Pediatrics, Free University Hospital, P.O. Box 7057, 1007 MB Amsterdam, The Netherlands.*

M.G. KNYAZEVA & C. NJIOKIKTJEN. Attention Deficits In Learning-Disabled Boys: Behavioural and EEG Analysis.

Neuropsychological aspects in relation to EEG data are highlighted in 50 learning disabled (LD) boys between 8 and 11 yr, examined by a child neurologist who excluded children with epilepsy or neurological syndromes. We compared 25 boys with VIQ $\leq 100 + 25$ points lower PIQ with ADHD (methylphenidate responders), 10 dysphasic/dyslexic boys with ADHD with PIQ $\leq 100 + 25$ points lower VIQ, 15 boys with normal FSIQ without subscale discrepancies and without marked attention deficits, and 25 normal controls. A computerized EEG approach, resulting in spectra and coherences, was used to investigate spatio-temporal organization of hemispherically distributed neural systems of the respective groups. Coherence patterns regarding intrahemispheric function differed for the LD/ADD groups. Comparison of these groups with normals showed decreased interhemispheric coherence at the symmetric F3F4, C3C4, P3P4, and O1O2 derivations. Consequences of interhemispheric deficit and differential disturbances of the right and left hemispheres in the LD/ADD subgroups are discussed.

Correspondence: *M.G. Knyazeva, Institute of Developmental Physiology, 119121, Pogodinskaya 8, Moscow, Russia.*

L.M.J. DE SONNEVILLE, M. VISSER, & R. LICHT. Objective Measurement of Attention in Preschoolers.

Objective evaluation of attentional control in children in the preschool age is virtually absent or is rarely used as part of a clinical neuropsychological assessment. Initial attempts to measure attention in very young children do suggest that reaction time tasks can be used successfully. Tasks that sup-

posedly assess aspects of attention also measure a number of other cognitive processes. To infer more confidently that the process being assessed is attention, one must directly manipulate the attentional component of the task while maintaining equivalence across all other parameters. Based on this principle and the outcome of attentional studies in primary school age children, we developed a task battery, including a set of paradigms specially designed for the assessment of aspects of attentional control in preschoolers. Results of a pilot study in 40 normal preschoolers (4.5–5 yr, 5.5–6 yr) suggest that various relevant indices of attentional control may be adequately measured in preschoolers.

Correspondence: *Leo M.J. de Sonnevile, Division of Pediatric Neurology, Department of Pediatrics, Free University Hospital, P.O. Box 7057, 1007 MB Amsterdam, The Netherlands.*

M. ALTHAUS, L.M.J. DE SONNEVILLE, R.B. MINDERAA, L.G.N. HENSEN, & R.B. TIL. Focused, Divided, and Sustained Attention In Children with the DSM-III-R Diagnosis “Pervasive Developmental Disorder Not Otherwise Specified.”

A group of 8–12-yr-old children with a qualitative impairment in the development of social communicative skills completed a focused, a divided, and a sustained visual attention task. These children were diagnosed (DSM-III-R criteria) to have a Pervasive Developmental Disorder Not Otherwise Specified (PDDNOS). Comparison with an age-matched group of healthy children revealed that the patients did not show a focused attention deficit, but had deficits in divided and sustained attention. The deficits found appeared to be unrelated to the children's level of intellectual functioning and are interpreted as reflecting deficits in the executive and evaluation processes, which are postulated to be a function of the “anterior attention system” or “effort system.” It is speculated that these deficits underlie the children's difficulty of appropriately adapting to unfamiliar situations.

Correspondence: *Monika Althaus, University Center of Child and Adolescent Psychiatry, Hanzeplein 1, 9713 GZ Groningen, The Netherlands.*

H. SWAAB-BARNEVELD, L.M.J. DE SONNEVILLE, P. COHEN-KETTENIS, H. VAN ENGELAND. Sustained Attention in a Child Psychiatric Population.

This study investigated the specificity of sustained attention problems in a psychiatric population consisting of children with ADHD, oppositional disorder (ODD), anxiety disorder (ANX), and pervasive developmental disorder (PDD). Additionally, ADHD children without comorbidity were compared to the ADHD children with comorbidity: 77 ADHD children were compared on the basis of their speed, accuracy, and stability of performance over time, as well as their behavioural adjustment following feedback on error responses, to 39 ODD, 35 ANX, 63 PDD, 24 ADHD + ODD, 14 ADHD + ANX, and 57 normal controls (aged 7–12 yr), with IQs above 80. All patient groups showed sustained attention deficits. Only ADHD children showed a lack of responsiveness to feedback, whereas anxiety in ADHD seems to protect these children from impulsive responding. Attempts to differentiate between the major diagnostic categories in this population on the basis of the assessed or computed sustained attention parameters will be discussed.

Correspondence: *Hanna Swaab-Barneveld, Department of Adolescent Psychiatry, University Hospital, P.O. Box 85500, 3508 GA Utrecht, The Netherlands.*

Paper Session 1/9:00–10:40 a.m.

CARDIOLOGICAL CONDITION AND ANAESTHESIA

G. VINGERHOETS, G. VAN NOOTEN, C. JANNES, & E. LANNOO. *Cognitive Sequelae after Open-Heart Surgery: A Six-Month Follow-up.* Patients were neuropsychologically tested on the day before and 6 months after routine cardiopulmonary bypass surgery (CPB) ($n = 91$). We used patients undergoing major vascular or thoracic surgery as a control group ($n = 18$). At 6-month follow-up the patients performed significantly better than before surgery [Hotelling's $T^2(14,92) = 7.70, p < .001$]. Individual comparisons revealed that in 12% of the CPB patients, the cognitive sequelae persisted at follow-up. These patients were significantly older at the time of surgery. Group data and individual incidence rates revealed no significant differences before or after surgery between the surgical groups. Variables directly associated with CPB were not significantly associated with the occurrence of long-term cognitive impairment.
Correspondence: *Guy Vingerhoets, University Hospital Gent 4K3, De Pintelaan 185, B-9000 Gent, Belgium.*

D. CAINE, P. ROACH, G. HERKES, & J. WATSON. *Patterns of Change in Cerebral Hypoxia: Acute and Follow-up Neuropsychology, rCBF, and EEG.*

Given both the extent and variability in patterns of neuropathological change in cerebral hypoxia, there has been remarkably little elaboration of the specific cognitive sequelae. The aim of this study was (1) to systematically examine the acute and chronic cognitive sequelae of hypoxic events; (2) to examine the associations between these and EEG and rCBF studies; and (3) to interpret patterns of cognitive change in the context of the known neuropathology of hypoxia. In the first such controlled study of hypoxic patients, cognitive processes in a consecutive series of 29 cases was compared with matched controls and discussed in association with acute and follow-up EEG and rCBF studies.

Correspondence: *Diana Caine, Neuropsychology Unit, Royal Prince Alfred Hospital, Camperdown, NSW 2050, Australia.*

R.A. COHEN, M. ALOIA, M. CLARK, P. TILKEMEIER, B. TATE, & M. JENKINS. *Neurobehavioral Deficits Associated with Cardiovascular Disease.*

Cardiovascular disease is a risk factor for cerebrovascular disease. Still, few studies exist that examine cognitive impairments in cardiac patients prior to the development of vascular dementia. We examined neuropsychological performance in cardiac rehabilitation patients. Although patients had no prior history of neurological disease or dementia, a majority (72%) exhibited significant verbal fluency deficits. Both verbal fluency and digit symbol performance were reduced relative to age-matched control subjects. Cognitive performance on measures of attention and verbal reasoning (similarities) also predicted outcome in cardiac rehabilitation. The findings suggest that severe cardiovascular disease predisposes patients to subtle frontal-subcortical dysfunction, which may serve as a foundation for the subsequent development of vascular dementia.

Correspondence: *Ronald A. Cohen, Department of Psychiatry and Human Behavior, Miriam Hospital Brown University Medical School, Providence, RI 02906, USA.*

J. DIJKSTRA, P. HOUX, & J. JOLLES. *Cognitive Recovery After an Operation Under General Anaesthesia In Elderly Patients.*

Postoperative cognitive dysfunctions (POCD) were assessed pre- and post-operatively in patients who had undergone an operation under general anaesthesia. Short-term cognitive impairments were found 1 wk after the operation in tests measuring basic motoric speed but not in tests measuring more complex cognitive speed and memory. After 3 months, the patients were back at their preoperative performance level. Although short-term POCD are found, the results do not support the notion that an operation under general anaesthesia causes long-term POCD.

Correspondence: *J. Dijkstra, Department of Psychiatry and Neuropsychology, University of Limburg, P.O. Box 616, 6200 MD Maastricht, The Netherlands.*

Paper Session 2/11:00 a.m.–12:40 p.m.

CHILD NEUROPSYCHOLOGY 1: HIV AND AUTISM

H. SWAAB-BARNEVELD, L. DE SONNEVILLE, P. COHEN-KETTENIS, & H. VAN ENGELAND. *Intelligence Profiles and Information Processing in Asperger's Disorder (ASP), High Functioning Autism (HFA), and Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS).*

The question is addressed whether children with ASP can be differentiated from HFA and from PDD-NOS children on basis of their intelligence and information processing profile. Subjects were 20 children with ASP, 7 HFA children, 36 PDD-NOS children, and 57 normal controls (all boys aged 7–12 yr with IQs >80). HFA and ASP/PDD-NOS show reverse patterns according to Bannatyne's recategorization of their WISC-R profiles and some identical profile characteristics. With respect to information processing according to a stage model, the groups show different profiles. The meaning of these differences in information processing characteristics is discussed.

Correspondence: *Hanna Swaab-Barneveld, Department of Child and Adolescent Psychiatry, University Hospital, P.O. Box 85500, 3508 GA Utrecht, The Netherlands.*

N. MINSHEW, G. GOLDSTEIN, & D. SIEGEL. *Complex Memory Impairments in Autism.*

Multiple studies have demonstrated the integrity of basic memory abilities and absence of amnesia in autism. However, recent research has suggested that memory abilities are not entirely intact either, and that impairments may be present in forming mediational strategies to support remembering, in working memory, and in memory for complex information. In this study, complex memory abilities were investigated in 52 well-documented autistic individuals with IQs above the mentally retarded range (IQ >70) and 40 normal controls older than 12 yr. Autistic and control groups were demographically and IQ matched. The results of this study demonstrated intact memory for simple information, less efficient learning and memory of complex information, and impairments in working memory. These memory impairments are most consistent with primary dysfunction of the frontal cortex rather than the hippocampus.

Correspondence: *Nancy J. Minshew, University of Pittsburgh, 3600 Forbes Ave., Suite 208, Pittsburgh, PA 15213, USA.*

H. VREUGDENIHL, H. MOSS, P. WOLTERS, D. BAKKER, & P. BROUWERS. *Evaluation of Spontaneous Eye Blinking as a Putative Measure of Central Dopaminergic Function in Children with Symptomatic HIV-1 Infection.*

Blink rate was evaluated in 74 children (mean age = 4.0 yr; range = 1–12) with AIDS from previously videotaped 30-min sessions in which the eyes were continuously observable for at least 3 min. Intrarater reliability was high, expected covariation of blink rate with age and concurrent activity were confirmed, and obtained rates were similar to published data. Higher blink rates were associated with the presence of encephalopathy ($p < .05$), with higher degrees of cortical atrophy ($r = .37$), and with white matter abnormalities ($r = .35$) on CT brain scans. Although patients with basal ganglia calcifications had lower blink rates than those without, this difference was not significant. A higher degree of cortical atrophy in pediatric AIDS had been associated with lower ratings of hyperactivity and here with higher blink rate, both associated with higher dopamine function. Studies measuring CSF dopamine levels in children with AIDS are needed to support the suggestion of a cortical inhibitory action on subcortical dopaminergic function and the presumed higher activity of this system with cortical atrophy.

Correspondence: *Pim Brouwers, Pediatric Branch, National Cancer Institute, Bethesda, MD 20892, USA.*

J.P. TEUNISSE & B. DE GELDER. *The Role of Configural Information In Face Perception of Autistics.*

The goal of this study was to investigate the role of configural information in face processing and face processing deficits in autistics, and to clarify conflicting data concerning the existence of an inversion effect for faces in au-

tistics. Three groups of subjects (normal adults, 10-year-old children and 20 autistics) were presented with two face perception tasks, an inversion task using photographs of faces, and of a control stimulus (shoes) and a composition task using photographs of faces aligned or nonaligned. Both tasks are taken to reflect the importance of configurational processing. Presentation of the composition task was adapted in order to reduce memory load, given the disadvantage of autistics in this domain. The results show that all three groups manifest a clear inversion effect (a sharp drop in the recognition performance for the inverted presentation condition) for faces, but not for the control stimuli. Results from the composition task, however, show that autistics do not have the composition effect like adults do. This pattern of results suggests that besides configurational processing. Another component is involved in the composition effect. A critical difference between the two tasks is that the composition tasks requires a visual search and might thus be subject to face inferiority effects. When the tasks are conceptualized along the dimensions of (a) face perception versus face memory and (b) face superiority versus face inferiority, the deficit of the autistic group as well as the limited composition effect in the children's group can be understood.

Correspondence: Prof. Beatrice de Gelder, Faculty of Social Sciences, Tilburg University, P.O. Box 90153, 5000 Le Tilburg, The Netherlands.

Paper Session 3/11:00 a.m.–12:40 p.m.

CLOSED HEAD INJURY

M. MILDERS, B. DEELMAN, & I. BERG. Learning Names to Faces Without Face–Name Associations.

Difficulties remembering the names of newly met persons are among the memory problems reported most frequently following closed head injury. One of the reasons why proper names are relatively difficult to learn is their lack of meaning. An attempt is reported to improve name learning in a group of closed head-injured patients by teaching them strategies to enhance the meaningfulness of people's names. This approach was thought to require less effort than the face–name associations, which are applied frequently in training studies. Learning names to faces did indeed improve following training. The improvement could not be attributed to retest effects, Hawthorne effects, or to the extensive use of face–name associations following training.

Correspondence: M. Milders, Department of Neuropsychology, University of Groningen, Oostersingel 59, 9713 EZ Groningen, The Netherlands.

J.M. SPIKMAN, A.H. VAN ZOMEREN, & B.G. DEELMAN. Are Attentional Deficits After Closed Head Injury More Than Mental Slowness Only?

The performance of 60 severely closed head-injured patients on tests addressing focused, divided, and sustained attention, as well as supervisory attentional control, was compared to the performance of a matched group of 60 healthy controls. Patients performed significantly worse on tests with

time pressure (those addressing focused and divided attention), indicating basic slowness of information processing, and on the self-paced tasks for supervisory attentional control. No indication was found for a sustained attention deficit. The influence of the demonstrated slowness of information processing and other possibly confounding cognitive factors was controlled for by means of subsequent covariance analyses. This resulted in a disappearance of group differences on tests for focused and divided attention. The only difference that remained concerned an aspect of supervisory attentional control.

Correspondence: J.M. Spikman, Department of Neuropsychology, Academic Hospital Groningen, Hanzplein 1, 9713 EZ Groningen, The Netherlands.

S. MILLIS & S. ROSS. Dissimulation Indices on the Wechsler Adult Intelligence Scale–Revised: A Replication and Extension.

Mittenberg et al. derived two discriminant functions from the Wechsler Adult Intelligence Scale–Revised (WAIS-R) to differentiate analog malingerers from head-injured patients. We applied these functions to a group of patients with moderate and severe traumatic brain injuries ($n = 20$) and a group of presumed clinical malingerers: litigating mild head injury participants ($n = 22$) who showed evidence of suboptimal effort or malingering on forced-choice tests. Cutoffs scores were derived that correctly classified 93% of the cases with the seven-subtest WAIS-R discriminant function and 74% of the cases with the Vocabulary–Digit Span difference score. Our findings provide additional support for the algorithms developed by Mittenberg et al.

Correspondence: Scott R. Millis, Rehabilitation Institute of Michigan, 261 Mack Blvd., Detroit, MI 48201, USA.

