Journal of the International Neuropsychological Society (1998), **4**, 1–78.

Abstracts Presented at the Twenty-Sixth Annual International Neuropsychological Society Conference

February 4–7, 1998
Honolulu, Hawaii

WEDNESDAY AFTERNOON, FEBRUARY 4, 1998

Poster Session 1/4:00–6:00 p.m.

DEMENTIA–1: ALZHEIMER'S DISEASE

J. LEVY, R. PARASURAMAN, P. GREENWOOD, R. DUKOFF, R. LASSER, & T. SUNDERLAND. The Differential Effects of Cholinergic Blockade and Augmentation on Visuospatial Attention in Alzheimer's Disease.
We investigated the impact of cholinergic drugs on the ability of Alzheimer patients to benefit from spatial localization information in feature and conjunction visual search. Four rectangles were used as valid precues that varied in spatial precision from the area of the target to the area of the entire stimulus array. Eleven patients and 11 elderly controls completed visual search after intravenous scopolamine and at no-drug baseline; patients received intravenous physostigmine. Scopolamine significantly increased reaction time and decreased response accuracy, and physostigmine speeded patient response. Scopolamine broadened visuospatial attention in patients as cholinergic blockade slowed patient reaction time at the most precise precue to a greater degree than among controls, whereas cholinesterase inhibition did not narrow spatial attention.
Correspondence: *James Levy, 1417 Belmont Ave. #301, Seattle, WA 98122, USA.*

J. OLIN, C. ZAROW, L. FOX, H. CHUI, C. MILLER, & L. SCHNEIDER. Clinical–Neuropathological Correlates of Lewy Bodies in the Substantia Nigra.
There has been interest in identifying whether dementia patients who present with behavioral symptoms are more likely to have subcortical and cortical Lewy bodies (LB) present. Using a cohort of patients who were enrolled in an Alzheimer's Disease Research Center, we compared counts of LB to behavioral, cognitive, and demographic variables. There were 30 dementia patients with age greater than 50 years; [mean education = 13.5 years (3.6)] of which 14 had cells with LB found in the substantia nigra [SN; mean count = 4.48, *SD* = 3.4]. Overall, few differences were identified between samples, suggesting that the presence of LB pathology in the SN is not necessarily a marker for patients with behavioral symptoms. Data on a larger cohort of patients will also be presented.
Correspondence: *Jason T. Olin, USC Department of Psychiatry, 1975 Zonal Ave., KAM 400, Los Angeles, CA 90033, USA.*

H. WISHART & R.E. HENDERSON. Heterogeneity in Language and Memory in Early Alzheimer's Disease.
Patients with early Alzheimer's disease ($N = 27$) showed significant memory and language deficits, despite scoring within the normal range on a dementia screening test. Heterogeneity in cognitive presentation, with regard to features often considered hallmarks of the disease, was also noted in these high-functioning patients. Two subgroups of patients emerged on cluster analyses. Patients with higher education showed greater retention on visual and verbal memory indices ($M = 65.6\%$, 54.1% respectively) than did the less educated patients ($M = 7.0\%$, 10.3%; both $p < .001$). More educated patients also showed significantly better preservation of the semantic memory network. They generated almost twice as many exemplars by category as by letter; less educated patients generated approximately equal numbers of exemplars on each form of the test. Further examination of heterogeneous patterns of cognitive impairment in early AD is warranted on both clinical and theoretical grounds.
Correspondence: *Robin Henderson, Rochester General Hospital, Physical Medicine and Rehabilitation, Box 374, 1425 Portland Ave., Rochester, NY 14621-3095, USA.*

F.C. GOLDSTEIN, E. WINOGRAD, E.S. MONARCH, J. PELUSO, & W.P. GOLDMAN. The Mere Exposure Effect in Alzheimer's Disease.
The mere exposure effect was examined in patients with Alzheimer's disease (AD). In Experiment 1, 16 patients and 16 normal controls judged the physical characteristics of faces. Following a delay, implicit memory was tested by presenting pairs of faces (old and new face) and asking subjects to decide which one they liked better. Both groups exhibited above chance preference for previously exposed faces. However, the effect was marginally greater for controls. In Experiment 2, AD patients exhibited significantly impaired recognition memory for faces compared to controls. These findings reveal a mere exposure effect for faces in AD patients, although not necessarily at normal levels. The results are discussed in terms of perceptually *versus* conceptually driven accounts of priming and the possible role of relatively intact occipital lobe functioning in early AD.
Correspondence: *Felicia C. Goldstein, Department of Neurology, Wesley Woods Health Center, 1841 Clifton Road, N.E., Atlanta, GA 30329, USA.*