E. LANNOO, F. COLARDYN, C. DE DEYNE, C. JANNES, & G. VINGERHOETS. Neuropsychological Outcome After Moderate to Severe Head Injury: A Six-Month Follow-up.

Neuropsychological outcome was examined prospectively in 75 head-injured patients and 37 general trauma control patients. A comprehensive battery of neuropsychological measures was administered at discharge from the department of neurosurgery and at 6 months postinjury. Head-injured patients performed significantly worse than controls on all measures at discharge, and on most measures at 6 months postinjury. Magnitude and pervasiveness of these impairments depend on injury severity. The relationship between head injury severity indices (PTA duration, coma length) and neuropsychological outcome is weaker at 6 months than at discharge. PTA duration seems a better predictor of neuropsychological outcome, especially at 6 months. Between discharge and 6 months postinjury, head-injured patients improved significantly on all measures, especially patients with the longest PTA duration.

Correspondence: Engelen Lannoo, Department of Psychiatry and Neuropsychology, University Hospital, 4K3, De Pinelaan, 185, B-9000 Gent, Belgium.

THURSDAY AFTERNOON, JUNE 20, 1996

Paper Session 4/1:40–3:20 p.m.

CHILD NEUROPSYCHOLOGY 2: TUMORS, NEUROFIBROMATOSIS AND EPILEPSY

M. SADEH, S. ZIMMERMAN, Z. ZLOTOGORSKI, L. KORNER-ICII, G. HOREV, R. WEITZ, & D. INBAR. Specific Learning Disabilities in Children With Neurofibromatosis Type 1 and Their Relation to MRI findings.

This study contrasted the cognitive deficits characteristic of children with neurofibromatosis type 1 (NF) with and without a learning disability. Fur-

thermore, it examined the relationship between their cognitive profile and the size and place of neurofibromas in the CNS (UBOs). The study included 40 children (6–17 yr of age), who were divided into four groups: NF + LD, NF, LD, and controls. A neuropsychological evaluation was conducted on all children. An *F*-test compared the cognitive functions, and a Mann-Whitney Wilcoxon test assessed the correlation between UBOs and cognitive results. The results support a separation of the NF + LD from NF group because of their different cognitive profile and amount of UBOs. The presence of specific damage to the right basal ganglia in the NF + LD group points to a neurological substrate for this difference.

Correspondence: Michelle Sadeh, Child Development Unit, Schnieder's Children Medical Center of Israel, 14 Kaplan St., Petach Tikva, Israel.

S.J. FIELD, M.M. SALING, R. WALES, & S.F. BERKOVIC. Discourse Production and Temporal Lobe Epilepsy.

Systematic investigation of discourse fluency in temporal lobe epilepsy (TLE) patients is in its infancy. Discourse fluency was investigated in 22 patients with TLE and 19 normal relatives, using the Joanne and Goulet eight-frame "Cowboy" cartoon. This task was repeated three times by each subject. Initial investigation at a psycholinguistic level revealed a patient subgroup that demonstrated different patterns of discourse production, in the direction of reduced fluency, when compared with the controls and remaining TLE patients. These results are discussed in relation to the effect that TLE may have on the speech production process. A range of additional analyses will evaluate the semantic and pragmatic aspects of language productions of these groups.

Correspondence: Sarah J. Field, Department of Psychology, University of Melbourne, Parkville, Victoria 3052, Australia.

B. PARRY-FIELDER, T. NOLAN, K. COLLINS, I. SCHEFFER, J. FISHER, V. ANDERSON, E. KEIR, & Z. STOJCEVSKI. Developmental Dysphasia: Does Epilepsy Play a Part?

Children with developmental speech and language disorders (developmental dysphasia) are a heterogeneous group, and often there is no apparent cause for the child's communication problem. The few studies reported, as well as clinical experience, suggest that there are epilepsy-aphasia syndromes that involve at least a subgroup of children with developmental dysphasia, where there has been early onset of the disorder. This study examined this issue using children with developmental dysphasia aged between 4 and 9 yr and a control group of normally speaking children. All children underwent a nocturnal 4-h sleep EEG, and various comparisons were made according to presence or absence of epileptiform activity on sleep EEG. Significant differences were found between this study and previously reported studies.

Correspondence: Bronwyn Parry-Fielder, Department of Speech Pathology, Royal Children's Hospital, Flemington Rd., Parkville, Victoria 3052, Australia.

D. RIVA, C. PANTALEONI, M. DEVOTI, & C. GIORGI. Neuropsychological Evolution of Children With Cerebral Tumors Treated with Different Modalities.

One hundred twenty-four children with cerebral gliomas were treated with various modalities: surgery, external fractionated radiotherapy, radiosurgery, or interstitial radiotherapy (alone or in combination). The subjects were evaluated once before the treatment, 6 months after, and more than 2 yr after. Intelligence, memory, and perceptual/motor skills were evaluated. Results show that (1) surgery does not worsen the preexisting deficits; (2) external radiotherapy alone or associated to chemotherapy and/or intervention causes a significant decline, which tends to increase over time; and (3) interstitial radiotherapy and radiosurgery do not cause any deficit. These results provide an additional prognostic factor in choosing the treatment of brain gliomas in children.

Correspondence: Daria Riva, Istituto Neurologica "C. Besta," 11 Via Celoria, 20133 Milano, Italy.

infarct. Detailed neuropsychological assessment showed a rather selective impairment in tasks that required affective processing, such as recognizing emotional facial expressions and reasoning on humorous material, while other perceptual and abstract-reasoning cognitive functions were unimpaired. We suggest that a stroke-induced deficit in the right hemisphere-mediated categorization and representation of emotions may have contributed to reinstate and maintain the patient's manic syndrome. We further suggest that our patient's deficit could be conceived as a form of "dyslexithymia," that is, a failure to form and use appropriate emotional categorizations, leading to misjudgment rather than inability to judge affects.

Correspondence: P. Vuilleumier, Department of Neurology, University Hospital of Geneva, 1211 Geneva, Switzerland.

E. MAYER, M.-D. MARTORY, & P. ZESIGER. A Case of Dysgraphia for Letters and Digits Sparing Shorthand Writing.

We report a patient who presents a dysgraphia affecting the production of letters and digits while sparing shorthand writing. The patient's writing impairment is twofold. First, he produces systematic letter substitutions that are also observed in tasks assessing the mental imagery of letters; this deficit is attributed to a disruption of allographic representations. Secondly, the patient can write correctly formed letters and digits, but the production of these symbols is slow and painstaking. This disturbance was investigated by using a digitizer to record his productions. Results suggest that letters and digits graphic motor patterns are no longer available to this patient, whereas motor patterns underlying the production of shorthand seem unaffected.

Correspondence: Eugene Mayer, Neuropsychology Unit, University Hospital of Geneva, 1211 Geneva 14, Switzerland.

A. SCHWEIGER & J. COLE. Is Reading Aloud Without Meaning Possible? A Case Study.

The observations of patients who can access meanings of words but not their phonological forms (e.g., deep dyslexics) led to a hypothesis that meaning must precede phonology in the process of reading. One implication is that reading sentences aloud presupposes some comprehension. We present an aphasic patient who read aloud sentences well, but shows no comprehension for the material he reads using common tests. We tested the patient on reading sentences that contain words that have two meanings and two corresponding phonological forms, differing by the location of the stressed syllable. The only way to produce the correct phonological forms of these words is by understanding their sentential context. The patient was able to pronounce 85% of these words correctly in context, suggesting that he must access meaning at some level to do this task. This case study supports the notion of the primacy of access to meaning in reading, a top down process with phonological realization as a later stage.

Correspondence: Avraham Schweiger, CUNY and the Center for Cognition, 952 5th Ave., New York, NY 10021, USA.

L. MANNING & E.K. WARRINGTON. Two Routes to Naming: A Case Study.

We report the case of an aphasic patient whose spontaneous speech and ability to communicate verbally were severely reduced. His comprehension of written words was preserved. Naming was preserved for objects, but impaired for actions. His verb syntax was impaired in contrast to his verb semantics. Naming on visual confrontation was significantly better than naming (the same stimuli) through propositional language. We interpret the data in terms of two routes to noun retrieval: within propositional speech or in nominal contexts. We suggest that the dissociation between verb syntax and verb semantics could also be accounted for within this framework.

Correspondence: Lilianne Manning, LADAPT Neuropsychology, 12 rue Notre Dame, 91450 Soisy-sur-Seine, France.

Paper Session 5/1:40–3:20 p.m.

CASE STUDIES ON LANGUAGE PROCESSING

P. VUILLEUMIER, F. GHIKA-SCHMID, J. BOGOUSLAVSKY, G. ASSAL, & F. REGLI. "Dyslexithymia" and Persisting Hyperthymia After Right Thalamic Infarct in a Patient With Recurrent Manic Episodes.

We report a 63-yr-old man with a history of transient isolated manic episodes who became persistently hypomanic after a small right thalamic

Symposium 2/3:40–5:45 p.m.

PEDIATRIC NEUROPSYCHOLOGY: EMERGING ISSUES AND DEVELOPMENTS

Organizer & Chair: B.P. Rourke

B.P. ROURKE. Pediatric Neuropsychology: Emerging issues and developments.

This symposium includes presentations of model-testing research in five of the areas that are emerging as central in the field of pediatric neuropsychology: the psychosocial sequelae of pediatric closed head injury; patterns of neuropsychological assets and deficits in Williams syndrome; the neuropsychological dimensions of the developmental psychopathology of Asperger syndrome; the analysis of subtypes of neuropsychological assets and deficits in the developmental outcome of low-birth-weight children; and expressive behaviors, including emotional expressiveness in HIV-infected children with differing types and degrees of brain pathology.

K.B. FUERST, B.P. ROURKE, D.R. FUERST, & J.L. FISK. Neuropsychological and Psychosocial Sequelae of Pediatric Closed Head Injury.

Neuropsychological test results of 128 pediatric closed head injury (CHI) cases were examined in relation to the psychosocial subtype to which they were assigned, based on a typology of Personality Inventory for Children-Revised (PIC-R) profiles. Across all ages, significant relationships were found between subtype membership and the WISC-R, WRAT-R, PPVT-R, as well as the Target, Aphasia Screening, and Finger Tapping tests. In all cases, children in the Social Isolation subtype (elevated cognitive triad and Psychosis scales) exhibited the lowest scores. The presence of psychometric intelligence, academic, and, to some extent, neuropsychological deficits subsequent to CHI may put the child at risk for psychosocial problems such as social isolation and withdrawal.

Correspondence: *Katy B. Fuerst, 1918 Oneida Ct., Windsor, ON N8Y 1T2, Canada.*

J.E. DEL DOTTO, N. BRESLAU, J.L. FISK, E. PICARD, & P.M. ANDRESKI. Neurodevelopmental Outcome of Low Birth Weight.

This study examined the performance of 473 low-birth-weight (<2,500 g, LBW) and 350 normal-birth-weight (<2,500 g, NBW) children on neurocognitive functioning in early childhood. Statistical analyses of the data by means of simple contrasted groups, cluster analytic, and multivariate profile procedures revealed that LBW children scored significantly lower than NBW children on measures of language-development, spatial cognition, fine motor, tactile, and attention skills when controlled for population site, race, maternal education, and child and maternal IQs, and that gradient relationships were observed across levels of LBW with language, spatial, tactile, and attention tests when controlled for the set of covariates. Cluster analysis also revealed that LBW children exhibit distinct subtypes of neuropsychological impairments that are similar to those identified in previous multivariate studies of learning disability subtypes.

Correspondence: *Jerel E. Del Dotto, Division of Neuropsychology, Henry Ford Hospital, One Ford Place, Detroit, MI 48092, USA.*

A. DON, E.G. SCHELLENBERG, & B.P. ROURKE. Auditory Pattern Perception in Children with Williams Syndrome (WS): Preliminary Findings.

Children with WS have a unique neuropsychological profile characterized by extremely poor visual-spatial skills but relatively preserved verbal skills. In this study the language and music skills of 10 children with WS (8–13 yr) were examined. Performance on music measures was similar to language performance; both were relatively intact compared to full-scale IQ ($M = 50$). Performance on linguistic tests measuring more basic auditory perception was better than performance on more complex tests. Hence,

despite their overall cognitive deficits, children with WS seem to process basic auditory patterns remarkably well.

Correspondence: *A. Don, Department of Psychology, University of Windsor, Windsor, ON N9B 3P4, Canada.*

K. ROELOFS, P. WOLFERS, P. BROUWERS, C. FERNANDEZ, H. VAN DER VLUGT, & H. MOSS. Deficits of Expressiveness in HIV-Infected Children: The Relationship Between Brain Abnormality and Impairments in Expressive Behaviors.

Expressive behavior of 37 HIV-infected children is investigated and correlated to brain functioning. Videotapes of the children are independently rated according to 10 functional and emotional expression variables by two psychologists (interrater reliabilities = 0.81 (R) 0.98). Two neurologists independently estimated CT scan brain abnormalities (enlarged ventricles, cerebellar and cortical atrophy, white matter abnormality, basal ganglia calcifications) with highly significant interrater reliabilities ($p < .001$). Three patient groups that differ in CT scan results are compared. Children with symptoms of brain abnormality (encephalopathy) perform significantly worse than children without encephalopathy on all expressive behaviors. Comparisons of encephalopathic children with and without basal ganglia calcifications demonstrate a significant difference in upper-limb movements. A neurophysiological basis (impaired cognition-action transfer) for decreased performance of emotional expressions is demonstrated.

Correspondence: *K. Roelofs, Pediatric Branch, National Cancer Institute, National Institutes of Health, Bldg. 10, Rm. 13N-240, Bethesda, MD 20892, USA.*

A. KLIN, S.S. SPARROW, B.P. ROURKE, F.R. VOLKMAR, & D.V. CICCETTI. The Developmental Psychopathology of Asperger Syndrome: A Neuropsychological Model.

Asperger syndrome (AS) is a pervasive developmental disorder characterized by severe and sustained impairments in social interaction, prosody and pragmatics in speech and nonverbal communication, and behavioral peculiarities marked by all-absorbing circumscribed interests. Recent validation research has shown that this condition differs from related syndromes, most notably autism unaccompanied by mental retardation, in that most individuals affected exhibit the neuropsychological profile consistent with nonverbal learning disabilities (NLD) as described by Rourke. This paper discusses the developmental impact of NLD and its association with AS and illustrates different trajectories of development resulting in a spectrum of social disabilities by contrasting the neuropsychological profiles and behavioral history of FSIQ-matched groups of AS + NLD and NLD only individuals.

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Symposium 3/3:40–5:45 p.m.

WHIPLASH

Organizer and Chair: B.P. Radanov

B.P. RADANOV. Whiplash.

Cognitive disturbances (deficient attentional functioning and impairment of memory) are frequent complaints in patients after whiplash injury. However, only few prospective studies of nonselected patients have been performed. These studies indicated that impaired cognitive functioning related either to trauma-induced somatic symptoms (e.g., pain) or psychological symptoms resulting from problems in adjustment to trauma-related somatic symptoms. Accordingly, in these studies cognitive disturbances after whiplash showed a fair rate of recovery, which paralleled recovery from trauma-related somatic symptoms. Neuropsychological studies with late

whiplash syndrome also support that energetic and motivational factors may explain poor performance in patients suffering from it. More recently neuroimaging studies with whiplash patients highlighted perfusion problems in different parts of the brain that were found to correlate with neuropsychological findings typical for brain areas in which hypoperfusion was detected. Based on a discussion of findings across different studies, this symposium will give the opportunity to promote new diagnostic standards of whiplash patients.

M. KEIDEL, J. FREIHOFF, L. YAGÜEZ, R. EISENTRAUT, H. WILHELM, & H.-C. DIENER. A Prospective Follow-up of Neuropsychological Deficits Due to Whiplash Injury.

In many cases of whiplash injury, apparative investigation does not detect physiological damage; however, many injured patients complain of having behavioral and neuropsychological difficulties in daily life. A 3-month prospective study was therefore carried out in which 30 drug-free patients (females = 16, *M* age = 29 yr; males = 14, *M* age = 28 yr) with acute minor whiplash injury without osseous damage or neurological deficits were investigated using an extensive neuropsychological battery in the acute phase (*M* = 5.7 d of trauma) and again 6 and 12 wk (*M* = 89.9 d) after the accident. Attention, concentration, cognition, and verbal and visual memory were quantified in patients and in a matched cohort of normal subjects. Changes over the observation period were analyzed. In the acute phase all neuropsychological functions were below the individual's normal level. A significant recovery of concentration and attention, of visual memory, imagination, and analytic capacity, of verbal memory and abstraction, of cognitive selectivity and of information processing occurred within the first 12 wk. We conclude that objective impairments matching the patient's subjective complaints can be quantified and monitored by neuropsychological testing. The diagnosis of a pseudoneurasthenic or neurotic syndrome in acute whiplash injury should be made with caution. In general, in a minor whiplash injury neuropsychological deficits recover within 6 months of trauma.

Correspondence: *M. Keidel, Department of Neurology, University of Essen, Hufelandstrasse 55, 45122 Essen, Germany.*

T.-M. ETTLIN, K. WACHTER, U. KISCHKA, J. MÜLLER, & A. OTTE. SPECT Findings and Neuropsychological Deficits in Whiplash-Associated Disorders.

The etiology of cerebral symptoms after whiplash injury is unclear. Because CT and MRI scans usually show no pathology, we performed ^{99m}Tc-HMPAO SPECT or ^{99m}Tc-ECD SPECT in 93 patients with late whiplash syndrome and in 9 controls. We found significant hypoperfusion in 65 of 93 patients, localized parieto-occipitally in 61 of 65 patients and/or frontally in 20 of 65 patients. Only one of the controls was read as abnormal. Most frequent neuropsychological deficits were decreased attention and concentration, but also disturbances in complex visual processing and frontal system functions. We hypothesize that lesions of nociceptive afferents-

from the upper cervical spine induce intracranial vasomotor dysregulation, which might account for some of the cerebral symptoms.

Correspondence: *T.-M. Ettlín, Rehaklinik Rheinfelden, 4310 Rheinfelden, Switzerland.*

B.P. RADANOV, M. STURZENEGGER, & G. DI STEFANO. A Two Year Follow-up Considering Attentional Functioning in a Sample of Whiplash Patients Referred from Primary Care.

According to a strict definition of whiplash injury, we assessed a consecutive nonselected sample of 117 patients with recent injury who had similar sociocultural and educational background. Patients were involved in automobile accidents and were all equally covered by accident insurance according to the Swiss country-wide scheme. Initial examination was performed 7.2 ± 4.2 d after trauma and follow-up examinations 3, 6, 12, and 24 months later. At all investigations patients underwent cognitive assessment, including Digit Span, Corsi Block Tapping, Number Connection Test, Trail-Making Test (Parts A and B), and Paced Auditory Serial Addition Task (PASAT). At 2 years, patients were divided into asymptomatic and symptomatic groups and then compared with regard to the initial and follow-up findings. Of patients studied, 18% (*n* = 21) still had injury-related symptoms at 2 yr. These patients initially performed worse on tasks of attentional functioning. However, during the first year there was on average an improvement regarding all aspects of cognitive functioning in these same patients. Beyond this time, symptomatic patients on average performed worse on almost all tests of attention. Such a course of attentional functioning may be explained as follows: (1) at least a part of symptomatic patients utilized analgesics on regular basis, which may have adverse effects on their attentional functioning; or (2) prolonged suffering from headache of considerably high intensity may have accounted for worsening of attentional functioning.

Correspondence: *B.P. Radanov, Department of Psychiatry, University of Berne, Inselspital, 3010 Berne, Switzerland.*

A.H. VAN ZOMEREN, R.J. SAAN, & V. TITZING. Cognitive Deficits and Personality Changes in the Late Whiplash Syndrome.

In a retrospective study of 120 patients with a late whiplash syndrome, significant impairments were found in memory and attention, but not in intelligence and concept shifting. Deficits were most striking in time scores (e.g., in tasks such as Trailmaking, visual reaction times). This slowness does not necessarily reflect structural brain damage in the patient sample. Personality questionnaires revealed strong changes in self-concept and feelings of anxiety, depression, and insufficiency in the patients. Anxiety was of such magnitude that 31% of them should be classified as suffering from posttraumatic stress disorder. It is argued that significant differences between patient and control group in cognitive functioning can be explained on the basis of energetic and motivational factors.

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FRIDAY MORNING, JUNE 21, 1996

Poster Session 2/June 21, 9:00 a.m.–5:45 p.m.
To June 22, 9:00 a.m.–12:40 p.m.

DEMENTIA

R.A. COHEN, H. KESSLER, R.F. KAPLAN, M. JENKINS, P. MALLOY, B. STONE, & N. GORDON. DRS Performance in Patients with Alzheimer's Disease and Stroke.

Patients with Alzheimer's disease (AD; *n* = 57), single cortical infarction (CVA; *n* = 46), and multiple infarctions (MID; *n* = 33) were compared to

age-matched normal control subjects (*n* = 25) on the Dementia Rating Scale (DRS). CVA, MID, and AD patients did not differ in DRS total score (*p* > .20), or any DRS subtest, although AD patients showed a trend toward greater memory impairments (*p* = .10). Patients were impaired across all DRS indices, including memory, compared to controls. CVA, MID, and AD patients did not differ on verbal recall, but CVA and MID patients had less overall impairment on the recognition tasks. Recognition memory impairment varied as a function of infarcted cortical hemisphere in CVA. These findings suggest that a single cortical infarction may produce global dementia of severity consistent with early AD and MID.

Correspondence: *Ronald A. Cohen, Miriam Hospital/Brown University, 164 Summit Ave., Providence, RI 02906, USA.*

M. TAUSSIG & C. SANFELIU. First Symptoms of Alzheimer's Disease: A Comparison Between Early and Late Onset and Its Implications for Diagnosis.

Early onset of Alzheimer's disease (AD) has received little attention. This study compares two groups of AD patients classified as "early" and "late onset" (#65 and >65 yr old) with respect to the age of onset. Four hundred forty subjects diagnosed with AD comprised the sample with more than a third confirmed as AD through autopsy. The results suggest major differences in variability and rank order of symptom expression. Among the major differences between early and late onset were changes in work behavior versus forgetfulness; forgetfulness versus not able to find way around; and difficulty managing finances versus losing things. These differences can be misleading, and thus erroneous diagnosis and inappropriate treatment may occur.

Correspondence: *I. Maribel Taussig, 4251 Golf Shore Blvd. N., #11-C, Naples, FL 33940, USA.*

J. ANDRIKOPOULOS. Visuocognitive Impairment in Presenile and Senile Dementia of the Alzheimer's Type.

Research has suggested clinical differences in patients with presenile (onset at age 65 and below) and senile (onset after age 65) onset Alzheimer's disease. The present study addressed whether a difference in visuocognitive performance exists between senile and presenile patients. Eighty consecutive patients with a diagnosis of Alzheimer's disease were separated into a presenile ($n = 19$) and senile ($n = 61$) group. The groups were equated for verbal intelligence, language performance, education, and duration of illness. There was no statistically significant difference between the groups in visuocognitive functioning, as measured by the Facial Recognition Test and Judgment of Line Orientation. When properly matched for severity of dementia, visuocognitive differences should not be present.

Correspondence: *Jim Andrikopoulos, Neuropsychology Clinic, 1750 28th St., Suite 1, West Des Moines, IA 50266, USA.*

Y. TOMODA, N. MOTOMURA, H. AKAGI, A. ASANO, & T. SEO. Language Disturbances in Alzheimer's Disease (AD) in Japanese.

We report on the quantitative analyses of the language disturbances in mild Alzheimer's disease (AD) using the Japanese version of western aphasia battery (WAB). The subjects were 20 patients with AD and 32 healthy controls. The results of the oral speech tests revealed significant differences in terms of the information contained in spontaneous speech, the ability to answer questions either "yes" or "no," the ability to follow sequential instructions, and the ability to remember words. In reading tests, significant differences were found in understanding sentences, identifying Kanji letters (Japanese ideogram), and reading Kanji letters. In writing tests, significant differences were found in the ability to write in dictation, the ability to express ideas by writing, and the ability to copy Kanji letters. However, the ability to write and read Kana (Japanese syllabary) was relatively preserved. These results suggest that Japanese AD patients demonstrate difficulties in reading and writing Kanji letters compared with Kana letters, at least in the beginning of the disease.

Correspondence: *Naoyasu Motomura, Department of Health Science, Osaka Kyoiku University, 4-698-1 Asahigaoka, Kashiwara, Osaka, Japan.*

M. MAROGNA, A. TINTI, R. GENTILE, M.L. INGLESE, C. SER-RATI, & A. TARTAGLIONE. The Specificity of Cognitive Changes in Dementia.

This study attempted to determine the specificity of a test of mental status in indicating the presence of dementia or the possible evolution towards a full-blown picture of dementia. Toward this end, the performances on the Steven Mattis Dementia Rating Scale (SMDRS) of three groups of patients—controls ($n = 107$), demented patients ($n = 63$), and strictly unilateral brain diseased patients (193)—were compared to each other. The discriminant analysis carried out on individual results of single SMDRS subtests showed a significant between-group difference, each group having differed from all the others. The classification was successful in 68.3% of cases. This demonstrates that brain damage not responsible for demen-

tia can yield a cognitive impairment that can be recognized on a simple test.

Correspondence: *Antonio Tartaglione, Department of Neurology, University of Genoa, Via De Toni 5, 16132 Genova, Italy.*

M. JÓDAR, M. REY, L.L. TÁRRAGA, M. BOADA, & M. MATARÓ. Does an Integral Stimulation Retard Cognitive Deterioration in Dementia?

Some studies have showed that patients with Alzheimer's disease show an annual deterioration of 2.2 to 4.2 mean scores in Mini-Mental Status Examination (MMSE). This study examined the effect of cognitive stimulation in two groups of patients submitted to a 1-yr integral program (one Alzheimer's disease group, one vascular dementia group). MMSEs were applied prior to the beginning of the program and twice monthly to all subjects. Results of 1-yr evaluation show differential effects of stimulation in both types of dementia, as well as a reduced annual mean score in patients with Alzheimer's disease.

Correspondence: *Mercè Jódar, Department of Psychology and Health, EDIFICI B, 08193 Bellaterra, Barcelona, Spain.*

H. NAKAMURA, S. NAKAOKI, S. YOSHIDA, M. NAKANISHI, & T. HAMANAKA. Semantic Priming Using Kanji (Ideogram) Words in Japanese Aphasia and Alzheimer-Type Dementia.

We report the first systematic study in Japan regarding semantic priming on a lexical decision task in patients with aphasia and Alzheimer-type dementia. The subjects were 9 aphasics, 2 Alzheimer-type dementia patients, and 11 normal controls. All stimuli were presented as Kanji (ideogram) words, and each prime-target pair was semantically related and not associated. The results indicated that reaction times for the stimuli of this experiment were generally shorter than that of other studies executed in English-speaking countries. This might reflect the difference between the two languages. However, priming effects were confirmed in normals and were suggested in aphasics and Alzheimer-type dementia patients in this study. We argued that semantic priming effects were observed in Kanji words as well as in alphabet words.

Correspondence: *Toshihiko Hamanaka, Department of Neuropsychiatry, Nagoya City University, Kawasumi, Mizuho, Nagoya 467, Japan.*

MEMORY

H. OKAWARA, M. KATO, M. MIMURA, Y. SAKAMURA, M. MIZUNO, H. KASHIMA, & M. ASAI. Examination of Memory for Temporal Order in Learning and Remote Memory Tasks in Patients with Korsakoff's Syndrome.

We developed tests for memory for temporal order in learning and remote memory tasks and tested patients with Korsakoff's syndrome. The learning task included five sets of 10 cards, each with one word in Japanese kana or Chinese characters used. The temporal order of two random cards was questioned twice per set. The remote memory task included, for patients in their 50s and 60s, 18 test items that were developed from social, sports, or cultural events in three prior decades. The temporal order of two items in the same or different categories was questioned. Correct response rates in learning and remote memory tests were significantly lower in patients with Korsakoff's syndrome compared to controls. No significant correlation was detected in temporal order memory performance in learning and remote memory tasks.

Correspondence: *Hiroshi Okawara, Department of Neuropsychiatry, School of Medicine, Keio University, 35 Shinanomachi, Shinjuku-ku, Tokyo, 100, Japan.*

M. DE LUGT, R.W.H.M. PONDS, N. ROZENDAAL, P.J. HOUX, & J. JOLLES. The Dutch Adult Reading Test (DART): A Measure of (Premorbid) Intelligence?

Reading tests have been proposed as a simple measure for obtaining an estimation of premorbid IQ, especially for use in the clinical diagnosis of brain injury and dementia in elderly patients. The Dutch version of the

National Adult Reading Test was investigated in the first panel of the Maastricht Aging Study with 359 subjects aged 25–80 yr. Intra-rater and inter-rater reliability were studied. The results show that the Dutch Adult Reading Test (DART) has good reliability, but underestimates IQ compared to that measured with a standard intelligence test. This underestimation was particularly prominent when the DART raw scores were low. The data show that caution is needed when the DART is used for clinical purposes.

Correspondence: *M. de Lugt, Department of Psychiatry and Neuropsychology, University of Limburg, P.O. Box 616, 6200 MD Maastricht, The Netherlands.*

M. BENGTSON, W. MITTENBERG, A. SELLERS, & B. SCHNEIDER. Meta-analytic Evidence of Substantial Memory Improvement in Adults from 1945 to 1992.

American IQs increased by 14 points over the past five decades, but Flynn attributed this to education rather than intelligence. The current meta-analytic study examined linear improvements on the WMS subtests over the last 47 yr after the effects of age and education had been controlled. Eighty studies reporting subtest, education, and age data for normal individuals sufficient for regression analyses were identified. Sample sizes ranged from 672 to 4,885. Significant temporal improvements were observed ($M = .7 SD$) ranging from 1.33 SD on Visual Reproduction to .32 SD on Mental Control. These changes were unrelated to education, but were correlated with subtest sensitivity to brain function. Memory ability appears to be increasing over time in a manner similar to previously demonstrated population gains in intelligence.

Correspondence: *Michelle L. Bengtson, Department of Psychiatry, Division of Neuropsychology, Henry Ford Hospital, One Ford Place (1C36), Detroit, MI 48202, USA.*

F. GREINER, K. DEAN, K.A. OLSON, J.R. GRABER, P. WINN, & W.W. BEATTY. Domino Playing Skill in Dementia: Roles of Calculation, Implicit and Explicit Memory.

Demented patients with retained skill at playing dominoes performed as well as healthy elderly players on implicit memory items concerned with domino play as well as on verbal explanations for the strategies evoked by the implicit memory items, but they were severely impaired on explicit items about domino terminology and conventional semantic memory tests of naming and verbal fluency. Calculation ability for the skilled players varied greatly; only dot counting number, reading, and comparison of number size were consistently performed accurately. Preserved domino playing skill is associated with normal implicit memory for game-related operations and nearly normal access to semantic knowledge that is contextually bound to these operations, but there is no general facilitation of access to semantic memory.

Correspondence: *William W. Beatty, Department of Psychiatry and Behavioral Sciences, University of Oklahoma Health Sciences Center, P.O. Box 26901, Oklahoma City, OK 73190, USA.*

G. VINGERHOETS & E. LANNOO. Complex Figure Testing: Memory Trials of the Rey-Osterrieth and Taylor Figures Are Not of Equivalent Difficulty.