G. GLOSSER, P.K. GRUGAN, & R.B. FRIEDMAN. Comparison of Reading and Spelling in Patients with Probable Alzheimer's Disease.
Alzheimer's disease (AD) patients are reported to show mild but reliable difficulties reading aloud and spelling "exception" words that have unusual or unpredictable correspondence between their orthography and pronunciation. To better understand the cognitive dysfunction responsible for the apparent surface alexia and lexical agraphia in AD, 21 patients and 27 elderly controls completed specially designed tests of single word reading and spelling. AD patients performed below controls on all tasks and showed a mildly exaggerated "regularity effect" (i.e., difference between regular and exception word scores). Qualitative analyses, however, did *not* demonstrate response patterns consistent with suggested impairment within a

central orthographic lexicon. It is proposed, therefore, that the mild alexia and agraphia in AD may result from disruption in certain nonlinguistic cognitive processes.
Correspondence: *Guila Glosser, Neurology (Gates 3W), University of Pennsylvania Medical Center, 3400 Spruce Street, Philadelphia, PA 19104-4283, USA.*

M. PATTERSON & M. JACOBS. The Relationship of Lateralized Cognitive Dysfunction to Depression in Early Alzheimer's Disease (AD).
The diagnosis of depression has been reported in the literature by many investigators to be associated with right hemisphere dysfunction. Few studies have examined the relationship between depression and brain dysfunction in AD patients with depression. We sought to determine whether, in AD patients, a current diagnosis of depression is associated with predominant dysfunction in the right or the left hemisphere. Fifty-three right-handed AD patients matched for age, education, and dementia severity, received a neuropsychological battery and a semistructured clinical interview, yielding a diagnosis of major or minor depression or no depression. Test scores were compared between depressed and nondepressed subjects. Results did not demonstrate lateralized cognitive dysfunction in depressed AD patients.
Correspondence: *Marian B. Patterson, University Alzheimer Center, 12200 Fairhill Road, Cleveland, OH 44120, USA.*

R. FAMA, E.V. SULLIVAN, P.K. SHEAR, D.A. CAHN, K.O. LIM, L. MARSH, J.A. YESAVAGE, J.R. TINKLENBERG, & A. PFEFFERBAUM. Relationships Between Verbal and Nonverbal Fluency and Regional MRI Brain Volumes in Alzheimer's Disease.
We examined relationships between verbal and nonverbal fluency and regional MRI brain volumes in 38 AD patients. The patients had impaired verbal and nonverbal fluency performance as well as widespread cortical and hippocampal volume deficits. Lower scores on a semantic fluency task were related to smaller frontal and posterior superior temporal volumes. Lower figural fluency scores were related to smaller frontal, anterior superior temporal, and anterior parietal gray volumes. Multiple regression analyses identified frontal volume as a unique predictor of figural fluency performance. Thus, despite widespread cortical and hippocampal volume deficits in these AD patients, semantic and design fluencies showed selective and predicted relationships with regional cortical, but not hippocampal, volumes.
Correspondence: *Rosemary Fama, Department of Psychiatry and Behavioral Sciences, Stanford University School of Medicine, Stanford, CA 94305-5548, USA.*

D.A. CAHN, E.V. SULLIVAN, P.K. SHEAR, R. FAMA, K.O. LIM, J.A. YESAVAGE, J.R. TINKLENBERG, & A. PFEFFERBAUM. Structural MRI Correlates of Clock Drawing Performance in Alzheimer's Disease.
The wide use of the Clock Drawing Test (CDT) in the assessment of dementia reflects its sensitivity to the detection of deficits in neurodegenerative disorders such as Alzheimer's disease (AD). In addition to visuospatial functioning, the CDT may be dependent on semantic memory and executive functioning. The purpose of the present study was to examine the relationship between clock drawing performance and MRI regional brain volumes in AD patients. CDT score showed significant correlations with right, but not left, volumes of gray matter in the prefrontal, anterior-superior temporal, and posterior-superior temporal cortex. After accounting for the effects of language, motor control, visuoconstruction, and dementia severity, CDT scores were selectively related to right anterior-superior temporal gray matter volumes, confirming extra-parietal contributions to CDT performance.
Correspondence: *Edith V. Sullivan, Department of Psychiatry & Behavioral Sciences, Stanford University School of Medicine, Stanford, CA 94305-5548, USA.*

W.P. GOLDMAN, J.D. BATY, V.D. BUCKLES, S. SAHRMANN, & J.C. MORRIS. Motor Functioning in Alzheimer's Disease Subjects Without Extrapyramidal Signs.
Alzheimer's disease (AD) subjects have been shown to exhibit extrapyramidal signs (EPS) such as bradykinesia, rigidity, and resting tremor, yet it remains to be determined whether subjects without clinically evident EPS display slowing on objective tests of motor function. We characterized three subject groups who were assessed by standard neurological examination to be free of EPS: healthy elderly control, questionably demented AD, and mildly demented AD. Tests include Block Design, Digit Symbol, Trail-making A, Crossing-off, gait velocity, finger tapping, reaction time, and movement time. Compared to controls, the mildly demented AD group was impaired on all measures except finger tapping and reaction time. There was no evidence of motor impairment in the questionably demented AD group. These findings suggest that the neural structures that support motor function are spared in questionably demented AD subjects, but these structures degenerate with increasing dementia severity.
Correspondence: *William P. Goldman, Department of Neurology, 4488 Forest Park Blvd., Campus Box 8111-ADRC, Washington University Medical Center, St. Louis, MO 63108-2293, USA.*