The Taylor figure is assumed to be an equivalent of the Rey-Osterrieth figure and the figures are frequently used interchangeably in both clinical and experimental test-retest situations. Recent studies have suggested, however, that the memory trials of the Rey-Osterrieth and Taylor Complex Figures are not of equivalent difficulty. These findings are confirmed in a larger sample of healthy controls receiving either the Rey-Osterrieth ($n = 130$) or Taylor ($n = 58$) version of the complex figure test. The results of the copy trial show comparable scores between the two forms. Both immediate and delayed recall show a significantly better performance (about 3 points) for the Taylor figure. The greater ease of recall for the Taylor figure has important research and clinical implications.

Correspondence: *Guy Vingerhoets, Department of Psychiatry and Neuropsychology, University Hospital Gent 4K3, De Pintelaan 185, B-9000 Gent, Belgium.*

I. REINVANG. Focal Retrograde Amnesia Associated with Migraine.

A case of 20-yr focal retrograde amnesia is reported. Neuropsychologic testing before and after onset of amnesia showed no anterograde learning or memory deficits. The patient has abnormal EEG, but no localized injury has been detected on CT or MRI. During 3-yr of follow-up there has been no recovery. Further testing shows that the patient has a dense retrograde amnesia comprising personal and public events as well as famous persons.

Correspondence: *Ivar Reinvang, Department of Psychology, University of Oslo, Box 1094 Blindern, 0317 Oslo, Norway.*

FRONTAL LOBES

J.V. FILOTEO, R. ROMO, L. RILLING, B. WILLIAMS, & J.W. ROBERTS. The Relationship Between Working Memory and Executive Functions: Evidence from Patients with Parkinson's Disease.

The association between working memory and executive functions was evaluated in an unselected group of Parkinson's disease (PD) patients. The results indicated that different aspects of working memory were associated with different executive functions. Specifically, PD patients' verbal fluency abilities tended to correlate most reliably with their ability to repeat digits backward, whereas their verbal learning and memory abilities tended to correlate most reliably with an index measuring the difference between their forward and backward digit spans. In contrast, patients' scores on a test of concept formation and perseverative thinking were not significantly associated with any of the working memory indices. These results suggest that, at least in PD, working memory is not associated with all aspects of executive functioning.

Correspondence: *J. Vincent Filoteo, Department of Psychology, 502 Behavioral Science Building, University of Utah, Salt Lake City, UT 84112, USA.*

P. ALLAIN, D. LE GALL, G. AUBIN, P.A. JOSEPH, J.L. LE GUIET, & J. EMILE. Frontal Lobe Syndrome: Dissociations on Tasks Using Scripts.

Frontal lobe-damaged patients ($n = 23$), posterior lobe-damaged patients ($n = 10$), and normals ($n = 10$) were compared on script tasks. First, they were asked to reestablish the sequential order of two scripts, divide them into scenes, and choose the most important action in each scene. They were then asked to order new scripts, which contained aberrant items. Impairments in script information processing were only observed in frontal patients. In the first task, eight participants made errors in ordering actions as in choosing scenes and made deviant estimates of action importance. In the second they refused the aberrant elements. Eleven participants performed as controls in the first task, but used the irrelevant items in their arrangements. The four others performed as controls in the two tasks. These results were discussed with regard to fractionation of the frontal lobe syndrome.

Correspondence: *Didier Le Gall, Neuropsychological Unit, Department of Neurology B, CHU, 49033 Angers, cedex 01, France.*

P. ALLAIN, D. LE GALL, G. AUBIN, M. FORGEAU, P.A. JOSEPH, P. LEJEUNE, & J. EMILE. Selective Impairment of the Attentional Component of Working Memory in a Patient with Bilateral Frontal Lobe Damage.

A 36-yr-old right-handed man sustained a severe closed head injury with bilateral frontal lobe lesions (1978). In 1994, after a lobectomy of the left frontal lobe (infectious abscesses), he presented normal performances on most subtests of the WAIS-R, long-term memory tests and tasks used to assess the Supervisory Attentional System (Tower of London, Stroop Test, MCST, TMT), and deficits in short-term memory. With regard to Baddeley's Working Memory Model, the patient showed normal functioning of the articulatory loops (word length effect, phonological similarity effect, and abolition with articulatory suppression) and dysfunctioning of the central executive component. The patient failed on Brown-Peterson paradigm

only when the distraction tasks were more demanding. These performances were close to those reported for another patient.

Correspondence: *Didier Le Gall, Neuropsychological Unit, Department of Neurology B, CHU, 49033 Angers, cedex 01, France.*

S. GAUGGEL & I. ROSENDAHL. Self-Control in Two Patients with Frontal Lesions.

Preference for immediate small reinforcers (i.e., points exchangeable with money) over delayed large ones was assessed in two patients with frontal lesions and in five healthy controls. Delay and amount of reinforcers were systematically varied during six conditions. If amounts of the reinforcers or preinforcer delays were varied, all subjects showed preference for either the larger or the more immediate presented reinforcer. If both delay and amount were varied, subjects preferred the larger, more delayed reinforcer over the smaller, less delayed reinforcer. However, frontal patients showed this preference even when the preinforcer delay was extraordinarily long and they could earn more points if they chose the smaller, less delayed reinforcer. Unlike the behavior of healthy controls, their behavior could not be described by molar maximization.

Correspondence: *Siegfried Gauggel, Department of Psychology, Philipps-University of Marburg, Gutenbergstr. 18, D-35032 Marburg, Germany.*

P. VAN VUGT, P. PAQUIER, L. KEES, & P. CRAS. Compulsive Writing Behavior in a Demented Alcoholic Patient with Frontal Lobe Hypoperfusion.

Increased writing activity (IWA) in a 70-yr-old, right-handed spontaneous man presenting with a history of alcohol abuse and maturity onset diabetes is reported. CT scan of the brain revealed marked cortico-subcortical atrophy and ^{99m}Tc-HMPAO SPECT disclosed severe bilateral frontal hypoperfusion more pronounced on the right. The patient's micrographic writing consisted of sentences that were copied from whatever printed text he could set eyes on. Occasionally, short and simple, but meaningful statements about daily life activities were inserted. We discuss several neurologic causes of IWA and the equivocal terminology found in the literature. A distinction between hypergraphia and compulsive writing behavior (CWB) is proposed. It is concluded that our patient's IWA may be characterized as CWB.

Correspondence: *Peter van Vugt, Turkoosstraat 6, B-2600 Berchem, Belgium.*

M.A. JURADO, P. TRESERRAS, M. MATARÓ, K. VERGER, J. GRAFMAN, C. JUNQUÉ. Feeling-of-Knowing Judgments About Temporal Ordering in Frontal Lobe Patients.

Among the different kinds of memory related to frontal lobes, metamemory has been little studied. We investigated the feeling-of-knowing accuracy about a temporal ordering task. Subjects were 35 frontal lobe lesion patients and their matched controls. Correlations between temporal ordering score and feeling-of-knowing were significant for control group in the 3 different lists studied and higher than for frontal group (they had only a significant correlation). Different difficulty of the task affected in the same way frontal patients and controls, but patients showed a poorer accuracy in all feeling-of-knowing performances. These results reinforces the involvement of frontal lobes in metacognition and awareness.

Correspondence: *C. Junqué, Department of Psychiatry and Clinical Psychobiology, University of Barcelona, Passeig de la Vall d'Hebrón 171, Barcelona 08035, Spain.*

J. VILKKI & O. SURMA-AHO. Inaccurate Prediction of Word List Recall After Frontal Lobe Lesions.

Patients with frontal ($n = 29$) and nonfrontal ($n = 28$) lesions were examined with a word list learning task using selective reminding. Before each of the six free recall trials the subject had to predict the result. He or she was told that if the number of words recalled was equal to or higher than the prediction, the score was the prediction. If he or she failed to reach the prediction, the number of words missing from the prediction was subtracted from the number of words recalled, with the remainder being the score. The left hemisphere groups recalled fewer words and overpredicted

their recall on the first two trials as compared to the right hemisphere groups. The frontal groups were less accurate than the nonfrontal groups on the predictions of recall.

Correspondence: *Juhani Vilkki, Department of Neurosurgery, University Central Hospital, Topeliuksenuatu 5, FIN-00260 Helsinki, Finland.*

R. BLANCO MENÉNDEZ, J.C. ALVAREZ CARRILES, & E. VERA DE LA PUENTE. Both Frontal Lobes Are Involved in the Generation and Processing of Visual Mental Imagery (VMI).

The structures involved in the conscious generation and processing of VMI have been traditionally located in the postrolandic portions of the brain. However, recent research suggests that the frontal lobes play an important role in this function. VMI has been assessed in a group of control subjects and brain-damaged patients, showing no significant differences between post- and prerolandic lesioned patients in tests results. Nevertheless, the same tests could distinguish control subjects from brain-damaged ones accurately.

Correspondence: *Enrique Vera de la Puente, Unidad de Neuropsicología, Hospital Central de Asturias, calle Julián Clavería, s/n 33006 Oviedo, Spain.*

NEUROPSYCHIATRY

P. BRUGGER, M. REGARD, & T. LANDIS. Phenomenological Classification of Autoscopic Phenomena.

The literature on autoscopic phenomena, the hallucinatory or illusory reduplication of one's own body, suffers from considerable terminological and conceptual inconsistencies. We propose here a classification scheme of autoscopic phenomena based on phenomenological criteria. While autoscopic hallucinations are mere visual hallucinations of one's own body or parts of it, heautoscopy proper involves depersonalization and feelings of bodily reduplication. The "feeling of a presence" lacks any visual impressions; one's "doppelgänger" remains invisible. Out-of-body experiences refer to the illusory separation of body and mind. In internal heautoscopy, one's inner organs are visualized in peripersonal space. Negative heautoscopy is the experience of not seeing one's own body. We discuss the characteristic neurological conditions in which the different subtypes occur.

Correspondence: *Peter Brugger, Department of Neurology, University Hospital Zurich, CH-8091 Zurich, Switzerland.*

A. DUCHÊNE, P. BRUGGER, & R.E. GRAVES. Schizotypy and Response Commonality in Verbal Fluency.

High scorers on scales measuring schizotypal personality traits reportedly respond with rare words in classical word association tasks. In 40 students, we investigated whether high schizotypal participants would generate more uncommon words in a 2-min letter fluency task (letters A and F). High scorers on the Magical Ideation scale generated as many words as low scorers. Both groups also generated a comparable number of unique words (named by only one person) and "common" words (shared with five or more other persons). As hypothesized, high scorers generated more "rare" words (shared with fewer than five other persons) than low scorers. The findings illustrate that response commonality analyses of verbal fluency may prove useful in investigations of semantic retrieval in both clinical and theoretical applications.

Correspondence: *Alexandre Duchêne, Department of Neurology, University Hospital Zurich, CH-8091 Zurich, Switzerland.*

D.N. ALLEN, G. GOLDSTEIN, M.W. GILBERTSON, & D.P. VAN KAMMEN. Effects of Neuroleptics on WCST Performance in Schizophrenia and Schizoaffective Disorder.

In the current investigation, we used a prospective longitudinal double-blind, placebo-controlled experimental design to investigate Wisconsin Card Sorting Test performance in 23 patients with schizophrenia or schizoaffective disorder and 16 normal controls. Subjects were tested on two occasions separated by 3 wk. During this time, patients were either withdrawn from medication or maintained on medication. Subjects with schizophre-

nia did not exhibit expected improvements from the first to the second assessment period and medication status did not significantly influence test performance. These results suggest that neuroleptic medication did not significantly influence cognitive abilities.

Correspondence: Daniel N. Allen, Psychology Service, VA Medical Center, 7180 Highland Drive, Pittsburgh, PA 15206, USA.

W.N. MERCER, M.L. BENGTON, J.M. BENNETT, & J.L. FISK. Characteristic MMPI-2 Profiles in Presurgical Epilepsy Patients: Effect of Sex and Localization of Lesion on Psychopathology.

The purpose of the present investigation was to examine presurgical patients with intractable epilepsy on MMPI-2 measures of psychopathology and to determine if epileptic foci or sex affected expression of psychopathology. We retrospectively reviewed the MMPI-2 profiles of 39 patients with intractable epilepsy referred for a neuropsychological presurgical assessment. Localization of foci was confirmed by two diagnostic tests. Cluster analysis solution based on the MMPI-2 stabilized after a three-group solution. Cluster 1 reflected significant elevations on scales 1, 2, and 3. Cluster 2 reflected generalized psychopathology, with elevations on seven clinical scales. Cluster 3 reflected a relative absence of psychopathology. MANOVA indicated no significant main effect or interaction effect for sex or localization of lesion. Clinical utility and directions for future research are discussed.

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M.L. BENGTON, W.N. MERCER, F.M. MCCARTHY, & J.E. DEL DOTTO. Characteristic MMPI-2 Profiles in Patients Referred for Adult Attention Deficit Disorder.

The present investigation compared MMPI-2 profiles of psychopathology across patients referred for possible diagnosis of adult attention deficit disorder. We retrospectively reviewed neuropsychological assessment results of 96 (males, $n = 57$, 59%; females, $n = 39$, 41%) patients referred with attention/concentration complaints. All patients were referred by primary care physicians, with specific request for assistance in the differential diagnosis of adult attention deficit disorder. Cluster analysis solution based on the MMPI-2 stabilized after a four-group solution. Significant elevations were observed on F and scales 1, 2, 4, 6, 7, and 8. Clinical utility and directions for future research are discussed.

Correspondence: Michelle L. Bengtson, Henry Ford Hospital, Division of Neuropsychology, One Ford Place, Detroit, MI 48202, USA.

J.C. SANZ, C. JUNQUÉ, & M. PÉREZ. Sex Differences in the Brain Structure and Function of Schizophrenic Patients.

This research is based on a study using computerized tomography (CT) and neuropsychological tests on a sample taken on 30 chronic schizophrenics (13 females, 17 males) to research alterations of their brain structures and functions, as well as the relationship between both parameters. The results obtained point out the existence of a neuropsychological dysfunctional pattern wider and deeper in schizophrenic females than in schizophrenic males, which is related to signs of cerebral hypoplasia in CT. Males have smaller dysfunction than females, which is focused more on the frontotemporal regions and tends to relate to enlargement of the third ventricle in CT. The significance and implications about these findings are discussed.

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TOXIC AGENTS

H. YOSHIMASU, M. KATO, M. MIMURA, H. KASHIMA, & M. ASAI. Rehabilitation for the Acquisition of Domain-Specific Knowledge in Korsakoff's Syndrome.

We attempted memory rehabilitations for domain-specific knowledge and investigated whether the patients with Korsakoff's syndrome could learn

the names of 25 ward staffs. Participants were five inpatients with alcoholic Korsakoff's syndrome. Patients have participated in the rehabilitation program once a week for about 6 months. We used 25 photographs of ward staff members. At every session, we presented a photograph one by one in random order, and asked participants to recall the name of the person. The subjects could learn the name-face association of the ward staff. Therefore, it is suggested that the decreased domain-specific knowledge of Korsakoff's syndrome may be improved by repetitive learning. The number of names remembered is neither correlated with the results of the tests for anterograde amnesia nor for frontal function, but is significantly correlated with the WAIS-IQ.

Correspondence: Haruo Yoshimasu, Department of Neuropsychiatry, Keio University, 35, Shinanomachi, Shinjyuku, Tokyo, Japan.

E.M. WEKKING, G. VAN DER LAAN, R.E.C.S. VAN DUN, Y. ROOS, T. HUY, J. HOOISMA, B.M. KULIG, H.H. EMMEN, A.C. MONSTER, & F.A. DE WOLFF. Organic Psychosyndrome Due to Exposure to Neurotoxic Solvents. The Development of a Diagnostic Protocol.

In this paper the development of a diagnostic protocol for an organic psychosyndrome (OPS) due to exposure to neurotoxic solvents will be discussed, mainly from a neuropsychological viewpoint. Twenty patients with solvent-related occupations, who were mildly to severely exposed, were examined in a multidisciplinary team, the Solvent Team. According to this team, in seven patients there were strong to very strong indications for OPS and in another seven some indications for OPS.