PEDIATRICS-1: DISORDERS

J. WILLIAMS, M. GRIEBEL, B. LANGE, & S. BATES. Neuropsychological Findings for Children Diagnosed with Epilepsy Prior to Anticonvulsant Treatment.
The purpose of the present research was to control for anticonvulsant effects by assessing children with newly diagnosed epilepsy prior to initiation of treatment. Performances on neuropsychological tasks were compared between children with newly diagnosed epilepsy ($N = 37$) and a control group of children ($N = 26$). There were no group differences on age, SES, IQ, sex, or race. T tests were used for statistical analysis with age as a covariate on tasks not reported in standard scores. Results indicated that children with epilepsy performed significantly below controls on cognitive tasks requiring attention and quickness in information processing. They were rated as demonstrating more difficulty with attention and concentration by parents and teachers. Outcome findings suggest cognitive and behavioral difficulties associated with the underlying seizure disorder independent of medication effects.
Correspondence: *Jane Williams, UAMS, Department of Pediatrics, 800 Marshall, Little Rock, AR 72202, USA.*

T. HERSHEY, N. BHARGAVA, N. WHITE, & S. CRAFT. Standard *Versus* Intensive Insulin Treatment in Children with Insulin-Dependent Diabetes Mellitus (IDDM): Effects on Memory and Reaction Time.
Children with IDDM, enrolled in intensive ($N = 12$) or standard ($N = 10$) insulin treatment regimens, and non-diabetic children ($N = 16$) were tested on memory and reaction time measures. The intensive treatment group performed more slowly but not less accurately on pattern recognition, had slower voice reaction times, and were less accurate on long delays (60s) on spatial delayed response. Although the intensive treatment group experienced more severe and mild hypoglycemic episodes than the standard group, there were no correlations between number of episodes and performance.
Correspondence: *Tamara Hershey, Psychiatry Department, Washington University School of Medicine, 4940 Children's Place, St. Louis, MO 63110, USA.*

M. LISS, D. FEIN, D. ROBINS, & L. WATERHOUSE. Cognitive Estimation in Individuals with Pervasive Developmental Disorders.
Cognitive estimation is a measure of executive functioning, an area that has been thought to be specifically impaired in individuals with pervasive developmental disorders. The Biber Cognitive Estimation Test, a 20-item test with 5 estimation questions in each of four categories (time/duration, quantity, weight, and distance), was given to individuals with autistic disorder and other pervasive developmental disorders. Responses are com-

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

pared to those of mental-age-matched controls and correlated with performance on the Information subtest of the WISC–III, the Operations subtest of the Key Math Test, and the Vineland Adaptive Behavior Scales. Results are discussed in terms of selective impairment on particular domains, on units of measurements, and of individual difference measures.
Correspondence: *Deborah Fein, Department of Psychology, University of Connecticut, 405 Babbidge Road, U-20, Storrs, CT 06269, USA.*

J.M. McKELLOP, A.M. WEBER, & D.N. FRANZ. Neuropsychological Functioning in Children who have Tuberous Sclerosis with and without Mental Retardation.
We report on 37 children who have Tuberous Sclerosis (TS), a genetic neurocutaneous disease that is characterized by high penetrance, variable expressivity, and involvement of multiple organ systems (e.g., brain, heart, skin). All children are patients in multidisciplinary TS clinic. Twelve children were too intellectually impaired to complete a standardized neuropsychological assessment. Children who completed testing ($n = 25$) demonstrated a bimodal distribution of measured intelligence. Twelve children demonstrated evidence of mental retardation (MR), and 13 children demonstrated average-to-low average general intelligence. Further, the group with MR displayed moderately to significantly impaired functioning in language, academic achievement, memory, and visual–motor domains. The children without MR demonstrated average neuropsychological functioning in all assessed domains. Longitudinal follow-up is required to ascertain whether or not these children's neuropsychological development will stay within the normative range.
Correspondence: *J. Mark McKellop, Division of Neurology–OSB 5, Children's Hospital Medical Center, 3333 Burnet Avenue, Cincinnati, OH 45229, USA.*