Correspondence: E.M. Wekking, Department of Psychiatry, Academic Medical Center, Tafelbergweg 25, 1105 BC, Amsterdam.

S.B. ROURKE & I. GRANT. The Effects of Length of Abstinence on Neuropsychological Recovery in Healthy Male Alcoholics: A 6-Year Prospective Study.

Forty-seven recently detoxified alcoholic men (mean abstinence of 30 d) were matched to 44 nonalcoholic controls and compared on the Halstead-Reitan battery and selected WAIS subtests across 3 evaluations over a 6-yr period. Mean age and education of sample were 48.0 (9.4) and 14.2 (2.1) yr, respectively. At baseline, alcoholics had neuropsychological (NP) deficits in attention, abstraction, nonverbal problem-solving, psychomotor speed, and simple motor skills. Similar NP deficits were observed in alcoholics who resumed drinking at 2- and 6-yr follow-up. In contrast, continuous stable abstinence was associated with NP improvement in abstracting ability, simple motor skills, and nonverbal problem-solving skills at 2 yr, and further recovery in the latter at 6 yr. However, continued deficits in attention and psychomotor speed were noted after 2 and 6 yr of abstinence. These persistent NP deficits may indicate non-recoverable abilities from alcoholism, or they may be resistant to improvement because of increasing age, despite stable long-term abstinence.

Correspondence: Sean B. Rourke, Department of Psychiatry, Wellesley Hospital, Toronto, Ontario M4Y 1J3 Canada.

H.H. EMMEN, B.M. KULIG, G. VAN DER LAAN, R.E.C.S. VAN DUN, Y. ROOS, T. HUY, J. HOOISMA, A.C. MONSTER, E.M. WEKKING, & F.A. DE WOLFF. The Use of Computerized Neuropsychological Tests for the Detection of Neurotoxic Effects.

Occupational exposure to organic solvents has been associated with the development of chronic toxic encephalopathy or organic psychosyndrome (OPS). Since computer-based neurobehavioral testing appears to be a promising tool in detecting early signs of neurotoxicant overexposure a group of twenty cases suspected of OPS was tested using a set of automated tests from the Neurobehavioral Evaluation System (NES). Deviant test performance was observed on measures of attention, perceptual coding and memory.

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HEAD INJURY

N. DELAND & M. VANIER. Measuring Capacity and Control of Information Processing with Clinical Tests of Focused Attention: Is It Possible?

A method for measuring capacity and control of information processing using clinical tests of focused attention (FA) was tested on a group of 50 normal research participants and on 3 patients with a severe closed-head injury. Normative data showed that it is possible to isolate capacity and control in the different tests. Patients demonstrated FA problems that were either attributable to a control problem, a capacity problem, or a combination of the two. However, the tests used appear to involve two kinds of control components. These results are encouraging from a theoretical and clinical point of view.

Correspondence: *Nathalie Deland, Centre de Recherche, Institut de Réadaptation de Montréal, 6300 ave Darlington, Montréal, PQ H3S 2J4, Canada.*

J. ANDRIKOPOULOS. Paradoxical Dissociation in Attention Tasks in Compensable Mild Head Injury.

The present study examined a dissociation between the WMS-R Attention Concentration Index (ACI) and WAIS-R Digit Symbol Substitution (DSS) in mild head-injured patients whose neuropsychological data suggested questionable motivation (QMG). A moderate-to-severe head injury group (HIG) performed significantly better on the ACI than did the QMG. The QMG performed significantly better on DSS ($M = 95.89$) than on the ACI ($M = 74.72$); in the HIG there was no significant difference between the ACI ($M = 85.72$) and DSS ($M = 80.56$). A paradoxical dissociation was observed whereby more simple measures of attention are failed relative to measures that are more sensitive to the effects of head injury.

Correspondence: *Jim Andrikopoulos, Neuropsychology Clinic, 1750 28th St., Suite 1, West Des Moines, IA 50266, USA.*

J. ANDRIKOPOULOS. Dissociation Between Visuospatial and Perceptual Functioning in Closed Head Injury.

A dissociation between visuospatial and perceptual abilities was first suggested by Newcombe and Russell in patients with penetrating brain injuries. The present study examined if there is disproportionate impairment on the Facial Recognition Test (FRT) in contrast to Judgment of Line Orientation (JLO) in patients with moderate-to-severe closed head injury (HG). The control group consisted of psychiatric patients (PG). The HG performed significantly worse than the PG on both JLO and the FRT. However, within the HG, the FRT was failed significantly more than was JLO.

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E. LANNOO, F. COLARDYN, C. DE DEYNE, C. JANNES, & G. YINGERHOETS. Subjective Complaints After Moderate to Severe Head Injury: Usefulness of a Self-Report Questionnaire.

Subjective complaints of 48 head-injured patients, 16 general trauma controls, and 14 normals were assessed using a self-report questionnaire that requires the comparison of the current psychosomatic, cognitive, emotional, and behavioral status with the status before the injury on a 7-point rating scale. There is a highly significant increase in complaints in both patients groups, except for behavioral complaints in the head-injured group. There are no differences between the ratings of head-injured patients and their relatives. The ratings of the normals are the lowest, but there are no significant differences between the three groups. No relationship was found between magnitude of complaints and injury severity, employment status after injury, age, education, gender, or intelligence.

Correspondence: *Engelien Lannoo, Department of Psychiatry and Neuropsychology, University Hospital, 4K3, B-9000 Gent, Belgium.*

J. COCKBURN, P. HAGGARD, & S. HUYBREGTS. Effects of Cognitive Demands on Standing Balance After Brain Injury.

Recent research has suggested that in some circumstances, including recovery from brain injury, "automatic" motor skills may make substantial

demands on cognitive resources, resulting in decrement in one or both tasks. In this study, standing balance of 13 neurological patients was measured alone and during performance of three different cognitive tasks. Results indicated that, contrary to prediction, balance, although still impaired, was facilitated in most subjects by attention to another task. However, two patients, who had both cerebellar and cortical damage, were impaired on all tasks when performed simultaneously, indicating cerebralization of postural control and insufficient cerebral resources to maintain both activities at the same level as singly. Results suggest conditions under which attention to other tasks facilitates or impedes balance need further examination. Correspondence: *Janet Cockburn, Department of Psychology, University of Reading, Earley Gate, Reading RG6 6AL, UK.*

MULTIPLE SCLEROSIS

K. BEECKMANS, R. CLUYDTS, & E. GYSELS. Cognitive Functioning in Patients with Multiple Sclerosis After 1 Year.

The neuropsychological performances of 24 outpatients (14 females, 10 males) who underwent a repeated testing after a 1-yr follow-up period were evaluated. Significant performance decrements attributable to the demyelination process of multiple sclerosis (MS) could not be detected on tests assessing sustained and focused attention, audioverbal and visuospatial memory, visuospatial abilities, verbal fluency, and abstract/conceptual reasoning. The results indicate no uniform MS-related evolution of cognitive functioning. The natural history of cognitive impairment in MS is characterized by a strong intersubject variability. In our study, illness variables such as duration of illness and course of MS (chronically progressive versus relapsing-remitting) are poor predictors of cognitive decline.

Correspondence: *Kurt Beeckmans, Frans Devogheallaan 40, 1750 Lennik (Brabant), Belgium.*

N. ORTIZ, E. GARRAN, M. REICHERTS, M. CHOFFLON & E. MAYER. Interhemispheric Transfer and Alexithymia in Multiple Sclerosis.

Complete commissurotomy is a sufficient condition for a high level of alexithymia. Besides, patients with multiple sclerosis (MS) show an impairment of interhemispheric transfer. The aim of our study was to examine whether alexithymia reflects a functional disconnection between the two cerebral hemispheres in MS patients. We explored interhemispheric transfer in a group of 37 MS subjects. Alexithymia was assessed with the Toronto Alexithymia Scale of 20 items (TAS-20) and also with a computerized version of the Parallel Visual Information Processing Test (PVIPT). In patients with the relapsing-remitting form (RRMS) only, results show a correlation between lower scores in the PVIPT and an impairment of visual, auditory, sensory, and motor transfer. These findings suggest that, in RRMS, alexithymia may be due to an interhemispheric transfer deficit.

Correspondence: *Nadid Ortiz, Department of Clinical Neurosciences and Dermatology, Geneva University Hospital, 1211 Geneva 14, Switzerland.*

GENERAL NEUROPSYCHOLOGY

P. VUILLEUMIER, F. STAUB, & G. ASSAL. Sniffing Behavior.

We report a 65-yr-old man with postanoxic encephalopathy who showed compulsive sniffing at objects, an environment-driven behavior not previously described. Other environment-driven responses, such as manipulation of tools and hyperlexia, were also present. The patient had a severe dementia, with amnesia, semantic dysphasia, apraxia, and visual agnosia. In contrast, he could correctly identify several familiar odors. We assume that the patient's stereotyped exploration of objects by smelling them could have been brought about by the lack of visual recognition and semantic knowledge. Better olfactory than visual recognition would be compatible with a predominant involvement by anoxia of associative neocortex in frontal and posterior temporal-parietal border zone areas, with relative sparing of olfactory areas in the anteromedial temporal and orbitofrontal regions. Correspondence: *P. Vuilleumier, Department of Neurology, University Hospital of Geneva, 1211 Geneva, Switzerland.*

C. WETZEL, J.M. ANNONI, G. MENTHA, & E. GIOSTRA. Heterogeneity in the Neuropsychological Profile of Patients Having a Small-Diameter Portocaval H-Graft.

A retrospective study was conducted on 12 patients suffering from hepatic cirrhosis of diverse etiology, 3 to 30 months after a small-diameter portocaval H-graft. Usually, liver dysfunction can induce a portocaval encephalopathy, classified in four clinical stages with neurological disorders and alteration of mental status and EEG. However, 70% of cirrhotic patients present subclinical signs, which are measured by specific and highly sensitive neuropsychological tests long before any neurological or EEG modification appears. Ninety percent of our patients presented significant changes in mental flexibility (trail-making B) and memory performances (learning score), whereas other results (e.g., Stroop, remote recall) were less pathological. Furthermore, the neuropsychological deficit was more significant than the neurological impairment in 33%, and the EEG disorder in 42%, of the cases.

Correspondence: *Corinne Wetzel, Department of Clinical Neurosciences and Dermatology, Geneva University Hospital, 1211 Geneva 14, Switzerland.*

J. SPATT & G. GOLDENBERG. Reaching for Something Versus Reaching with Something: Two Aspects of Manual Dexterity in Patients with Left- and Right-Sided Lesions.

We used a complex reaction time paradigm to test the hypothesis that the impairment of left brain-damaged (LBD) patients in performing motor tasks lies on a conceptual rather than a motor planning level. Load on motor planning was kept constant, but the conceptual context was varied by introducing a model of a hand according to which fingers had to be chosen in a reaching task. Performance of LBD patients was only impaired when movements had to be performed according to a model of a hand. In contrast, right brain-damaged (RBD) patients were slower than controls regardless of the condition.

Correspondence: *Josef Spatt, 2. Neurology. Abt., Neurologisches Krankenhaus Rosenhügel, Riedelgasse 5, 1130 Vienna, Austria.*

E. PECK, M. SCHWARTZ, S. MITCHELL, & A. PECK. Ciguatera Fish Poisoning: A Case Study of the Neuropsychological Effects of Exposure.

Ciguatera fish poisoning (CFP) results from consumption of fish contaminated by ciguatoxins. CFP is endemic in the Caribbean and Pacific, but is circumtropical globally and may affect more than 25,000 individuals annually. The clinical manifestations include neurologic, gastrointestinal, and cardiovascular symptoms. Previous publications have not provided a specific analysis of the cognitive sequelae of CFP, although neurologic abnormalities, including coma and seizures, have been reported. We present the neuropsychological case study of a 40-yr-old, well-educated professional male with a documented history of CFP. Two separate neuropsychological examinations each conducted at a different laboratory were carried out at 5 and 25 months after CFP exposure. The data indicate problems with verbal learning and memory, grip strength, and aspects of thinking efficiency.

Correspondence: *Edward A. Peck III, Neuropsychological Services of Virginia, 2010 Bremond Rd., Suite 127, Richmond, VA 23226, USA.*

R. J. COMPTON & S.C. LEVINE. Mood and Perceptual Asymmetry During the Menstrual Cycle.

Several studies have reported shifts in perceptual asymmetry during the menstrual cycle, but the potential confounding effect of mood changes has been largely ignored. In this study, 24 women research participants completed four visual laterality tasks and a mood questionnaire at three phases of the cycle. Results indicate no overall effect of cycle phase on any of the asymmetry or mood scores. However, results revealed significant associations between negative affect and decreased right hemisphere performance on two face perception tasks. Implications for right hemisphere mediation of negative affect and future research on cycle-related shifts in perceptual asymmetry are discussed.

Correspondence: *Rebecca J. Compton, Department of Psychology, University of Chicago, 5848 S. University Ave., Chicago, IL 60637, USA.*

W.N. MERCER, M.L. BENGTON, J.E. DEL DOTTO, M.L. ROSENBLUM, J.P. ROCK, T. MIKKELSEN, & M. STOLTENBERG. Serial Neuropsychological and Neuroradiological Results Following Surgical Resection of a Right Oligodendroglioma: A Report of Two Cases. Oligodendrogliomas are indolent tumors with a median survival time of 51 months to 5.3 yr. Typically, treatments have included biopsy, resection, irradiation, chemotherapy, and combinations of these treatments. To date, no research exists that tracks neuropsychological performance in individuals before and after treatment of oligodendrogliomas. We report serial neuropsychological assessment and neuroradiological results of a 53-yr-old man and 67-yr-old woman, both of whom underwent resection of a right-frontal oligodendroglioma. Future research should address quality of life and the possible relationships to pre- and postoperative variables following resection of oligodendrogliomas.

Correspondence: *Walt N. Mercer, Henry Ford Hospital, Division of Neuropsychology, One Ford Place, Detroit, MI 48202, USA.*

R. PETRUCCI, A. CARTER, S. BROZENA, & L. LAZARUS. Neuropsychological Profile of Heart Transplant Candidates.

A comprehensive neuropsychological and demographic profile of end-stage heart failure patients awaiting transplantation is needed to develop a normative database. This paper will present preliminary data for more than 200 cardiac patients (from an initial pool of 1,050), including the number of previous neurologic events, results of an extensive bedside mental status examination, and finally a summary of a comprehensive neuropsychological battery. Demographics include cardiac etiology, sex, age, race, and education. Descriptive statistics will be provided for individual cognitive tests, cardiac etiologies, the mental status examination, and number of neurologic events. Tests for significance will be performed to evaluate the differences between variables (e.g., etiologies and cognitive performance).

Correspondence: *Ralph J. Petrucci, Heart Failure/Transplant Center—MS 115, Medical College of Pennsylvania and Hahnemann University, Broad & Vine, Philadelphia, PA 19102, USA.*

A. LINDSAY, T. GOLDSMITH, & R. DIAZ. Neuropsychological Mechanisms in Network Techniques.

There is a paucity of research on what neuropsychological mechanisms underlie cognitive network techniques. This study evaluated the neuropsychological characteristics of two cognitive network techniques: Pathfinder Similarity and Coherence in Senile Dementia Alzheimer's Type (SDAT). Compared to 20 matched controls, SDAT patients demonstrated significant deficits on all neuropsychological tests related to semantic processing. An examination of the neuropsychological variables found that immediate memory skills were highly related to Pathfinder Similarity scores and the structural Coherence utilized by subjects. Additionally, the ability to mentally manipulate information was also related to the structural Coherence. These results suggested that slightly different neuropsychological mechanisms underlie Pathfinder Similarity and Coherence. As such, Pathfinder Similarity and Coherence network techniques may be highly sensitive to the fluctuations in the semantic system due to encoding/storage and executive attention deficits other than neuropsychological processing variables.

Correspondence: *Allen Lindsay, 9162 Blind Pass Rd., St. Petersburg Beach, FL 33706, USA.*

K. YOKOYAMA, C. HASEGAWA, Y. MURAKAMI, & T. HIGASHIYAMA. Selective Anarithmetria Due to an Extensive Unilateral Stroke in a Left-Hander.

We report a 23-yr-old, left-handed woman who presented with selective acalculia after suffering a stroke. On admission to our rehabilitation center 4.5 months post-onset, she demonstrated a severe arithmetical disability with no other deficits of main cognitive domains. Her PIQ on the WAIS-R, which was 57 on admission, improved to 78 with a stable VIQ of 100 where weighed scores of the arithmetic subtest remained low (6 on admission, 7 1-year post-onset). A magnetic resonance imaging scan showed an infarction involving almost the entire MCA territory on the right hemi-

sphere. Her calculating disability was limited to arithmetical skills with preserved number processing and facts. Her cognitive profile suggested that processing systems for calculation as a complex procedure can be separated between the two hemispheres.

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Symposium 4/9:00–10:40 a.m.

THE FUTURE ROLE OF NEUROPSYCHOLOGICAL ASSESSMENT DURING INVASIVE PROCEDURES OF EPILEPSY SURGERY

Organizers and Chairs: *M. Hendriks and A.P. Aldenkamp*

M. HENDRIKS & A.P. ALDENKAMP. *The Future Role of Neuropsychological Assessment During Invasive Procedures for Epilepsy Surgery.* In the current procedure of epilepsy surgery several noninvasive and invasive diagnostic techniques are used to acquire knowledge of the functional and structural architecture of the brain of candidates for epilepsy surgery. The major aim is to achieve congruence in all results with respect to lateralization and localization of the epileptic focus. Functional imaging (such as functional magnetic resonance imaging [fMRI] and magnetoencephalography [MEG]) directly relates cognitive functioning of the individual patients to their cerebral anatomy. The developments of these functional imaging techniques will change neuropsychological assessment procedures in the noninvasive and invasive phases. In this symposium we will present data on the current applications of pre- and postsurgical neuropsychological testing, the WADA test, and cranial stimulation techniques. In the second part the use of functional MRI and MEG is illustrated and the consequences for the future will be discussed.

Correspondence: *M. Hendriks, Dr. Hans Berger Clinic, P.O. Box 90108, 4800 RA Breda, The Netherlands.*

J. VERMEULEN. *Electrical Stimulation Mapping of Language and Memory Functions in Epilepsy Surgery: Advantages and Limitations.* The main application of stimulation mapping in neurosurgery is to plot functional anatomy so that the resection can be tailored, while minimizing the risks of postoperative functional deficit. This presentation focuses on language and memory, since these are particularly vulnerable functions in epilepsy surgery. Despite methodological limitations, the technique seems to be valuable in practice, because at present there is no useful alternative to map language with sufficient accuracy to plan resections. The application of functional imaging techniques such as PET and MRI have the potential to noninvasively lateralize and localize language areas. However, it remains to be established whether functional maps based on PET or MRI changes indeed provide valid data to guide safe reactions. Unilateral electrical stimulation may also be used to predict whether the hemisphere contralateral to the epileptic focus is capable of sustaining memory function following temporal lobectomy. The methodological problems of this procedure and its future role in epilepsy surgery will be presented.

Correspondence: *J. Vermeulen, Department of Neuropsychology Meer en Bosch, Epilepsy Centre, Achterweg 5, 2103 SW Heemstede, The Netherlands.*

W.C.J. ALPHERTS. *The Wada Test in Epilepsy Surgery: Procedural and Validity Aspects.*

For more than three decades, Wada testing has been used as a golden standard preoperative tool in establishing cerebral dominance and in predicting whether the patient is at risk for postoperative anterograde amnesia. Wada testing is an invasive technique, which is subject to an inherent risk. The reliability and validity of the Wada test are much in debate. Both parameters cannot be studied in a systematically controlled design. One is

not so sure of the real predicting power of a "risky" Wada test outcome. On the other hand, only few cases are described of false-negatives. This state of affairs will be discussed and probable solutions are presented. Possibilities for neuropsychological assessment during magnetoencephalography will also be discussed.

Correspondence: *W.C.J. Alpherds, Department of Neuropsychology Meer en Bosch, Epilepsy Centre, Achterweg 5, 2103 SW Heemstede, The Netherlands.*

T.A. HAMMEKE. *Functional Magnetic Resonance Imaging (fMRI) and Epilepsy.*

Functional magnetic resonance imaging (fMRI) is a rapidly developing technology that has promise for clinical applications. This presentation will review investigations conducted at the Medical College of Wisconsin that demonstrate the power of the technology for lateralization of language and memory functions in normals and patients with intractable epilepsy, and determine the degree to which the cerebral distribution language functions (as measured by fMRI) can be predicted on the basis of selected demographic, medical history, and neuropsychological variables. These studies show a strong correlation between indices of language lateralization from Intracarotid Amobarbital (Wada) Testing and fMRI and illustrate how the technology may be used to aid our understanding of aberrations in language distribution in patients with seizures. Methodological issues will also be reviewed.

Correspondence: *T.A. Hammeke, Department of Neurology, 9200 W. Wisconsin Ave., Milwaukee, WI 53226, USA.*

A. PAPANICOLAOU. *Possibilities for Neuropsychological Assessment During Magnetoencephalography.*

Magnetoencephalography (MEG) is currently used to supply information regarding the sources of abnormal brain activity (e.g., inter-ictal events) as well as the sources of activity associated with normal responses to sensory stimuli, with preparation and execution of movements and with activity associated with the performance of complex cognitive and linguistic tasks. A brief review will be presented of the fundamental technical aspects of MEG applications that illustrate the efficacy of the method in supplementing classical methods of localizing epileptic activity foci, of establishing hemispheric dominance for language in epileptic patients, and of performing functional mapping of the cortex in both normal subjects and patients. The prospects of replacement of some invasive procedures, currently used for such purposes, by MEG will also be discussed.

Correspondence: *A. Papanicolaou, University of Texas at Houston Medical School, 6431 Fannin St., Suite 7 148, Houston, TX 77030, USA.*

Paper Session 6/9:00–10:40 a.m.

MEMORY DISORDERS

M. MIMURA, M. KATO, H. YOSHIMASU, & H. KASHIMA. *Cognitive Estimation and Time Estimation in Korsakoff Syndrome.*

Seven Korsakoff patients were compared with 30 alcoholics and 30 normal subjects on the ability to estimate appropriate time needed for various events. For this purpose, the Cognitive Estimation Test (CET) was modified to comprise exclusively those questions that concern the size of time or space. Korsakoff patients were more severely impaired on both the temporal and spatial CET than alcoholics, who performed worse than normal. Korsakoff patients were equally impaired on the temporal and spatial CET. The CET had significant correlations with VIQ, Wisconsin Card Sorting Test, and verbal subtests of duration estimation. Poor performance of Korsakoff patients on the CET may represent nonspecific impairment in verbally mediated problem-solving activities.

Correspondence: *Masaru Mimura, Department of Neuropsychiatry, Tokyo Dental College, Ichikawa General Hospital, 5-11-13 Sugano, Ichikawa 272, Japan.*

M.E. TIMMERMAN & W.H. BROUWER. Impaired Access to Declarative Memory and Intact Procedural Learning More Than a Year After Severe Closed Head Injury (CHI).

The hypotheses of impaired declarative memory and intact procedural memory were tested making use of four experimental tasks: a semantic memory task, a memory comparison task, a mental rotation task, and a mirror reading task. These tasks were administered on two different days to 12 survivors of a severe CHI and a healthy control group of comparable age and education. In three tasks the association strength between nodes of declarative knowledge was varied and it was expected that this would affect the CHI group more than the controls. In two tasks opportunities for procedural learning were provided by repeatedly presenting the same cognitive tasks. It was expected that the CHI group would profit as much from this as would the control group. Both hypotheses were confirmed.

Correspondence: *Wiebo H. Brouwer, Department of Neuropsychology, University of Groningen, AZG, P.O. Box 30001, 9700 RB Groningen, The Netherlands.*

B. PILLON, B. DEWEER, M. VIDAILHET, A.M. ERGIS, Y. AGID, & B. DUBOIS. Learning Deficits and Allocation of Attentional Resources in Parkinson's Disease.

To test the hypothesis that learning deficits in Parkinson's disease are related to impaired allocation of attentional resources, we analyzed the performance of nondemented Parkinsonian patients in the following situations: (1) word list learning with semantic cues; (2) learning of spatial location of pictures; (3) verbal conditional learning; (4) visuospatial conditional learning; and (5) supraspan visuospatial learning. The results showed that learning was impaired in situations 2, 3, and 4, where associative links are arbitrary, but preserved in situation 1, where associative links are semantically pre-established, and situation 5, where learning complexity is adapted to attentional resources (visuospatial span). These results support our hypothesis. Correspondence: *Bernard Pillon, INSERM U 289, Hôpital de la Salpêtrière, 47 Bd de l'Hôpital, 75651 Paris cedex 13, France.*

H.E. HULSHOFF POL, R. HIJMAN, P. MEYER, C.A.F. TULLEKEN, L.M.P. RAMOS, M.A. VIERGEVER, & J.M. VAN REE. A Longitudinal Follow-up Study on Verbal and Visual Memory Processing in Patients with Frontal Lobe Damage.

The influence of site and time on verbal and visual memory processing was assessed in 11 patients with frontal lobe damage due to a tumor at 3–5 wk and 2–4 yr post-neurosurgery. The damaged region was evaluated by 2D MR or CT and at follow-up by three-dimensional computer-reconstruction of 3D-FFE MR images to accurately evaluate the dorsolateral, medial, and orbitofrontal damage. While verbal memory was impaired following medial frontal lobe damage, visual memory was impaired following right dorsolateral frontal lobe damage. With time, memory had improved to normal in all patients. Chronicity of frontal lobe damage should therefore be considered as a factor influencing memory performance.

Correspondence: *H.E. Hulshoff Pol, Department of Psychiatry, University Hospital, P.O. Box 100, 3508 GA Utrecht, The Netherlands.*

Paper Session 7/11:00 a.m.–12:40 p.m.

CHILD NEUROPSYCHOLOGY 3: PRENATAL FACTORS AND HANDEDNESS

M.B. CASEY, E. PEZARIS, R. NUTTALL, & E. TUCKER. Evidence for the Heterozygotic Advantage in Scholastic Aptitude Scores: Moderate Right-Handers Excel Over Other Handedness Groups.

In this study we tested predictions from Annett's concept of the heterozygotic advantage. Based on her right-shift theory of pattern of brain organization, she proposed that moderate right-handers (MRH) should have higher scholastic aptitude (SA) scores than either nonright-handers (NRH) or strong right-handers (STRH). We supported this prediction using two samples (ages 9 and 13 yr) totaling 684 subjects. For both samples, using planned comparisons, we found that the NRH did not differ from the STRH

on the Otis Lennon Test of Abilities. These two groups combined performed at a significantly lower level (.23 to .33 of a *SD*) than the MRH group. One sample, followed longitudinally, had college entrance test scores (age 17 yr). Again, the MRH scored .26 *SD* higher. These consistent findings provide strong support for Annett's theory.

Correspondence: *M. Beth Casey, 201 Campion Hall, Boston College, Chestnut Hill, MA 02167, USA.*

J. HALL, G.W. HYND, C.A. RICCIO, & M.J. COHEN. The Relationship of Gender and Handedness to Corpus Callosum Morphology in Children.

In recent years technological advances have promoted the interest in the association between gender, handedness, and corpus callosum morphology. The present study examines three groups of children: (1) clinic referred, (2) normal, and (3) groups 1 and 2 combined. Subjects were administered neuropsychological instruments and MRI protocols designed to analyze regions of interest (ROI) of the corpus callosum. Analyses indicated a significant difference with smaller ROI area measurements in normal and female subjects. The midbody regions were also predictive of classification by gender when utilizing ROI variables. A correlation between right-handers and posterior ROI was demonstrated.

Correspondence: *Josh Hall, 570 Aderhold Hall, University of Georgia, Athens, GA 30602, USA.*

P. STIERS, M. HAERS, B.M. VAN DEN HOUT, R. VANDERKELEN, L.S. DE VRIES, O. VAN NIEUWENHUIZEN, & E. VANDEN-BUSSCHE. L94, a Set of Tasks for Screening Visual-Perceptual Functions in Children with Neonatally Acquired Brain Lesions.

The L94 is a screening battery comprising seven tasks that was developed to evaluate visual perceptual abilities in brain-damaged children. To demonstrate the utility of the L94 battery, 15 children at the age of 5.3 yr with neonatally acquired hemorrhagic-ischemic lesions were tested. At that age none of them exhibited reduced visual acuity. However, nine children performed below *Pc* 10 on three or more tasks of the L94.

Correspondence: *Erik Vandebussche, Laboratory for Neuropsychology and Psychophysiology, K.U. Leuven, Campus Gasthuisberg, B-3000 Leuven, Belgium.*

B. MAASSEN, J. PASMEN, & J. ROTTEVEEL. Neurological and Neuropsychological Profile in Low-Risk Preterm Infants at Five Years of Age.

In a prospective study, 44 low-risk (i.e., with a favorable neonatal risk score) preterm infants of 25–34 wk gestational age and 18 healthy term infants were neurologically examined and neuropsychologically tested at age 5 yr. The preterm infants as a group had a more unfavorable outcome than did the term infants. In particular, 12 of the 44 low-risk preterm infants showed neurological abnormalities and/or a worse neuropsychological outcome at age 5 yr. The remaining low-risk preterm infants, however, showed quite similar test scores as the term infants. From this result we concluded that the more unfavorable outcome of preterm infants is due to moderate to severe impairment of a few, instead of slight impairment of the majority. The children with an unfavorable outcome showed particular impairment in visual-motor integration, concentration, and auditory memory.

Correspondence: *Ben Maassen, Child Neurology Centre, Institute of Medical Psychology, University Hospital, P.O. Box 9101, NL 6500 HB Nijmegen, The Netherlands.*

Paper Session 8/11:00 a.m.–12:40 p.m.

NEUROPHYSIOLOGY

C.H.M. BRUNIA. The Intersection of Anticipatory Attention and Motor Preparation.

Anticipatory behavior is effective because of a faster information processing, both on the input side and on the output side. Information from the

sense organs reaches the cortex via the specific sensory thalamic relay nuclei. Information from cerebellum and neostriatum reaches the cortex via different motor nuclei in the lateral thalamus. Sensory and motor nuclei are covered by the reticular nucleus of the thalamus (RNT), which exerts a local inhibitory control on the relay nuclei. The RNT itself is controlled via the prefrontal cortex. The strategic position of the RNT suggests a crucial role in the input modulation to the sensory and motor cortices. It is argued that a comparable basic mechanism underlies both anticipatory attention and motor preparation.

Correspondence: *C.H.M. Brunia, Tilburg University, P.O. Box 90153, NL 5000 LE Tilburg, The Netherlands.*

K.B.E. BÖCKER, M.C.M. BASTIAANSEN, J.H.M. VROOMEN, B.M.L.F. DE GELDER, & C.H.M. BRUNIA. The Prosody of Spoken Language Modulates Event-Related Potentials: Preliminary Data on the Prosodic Negative Shift.

To find the reflection of prosody ("the music of spoken language") in an event-related potentials (ERP) component, ERPs were recorded while subjects listened to and responded to quadruples of Dutch words, with weak-strong (WS) and strong-weak (SW) stress patterns. The main finding is that SW words, which constitute only 12% of the Dutch lexicon, evoke a surplus negativity, named prosodic negative shift (PNS). This component is larger when metrical stress is task-relevant. The latency of the PNS is 300 ms, that is, at about the time of lexical access. This implies that, once validated, the PNS can play an important role in assessing the role of prosody in speech perception in general and in lexical segmentation in particular.

Correspondence: *Koen B.E. Böcker, Psychonomics Department, Utrecht University, Heidelberglaan 2, NL 3584 CS Utrecht, The Netherlands.*

J. GROB, B. MAEB, J. DAMMERS, G. BARNES, A.A. IOANNIDES, A.D. FRIEDERICI, & H.W. MÜLLER-GÄRTNER. MEG Study of Syntactic and Semantic Aspects of Language Processing.

Recordings of the magnetic field have been used to study the processing of language in the brain. Our study focuses on semantic and syntactic aspects of language processing using magnetoencephalography. Earlier ERP studies had shown differential patterns for the processing of semantic and syntactic aspect in auditory language perception with the syntactic processes inducing a particularly localized activity over the left anterior brain region.

Correspondence: *Joachim Gross, Institute of Medicine, Research Center Jülich, D-52425, Jülich, Germany.*

M.L. KAIPIO, K. ALHO, I. WINKLER, C. ESCERA, O. SURMA-AHO, & R. NAATANEN. Event-Related Brain Potentials and Attention in Closed Head-Injured Patients.

Event-related potentials to auditory stimuli were recorded from closed head-injured (CHI) and healthy subjects in nonattended and attended conditions. Auditory stimuli consisted of binaural sequences of repetitive standard tones (600 Hz), occasional deviant tones (700 Hz), and novel sounds. P3b latency to target tones was significantly prolonged in patients, indicating slowed processing of relevant stimuli. Additionally, N2 deflections to attended novel sounds and target tones were attenuated in patients, indicating decreased processing of attended sounds. The mismatch negativity elicited by deviant tones, even in the nonattended condition, was similar in CHI patients and control subjects. In comparison with control subjects, CHI patients showed an enhanced centrally maximal P3a component to novel sounds in the nonattended condition.

Correspondence: *Marja-Liisa Kaipio, Käpylä Rehabilitation Centre, Koskelantie 22, 00610 Helsinki, Finland.*

FRIDAY AFTERNOON, JUNE 21, 1996

Paper Session 9/1:40–3:20 p.m.

ADULT NEUROPSYCHOLOGY

J.R. GRABER, P. WINN, & W.W. BEATTY. Five Hypotheses About the Bases of Preserved Musical Skill in Dementia.

Neuropsychological methods were used to compare healthy controls, dementia patients who retained musical skill, dementia patients who were formerly musically skilled, and dementia patients who were never musically skilled. All groups were of comparable age and education; the latter three groups were of comparable dementia severity. Comparison of deterioration in naming and visuospatial construction revealed no evidence for relative preservation of right hemisphere function by patients who retained musical skill. Likewise, they showed no advantage on two tests of sequencing. Modest support for the possibilities that enhanced attention, enhanced access to semantic memory, and facilitated implicit memory were associated with preserved musical skill. Specifically, skilled patients performed more accurately on verbal fluency and cancellation tasks and tended to show greater picture priming than formerly skilled patients.

Correspondence: *William W. Beatty, Department of Psychiatry and Behavioral Sciences, University of Oklahoma Health Sciences Center, P.O. Box 26901, Oklahoma City, OK 73190, USA.*

J.R. CRAWFORD & M. OBANSAWIN. PASAT and Components of WAIS-R Performance: Convergent and Discriminant Validity.

The Paced Auditory Serial Addition Test (PASAT), WAIS-R, and National Adult Reading Test (NART) were completed by 152 healthy participants. Principal components analysis revealed that PASAT's loading on general intelligence was substantial and exceeded that of many WAIS-R subtests. Following rotation, PASAT loaded highly on the WAIS-R attention/concentration factor. Evaluation of nested confirmatory factor analytic mod-

els confirmed that, although PASAT is not independent of general intellectual ability, a substantial proportion of its variance is specific to the attention/concentration domain. Regression equations were built to permit a comparison of clients' obtained PASAT scores with their estimated *premorbid* PASAT scores (using NART and age as predictors) and with scores predicted from their *current* general level of intellectual ability (using the WAIS-R).

Correspondence: *John R. Crawford, Department of Psychology, University of Aberdeen, Old Aberdeen, AB9 2UB, UK.*

E.G. VISCH-BRINK, G. DENES, & D. STRONKS. Visual and Verbal Semantic Knowledge in Aphasia.

We studied visual and verbal semantic processing in aphasics, the relationship between semantic deficits and aphasia type and severity, and the relationship between pre-semantic and semantic visual processing. Participants included 74 LBD aphasic patients with AAT classification, 10 RBD patients, and 96 controls. Patients were submitted to an Object Decision Test and a Verbal and Visual Semantic Association Test. Compared to normals and RBD patients, aphasic patients as a group were significantly impaired in both tests. There was no correlation with aphasia type and severity. Some patients showed a selective deficit in visual and verbal semantics and/or a dissociation between presemantic and semantic visual processing.

Correspondence: *Evy Visch-Brink, Department of Neuropsychology, Erasmus University Rotterdam, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands.*

N. VON STEINBÜCHEL, M. WITTMANN, M. REISER, & E. PÖPPEL. Elementary Temporal Information Processing in Patients with Acquired Focal Brain Lesions.

In our study, three different levels of temporal processing were assessed in patients with acquired focal brain lesions. These logistics-related func-

tions can be differentially impaired depending on the nature and localization of damage to the brain. (1) A high-frequency mechanism associated with the identification of events in the range of 20–40 ms was measured with the temporal order threshold. (2) A low-frequency process responsible for the integration of events in the range of 2–3 s was measured with temporal reproduction and perception of ambiguous figures. (3) Between these two levels a process involved in the temporal control of voluntary movement in the range of 150–400 ms was measured with the personal tapping tempo.

Correspondence: *Nicole von Steinbüchel, Institute for Medical Psychology, University of Munich, Goetherstr. 31, 80336 München, Germany.*

Paper Session 10/1:40–3:20 p.m.

MEMORY ACROSS LIFESPAN AND GENDER

N. RAZ, F. GUNNING, D. HEAD, & J.D. ACKER. Neuroanatomical Correlates of Working Memory for Nonverbal Material: Evidence from Normal Aging.

We examined the neural substrates of nonverbal working memory and executive function in 103 healthy adults (age 18–80 yr). Subjects performed two tests of nonverbal memory and a test of executive function (the Wisconsin Card Sorting Test [WCST]). The volumes of the prefrontal cortex (PFC) and the fusiform gyrus (FG) were estimated from MRI images. The data were analyzed using path analysis of the cognitive variables and the volumes of their putative brain substrates (adjusted for height). As in our previously reported study, both age and the volume of the FG explained significant and unique proportion of variance in nonverbal working memory. Contrary to our previous findings, age but not the volume of the PFC predicted perseverative responses on the WCST. There were no significant effects of FG volume on perseveration or PFC volume on working memory. Correspondence: *Naftali Raz, Department of Psychology, University of Memphis, Memphis, TN 38152, USA.*

I.W. SCHMIDT, I.J. BERG, & B.G. DEELMAN. Compensation of Memory Problems: Memory Strategy Training in the Aged.

As most elderly complain of a decline in their memory compared to when they were younger, compensation of memory problems is a highly relevant topic for study. An inventory of memory aids and strategies that older people use spontaneously shows that they seem not to use the most effective strategies according to the literature on memory. This raises the question if older persons can be taught to use (psychologically relevant) strategies to overcome their everyday memory problems. A first study showed that an individual training in applying simple strategies can lead to a significantly improved memory performance. A second study focuses on the efficacy of the training of specific memory strategies on three specific memory problems (remembering names, intentions, and verbal information). In this paper preliminary results will be presented.

Correspondence: *Iris W. Schmidt, Department of Neuropsychology and Gerontology, University Hospital, P.O. Box 30.001, 9700 RB Groningen, The Netherlands.*

A. POSTMA, R. IZENDOORN, & E.H.F. DE HAAN. Sex Differences in Object Location Memory.

Object location memory includes two processes: one needs to encode the precise positions involved and to assign various objects to locations. This study examined whether sex differences exist for these two processes. Twenty males and 20 females reconstructed object locations in a square frame on a computer screen in three relocation conditions: object-to-position assignment, positions only, and a combined condition, which comprised both processes. Females did as well as males in the first condition, but were outmatched in the other two conditions. It thus seems that sex differences in object location memory do not include object-to-position assignment, but only positional encoding per se.

Correspondence: *Albert Postma, Department of Psychonomics, Utrecht University, P.O. Box 80140, 3508 TC Utrecht, The Netherlands.*

M. KORKMAN, T. NIKKINEN, L. KLENBERG, & E. AHONEN. Development of Memory: Short-term Memory, Supraspan Learning, and Delayed Retrieval.

The study investigated the development of various domains of memory. Subjects were 396 children, 3–12 yr of age. Short-term memory was assessed using NEPSY subtests assessing immediate recall of pictures, faces, sentences, names, and narration. Supraspan learning tasks required memorizing 15 words across five trials. Delayed recall tasks required recall of faces, names, and list after 30 min. On the short-term memory tests performance improved until age 8. After that, no significant improvement was observed except in free recall of narration. In this task and in supraspan learning, development continued until age 9–10. Delayed retrieval (memory decay) and learning curve showed no age trend.

Correspondence: *Marit Korkman, Department of Psychology, Free University of Brussels, Pleinlaan 2, B-1050, Brussels, Belgium.*

Paper Session 11/3:40–4:55 p.m.

NEUROPSYCHIATRY

M.H. MILLER, J.L. HOLT, G. ROSENBLUM, M. McCORMACK, & W. REICHMAN. The Use of Neuropsychological and Psychiatric Criteria to Diagnose Huntington's Disease.

Huntington's disease (HD) is characterized by a movement disorder, psychiatric symptoms, and cognitive changes. Diagnostic confirmation is usually limited to neurological changes and family history. Measures of cognitive decline and or psychiatric symptoms as more sensitive indices of HD were examined. Seventy-five individuals were divided into four groups: normal controls, presymptomatic at risk (AR1) with no history of treated psychiatric or cognitive/behavioral illness, presymptomatic (AR2) with such a history, and confirmed HD. Patients were examined with a neuropsychological battery and then given the genetic test for HD. Test performance was compared among controls, AR⁺, and AR⁻ in each of the AR groups and the confirmed group. The utility of selected neuropsychological measures in diagnosing HD prior to neurological symptoms is discussed.

Correspondence: *Michael H. Miller, Department of Psychiatry, University of Medicine and Dentistry of New Jersey, 671 Hoes Lane, Piscataway, NJ 08854, USA.*

L. KRABBENDAM, J. JOLLES, & M.M.A. DERIX. Neuropsychological Evaluation of Schizophrenic Patients With and Without Auditory Hallucinations.

Neuropsychological dysfunctions in schizophrenia have been found in a variety of cognitive domains. The present paper investigates whether inconsistency of research findings hitherto is due to the heterogeneity of subtypes of schizophrenia. Thus, two groups of schizophrenic patients were compared with each other and with matched controls. Fifteen patients with and 15 patients without auditory hallucinations were compared on a neurocognitive battery measuring memory and both simple and complex speed. No significant differences were obtained; patient groups were characterized by a large interindividual variability. The results indicate that future studies should investigate this within-group variability in more detail.

Correspondence: *L. Krabbendam, Department of Psychiatry and Neuropsychology, University of Limburg and Psychomedical Centre Vijverdal, P.O. Box 88, 6200 AB Maastricht, The Netherlands.*

K.B.E. BÖCKER, J. VAN DER LEE, R. HIJMAN, & E.H.F. DE HAAN. Perception, Mental Imagery, and Reality Discrimination in Hallucinating and Nonhallucinating Schizophrenic Patients.

In this study we tested the hypothesis that hallucinations result from confusion between information from external and internal scores, for example, perception and imagery, respectively. Hallucinating and nonhallucinating schizophrenic patients, as well as normal control subjects, performed multiple tests of perception, vividness of mental imagery, and reality

discrimination in both the auditory and the visual modalities. The data indicate that the hallucinating patients have relatively more vivid images in the modality in which they hallucinate. A surprising finding concerned a better reality discrimination in the hallucinating patients compared to the nonhallucinating ones.

Correspondence: *Koen B.E. Böcker, Psychonomics Department, Utrecht University, Heidelberglaan 2, NL 3584 CS Utrecht, The Netherlands.*

Paper Session 12/3:40–4:55 p.m.

NEGLECT

G. KERKHOFF, U. MÜNGBINGER, & G. RUDROFF. Recovery from Balint's Syndrome—A Rehabilitation Study.

A 26-yr-old man with Balint's syndrome resulting from left parietal, diffuse anoxic, and uremic brain damage is described. The patient had right and upper vertical neglect, simultanagnosia, disturbed visual space exploration and perception, as well as impaired reading and ADL activities (dressing, orienting in visual space, use of telephone, and public traffic). Visual perimetry showed a loss of color and form perception with intact light perception in the left field beyond 4°. Intensive rehabilitation was performed in a baseline-design over 10 months (starting 14 months after brain damage). Significant improvements were achieved in fixation, visual acuity, visual space exploration, reading, and three of the four trained ADLs. All results remained stable at follow-up 18 months after cessation of treatment. The results are discussed within a multicomponent model of Balint's syndrome.

Correspondence: *Georg Kerkhoff, EKN-Clinical Neuropsychology Research Group, City Hospital Bogenhausen, Dachauerstr. 164, D-80992 München, Germany.*

H. SHIBUYA & P.M. PEDERSEN. Distribution of Attention Over Visual Field in Neglect: There Is Not Necessarily a Directional Bias Towards Ipsilesional Extreme.

Based on the view that attention is a factor that influences the selection of objects within the visual field for recognition, we examined the distribu-

tion of attention over visual field in neglect patients in a task in which no physical response was required. The data were analyzed by using a computational model of visual selective attention, a fixed-capacity independent race model (FIRM), developed in experimental cognitive psychology. The results suggested that there is not necessarily a directional bias toward ipsilesional extreme in the distribution of attention over visual field in neglect. Furthermore, the phenomenon of extinction is suggested as a result of drastically low attentional concentration in a sector within the visual field.

Correspondence: *Hitomi Shibuya, Psychological Laboratory, University of Copenhagen, Njalsgade 90, DK-2300 Copenhagen S, Denmark.*

C. GUARIGLIA, G. LIPPOLIS, & L. PIZZAMIGLIO. Somatosensory Stimulation Can Improve Imaginal Neglect.

We studied the effects of a transcutaneous nerve electrical stimulation (TENS) on imaginal neglect, evaluated by means of a large variety of tasks. Eight right brain-damaged patients with left neglect were submitted to imaginal tests both in absence then during TENS on the left or on the right neck muscle. Results showed that TENS on the left produces significant improvement of performances on the left side of mental images compared to the performances obtained without TENS. These results suggested that the modification of the egocentric coordinate reference induced by TENS may affect the imagery system involved in visual representation of objects as well as that involved in space representation.

Correspondence: *Luigi Pizzamiglio, Università "La Sapienza," V. dei Marsi, 78, 00185 Rome, Italy.*

Presidential Address/5:10–6:10 p.m.

THE NEUROPSYCHOLOGY OF LATE ONSET DEPRESSION

Steve Mattis

SATURDAY MORNING, JUNE 22, 1996

Symposium 5/9:00–10:40 a.m.

OUTCOME FOLLOWING TRAUMATIC BRAIN INJURY

Organizer and Chair: J. Ponsford

K. BAKKER, V. ANDERSON, S. MORSE, C. CATROPPA, F. HARTOU, & G. KLUG. Attention in Preschool Head Injury.

Deficits in attentional capacity are widely reported following head injury (HI) and may have a significant impact on ongoing development. Nevertheless, little research has investigated attentional skills following HI in pediatric populations. A measure of attentional behavior was developed to evaluate attentional problems and recovery in preschool children following HI. The sample comprised 14 children, who were divided into two groups—mild HI and severe HI. Groups were evaluated at acute stage (0–3 months) and 6 months postinjury. Evaluation consisted of measures of intellectual functioning and attentional skills, including selective attention,

sustained attention, impulsivity, and distractibility. Results indicated differential recovery rates for attentional components.

Correspondence: *Vicki Anderson, Department of Psychology, University of Melbourne, Parkville, VIC 3052, Australia.*

J. DONDERS & E. BALLARD. Predictors of Behavioral and Psychosocial Adjustment after TBI in Children.

Pre- and postinjury patterns of behavioral and psychosocial adjustment were examined with standardized ratings (Achenbach Child Behavior Checklist) in 50 children with moderate to severe traumatic brain injury (TBI). Children were selected from a 36-month series of consecutive inpatient rehabilitation admissions. Premorbid deficits were no more common than in the general population, but levels of psychosocial adjustment deteriorated significantly after TBI ($p < .001$). Significant predictors of maladjustment at follow-up (median = 328 days after injury) included lower premorbid adjustment ($p < .01$), presence of diffuse edema or axonal shearing on CT/MRI scan ($p < .001$), and longer length of coma ($p < .10$). It is concluded that postinjury psychosocial impairments are common in chil-

dren with moderate to severe TBI and that such problems can usually not be attributed exclusively to premorbid dysfunction.

Correspondence: *Jacques Donders, Mary Free Bed Hospital, 235 Wealthy SE, Grand Rapids, MI 49503, USA.*

J. PONSFORD, J. OLVER, & C. CURRAN. Self-Report of Change and Emotional Adjustment 2–5 Years Following Traumatic Brain Injury (TBI).

Accurate documentation of the complex problems facing TBI individuals presents a significant challenge. This study investigated reliability of self-reported change in 70 TBI individuals interviewed 2–5 yr after injury. Their responses to a questionnaire covering cognitive, behavioral, and emotional changes were compared with those of a close other. Their emotional adjustment was assessed using the Leeds Scales of Anxiety and Depression. Results indicated substantial agreement between TBI subjects and close others. Forty-seven percent of the TBI sample exhibited clinically significant anxiety and/or depression on the Leeds Scales. There was no significant relationship between injury severity and number of changes reported by TBI subjects, but significant correlations existed between scores on the Leeds Scales and changes reported. Implications of these findings will be discussed.

Correspondence: *Jennie Ponsford, Bethesda Hospital, 30 Erin St., Richmond, Victoria, 3121, Australia.*

V. ANDERSON, S. MORSE, C. CATROPPA, F. HARITOU, G. KLUG, & J. ROSENFELD. Head Injury in Preschool Children: Recovery Profiles in the 12 Months Postinjury.

While recovery patterns following adult head injury are well documented, little is known about recovery after head injury in young children, where interactions between possible recovery and normal development may be difficult to differentiate. This study examines recovery profiles in a sample of 60 children, aged from 2 to 6 yr. Children were divided into four groups: mild, moderate, or severely injured and healthy controls. Head-injured children were evaluated on emergence from PTA, and at 6 and 12 months postinjury. Controls were assessed at equivalent intervals. Evaluation included measures of IQ, language, memory, and adaptive functions. Results indicated expected "recovery" for mild and moderate severity groups, but no "recovery" for severely injured children. Findings are discussed in the context of contemporary theories of early vulnerability.

Correspondence: *Vicki Anderson, Department of Psychology, University of Melbourne, Parkville, Victoria, 3052, Australia.*

Paper Session 13/9:00–10:40 a.m.

EMOTION

B. DE GELDER, J. VROOMEN, & T. POPELIER. Facial Expression: Do Parts Play a Full Role?

The present study presents one of the first efforts to understand the relative importance of parts of the face in the recognition of facial expressions. Previous studies have shown the importance of this issue among others for the understanding of impaired recognition of facial expressions for autism as well as understanding compensatory strategies that promote behavioral adaptation for expression recognition. Recent studies have shown that autistic subjects do not pay attention to the same extent to lower and upper parts of the face. The present summary presents the paradigm and results from normal subjects showing the very different role that the upper and the lower part of the face play in the recognition of some basic emotions. Results concerning neurologically impaired populations will be presented at the meeting.

Correspondence: *B. de Gelder, Faculty of Social Sciences, Tilburg University, P.O. Box 90153, 5000 LE Tilburg, The Netherlands.*

J.W. VAN STRIEN. Hemisphere-Specific Priming and Interference Effects of Stimuli with Positive or Negative Emotional Valences.

The differential engagement of the cerebral hemispheres in positive and negative emotions has been investigated in two divided-visual-field experiments. In Experiment 1, 16 males were administered a unilateral lexical decision task. Concurrent presentation of horrifying music resulted in a selective left-visual-field performance enhancement. In Experiment 2, 12 males and 12 females participated in a unilateral shape-matching task. Concurrent presentation of fearful sounds did not result in lateralized performance changes. Neutral sounds resulted in bilateral performance enhancements in females and in selective left-visual-field enhancement in males. The results will be discussed in terms of the interplay of structural (e.g., verbal vs. spatial) and dynamic (e.g., stress or anxiety) processes in determining visual field asymmetries.

Correspondence: *Jan W. Van Strien, Department of Clinical Psychology, Vrije Universiteit, De Boelelaan 1109, C141, 1081 HV Amsterdam, The Netherlands.*

D.G. ANDREWES & C. HORDERN. The Everyday Functioning Questionnaire: A Survey of Cognitive and Emotional Deterioration Following Brain Surgery.

Forty neurosurgical patients and their partners reported on the patients' everyday cognitive and emotional problems following brain surgery using a specially designed everyday functioning questionnaire (EFQ). These results were compared with a control group of 23 patients who had undergone surgery to extracerebral areas. Three of its five subscales (Concentration, Emotion, and Memory) were found to discriminate between the two groups, and factor analysis revealed a sound construct validity. The relationship between the EFQ and the neuropsychological test results on a subsample of patients found the partner's EFQ to have greater concurrent validity when compared to the patients self-report. The frequency of problems in the brain surgery group are presented in relation to the control group for each of the subscales. These results reveal that the EFQ can be used to identify patients who need postoperative support and rehabilitation.

Correspondence: *David G. Andrewes, Department of Psychology, Melbourne University, c/o Royal Melbourne Hospital, Victoria 3050, Australia.*

N.V. MARSH, D.A. KERSEL, J.H. HAVILL, & J. SLEIGH. Caregiver Burden Following Severe Traumatic Brain Injury.

Thirty primary caregivers of people with severe traumatic brain injury (TBI) were assessed at 6 and 12 months postinjury. There was no significant change in the caregivers average level of depression or anxiety over this time. There was a significant improvement in the caregivers overall level of social adjustment. Caregivers reported that the TBI subjects exhibited more problem behaviors at 12 months postinjury than at 6 months, although this did not lead to increased levels of distress for the caregivers. The level of objective burden for the caregivers remained stable between 6 and 12 months, although the level of subjective burden decreased. Results are discussed in terms of caregiver adaptation over the first 12 months following TBI.

Correspondence: *Nigel V. Marsh, Department of Psychology, University of Waikato, Private Bag 3105, Hamilton, New Zealand.*

Symposium 6/11:00 a.m.–12:40 p.m.

NEUROPSYCHOLOGICAL REHABILITATION OF PEOPLE WITH NON-PROGRESSIVE BRAIN INJURY

Organizer and Chair: B.A. Wilson

B.A. WILSON. Neuropsychological Rehabilitation of People with Non-progressive Brain Injury.

This symposium covers four topics. First, we address the issue of compensation in memory-impaired people. How does compensatory behavior de-

velop and which patients compensate well? The second topic addresses the dysexecutive syndrome, focusing on a stroke patient with severe impairment of executive functioning. A method is described for improving everyday problems and reducing family stress. The third paper describes a brain-injured patient with somatic, cognitive, affective, and psychosocial symptoms who underwent rehabilitation. A particularly interesting feature was the change in regional cerebral blood flow following treatment. The final paper addresses physical violence in survivors of severe head injury. A longitudinal follow-up study suggests that physical violence is more likely to occur in patients who do not receive rehabilitation.

Correspondence: *Barbara A. Wilson, MRC Applied Psychology Unit, 15 Chaucer Rd., Cambridge CB2 2EF, UK.*

B.A. WILSON. The Development of Compensatory Behavior.

This paper considers compensatory behavior in people with organic memory impairment following nonprogressive brain injury. It begins with the assumption that recovery of memory functioning is rarely possible once the period of natural recovery has passed. Compensating for memory deficits, therefore, is probably the best rehabilitation strategy; however, such behavior involves memory, so memory-impaired people find it difficult to compensate. Following the description of a framework for understanding the development of compensatory behavior, a survey of the use of compensations in 43 memory-impaired people is reported. From this information it would appear that age, severity of impairment, and additional cognitive deficits are important predictors of efficient use of compensations and of independence.

Correspondence: *Barbara A. Wilson, MRC Applied Psychology Unit, 15 Chaucer Rd., Cambridge CB2 2EF, UK.*

J. J. EVANS, H. EMSLIE, & B.A. WILSON. External Cueing Systems in the Rehabilitation of Executive Impairments of Action.

We describe the use of a mnemonic cueing system (Neuropage) and a paper-and-pencil checklist in the rehabilitation of executive problems in a 50-year-old woman. Following an anterior CVA 7 yr earlier, the patient, despite intact general intellectual and memory functioning, had specific executive impairments of attention, planning, realizing intended actions, and some obsessive-compulsive behaviors. In a series of ABAB single-case experimental designs, we have demonstrated the benefit of external cueing systems that initiate appropriately timed action and also appear to enhance task-focused attention. We argue that the combination of external control, increased attention to action, and a perceived sense of ownership of the cueing process are critical to the success with this patient.

Correspondence: *Jon J. Evans, MRC Applied Psychology Unit Rehabilitation Group, Box 58, Addenbrookes Hospital, Cambridge CB2 2QQ, UK.*

M. LINDGREN, H. THOSTRUP, & I. BRUDIN. Outcome of Neuropsychological Rehabilitation in Combination with Calcium Antagonist Treatment in a Case of Aneurysmal Subarachnoid Hemorrhage.

A 42-year-old woman patient with aneurysmal subarachnoid hemorrhage received neuropsychological rehabilitation in combination with calcium antagonist treatment for 20 months. The patient was assessed with semistructured interviews, neuropsychological tests, and cerebral blood flow examinations before and after treatment. The baseline examinations revealed severe symptoms such as memory impairment, sleep disturbance, and personality change. Impaired test performance and reduced cerebral blood flow were also noted. Because of the severity of the symptoms, the patient was unable to work. Following treatment the patient's symptoms were considerably reduced, neuropsychological testing revealed improved functioning and the SPECT examination showed an increase in the regional cerebral blood flow.

Correspondence: *May Lindgren, Box 4003, S-572 04 Oskarshamn, Sweden.*

A. SHIEL, D.L. McLELLAN, B.A. WILSON, J. EVANS, & J. PICKARD. Effect of Rehabilitation on the Incidence of Violent Behavior After Severe Head Injury.

Violent behavior is cited as a consequence of head injury, but data regarding incidence, prevalence, or the effect of intervention are sparse. This study in-

vestigated recovery in 30 severely head-injured patients. Tests of cognition, memory, executive function, visual perception, language, motor and functional skills, and social adjustment were administered. Incidences of physical violence were recorded. Fifteen patients underwent a rehabilitation program. There were no significant differences between the rehabilitation and nonrehabilitation groups regarding age or severity of injury, but nonrehabilitation patients were more likely to be violent ($\chi^2 = 4.74, p = .03$). Four predictors of violent behavior were identified: violent behavior during acute recovery; rehabilitation; RBMT score; and Speed of Information Processing. Improved self-monitoring and more realistic expectations of both patient and family after rehabilitation may explain this result.

Correspondence: *Agnes Shiel, University of Southampton Rehabilitation Research Unit, Level C, West Wing, Southampton General Hospital, Tremona Rd., Southampton SO16 6YD, UK.*

Paper Session 14/11:00 a.m.–12:40 p.m.

ATTENTION AND EXECUTIVE DISORDERS

E. NORTHAM, P. ANDERSON, G. WERTHER, R. ADLER, & D. ANDREWES. Neuropsychological Complications of Insulin-Dependent Diabetes in Children—A Prospective Study.

Previous research suggests that children with IDDM show selective impairments on neuropsychological tests. A cohort of children ($n = 134$) with newly diagnosed IDDM and normal controls ($n = 129$) was assessed 3 months after diagnosis (Time 1) on standardized tests of general intelligence, attention, memory, new learning, executive functions, and educational achievement and reevaluated 2 yr later (Time 2). At Time 1, the neuropsychological and educational profiles of newly diagnosed children did not differ from those of controls. At Time 2, the IDDM sample performed more poorly than controls on some measures of general intelligence, memory, new learning, and executive skills. Performance decrements were not apparent across the whole IDDM sample, but were related to specific disease risk factors.

Correspondence: *Elisabeth Northam, Department of Psychology, Royal Children's Hospital, Melbourne, Victoria 3052, Australia.*

J. BOGAN. The Developmental Assessment of Executive Functions.

The Seals Test, a computer-based psychological measure adapted from the Tower of Hanoi and based on Fuster's model of executive functions, was produced as a developmental measure of executive function. The measure was administered to a nonclinical group of 183 boys in the age ranges of 7–8, 9–10, and 11–12 yr. The results of t tests with Bonferroni adjustments indicated significant differences across the three age groups with a clear developmental improvement in scores. The Seals Test was then administered to two age groups of children with traumatic brain injuries (TBI). When the two clinical groups were compared with those of the nonclinical groups, matched for age, the results indicated that the TBI groups performed significantly lower than the normative groups. Additionally, a test-retest reliability for one age group revealed a correlation of $r = .755$.

Correspondence: *Jeffrey Bogan, Child and Adolescent Psychological Centre, L23, T1, Bondi Junction Plaza, Bondi Junction, NSW 2022, Australia.*

D. ANDERSON, P. ANDERSON, V. ANDERSON, O. ATHANASOPOULOUS, E. NORTHAM, & C. WILLMOTT. The Continuous Performance Task: Examination of Different Approaches to the Assessment of Sustained Attention in Pediatric Populations.

One of the most widely used measures of sustained attention (SA) is the visual continuous performance task (CPT). Traditionally, frequency of correct response and total errors of omission and commission have been used to evaluate performance on the task. Potentially valuable information regarding SA, however, is not available when such traditional methods are used. Examination of different aspects of SA, including lapses of attention, time on task effects, and intraindividual variability, may be more revealing. This study attempted to develop a method of quantifying these aspects of SA and examine its utility using CPT data from pediatric clinical populations

with reported attentional problems (ADD, mild-moderate head injury, IDDM, ALL treated with CRT) and healthy children. Implications of this approach for understanding the specific nature of SA deficits and remediation are discussed.

Correspondence: *Dianne Anderson, Department of Psychology, Royal Children's Hospital, Parkville, Victoria 3052, Australia.*

D.M. MAHALICK, J.A. BARTLETT, & W. MOLOFSKY. Psychopharmacological Treatment of Children with Attentional Disorders Secondary to Brain Injury.

This investigation sought to examine the efficacy of psychostimulant therapy in alleviating neurobehavioral dysfunction attendant to pediatric brain injury. There are several investigations in the adult literature that have employed the use of psychostimulants in treating both psychiatric and neu-

ropsychological residua associated with head injury. Overall, the results of these studies are equivocal, but suggest a beneficial impact on general functioning. The present prospective investigation utilized a double-blind, placebo-controlled, cross-over experimental design to examine the efficacy of methylphenidate in treating children with acquired attentional disorders secondary to brain injury. A cohort of 14 children with varying degrees of head injury was recruited for participation. As predicted, there were no differences in performance between baseline and placebo conditions on neurobehavioral tasks. In contrast, differences between drug and placebo conditions uniformly achieved statistical significance. Current findings provide support for the hypothesis that methylphenidate is an effective psychostimulant agent in treating attentional disorders secondary to brain injury in children.

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