J.C. GITTEN, D.E. DEDE, E.B. FENNELL, & B. MARIA. Neurobehavioral Development and Associated MRI Findings of Children with Joubert Syndrome.
Research on children with Joubert syndrome (JS) has focused on brain structural abnormalities and associated clinical symptoms. The degree of developmental delay has not been objectively reported. We investigated the neurobehavioral development of children with JS through psychological assessment in the largest sample to date. Thirty-two parents of children with JS completed the Child Development Inventory (CDI) and MRI data was gathered on 17 of these children. The incidence rate of 2:1 (male: female) is consistent with reported rates. The children in our sample ranged in age from 14 months to 17 years. Results indicate 94% were *severely impaired* according to the CDI, with age being positively correlated with degree of neurobehavioral impairment. MRI and CDI data did not yield consistent data regarding severity or condition.
Correspondence: *Jill Gitten, Department of Clinical and Health Psychology, University of Florida, Health Science Center, Box 100165, Gainesville, FL 32610, USA.*

S.C. GUY, G.A. GIOIA, & P.K. ISQUITH. Gender Differences in the Relationship Between Lead Exposure and Attention and Overactivity.
Regulatory processes of attention and behavior are hypothesized to be specifically vulnerable to the effects of lead exposure. Other research has suggested that males are more susceptible to the deleterious effects of lead. Using a subset of questions examining attention/related behaviors from a teacher checklist, we report significant lead effects for females rather than males in a sample of chronically lead exposed children. Timing of exposure upon the maturing brain is an essential mediating factor. The current study suggests the later a female experiences a peak lead exposure, the more difficulties she will exhibit inattentive and overactive behaviors. This relationship, however, is highly complex and requires multivariate models in order to further understand the full set of factors that contribute to lead's effects on children's neuropsychological functioning.
Correspondence: *Steven C. Guy, Division of Pediatric Neuropsychology, Mt. Washington Pediatric Hospital, 1708 W. Rogers Avenue, Baltimore, MD 21209, USA.*

G.A. GIOIA, S.C. GUY, & P.K. ISQUITH. Gender Dimorphism and Timing of Exposure in the Neuropsychological Outcome of Lead Poisoning in Children.
The relationship between lead and neuropsychological development is complex with a variety of factors likely modifying the effects. Gender and timing of lead exposure are examined as sources of effect modification in the relationship of lead exposure and neuropsychological functioning. For males, earlier exposure was related to greater perseveration and a less strategic verbal learning approach whereas later exposure was related to poorer memory recall following a short delay period. In contrast, for females later exposure was related to poor control of impulsive responding during sustained attention. The Overman et al. (1997) model of gender dimorphism in brain–behavior relationships (i.e., earlier maturation of orbital-prefrontal cortex in males and inferior temporal cortex in males and inferior temporal cortex in females) offers a paradigm for understanding these findings.
Correspondence: *Gerard A. Gioia, Division of Pediatric Neuropsychology, Mt. Washington Pediatric Hospital, 1708 W. Rogers Avenue, Baltimore, MD 21209, USA.*

M.D. LAUTERBACH, T.L. HOPKINS, C.L. PORTER, B.K. GLOGOWSKI-KAWAMOTO, A. YU, F.M. GUNNING-DIXON, M.E. KRONENBERG, D.M. WARMAN, S. RAZ, & C. J. SANDER. Differential Cognitive Recovery from Neonatal Respiratory Distress in Males and Females: An Outcome Study of Early Biological Risk.
Cognitive recovery from neonatal respiratory distress syndrome (RDS) was examined in the two sexes. We recruited 51 (30 females) preschool and school age graduates of Baptist Memorial Hospital Neonatal Intensive Care Unit. The sexes were similar in SES, birth, and delivery complications and neonatal course. The groups were also comparable in the degree of RDS as indexed by need for assisted ventilation and supplemental oxygen. Children with severe perceptual or motor deficits, seizure disorder, severe head trauma, intrauterine growth retardation, severe birth asphyxia, intracranial bleeds or genetic/chromosomal anomalies were excluded. The analyses revealed that sex was strongly associated with cognitive outcome, with females significantly outperforming males on Performance IQ, but not Verbal IQ measures.
Correspondence: *Sarah Raz, Department of Psychology, University of Memphis, Memphis, TN 38152, USA.*

M. DENNIS, M. BARNES, R. HETHERINGTON, J. BOSLOY, M. WILKINSON, J. DRAKE, F. GENTILI, H. HOFFMAN, & R. HUMPHREYS. Adult Survivors of Early-Onset Hydrocephalus: Does Mental Arithmetic in Childhood Predict Mental Arithmetic and Functional Numeracy in Adulthood?
Adult math skills in survivors of early congenital and infantile hydrocephalus can be predicted from their childhood mental arithmetic skills measured an average of 16 years (and up to 23 years) earlier. Mental arithmetic standing relative to age peers appears stable over the transition from childhood to adulthood for this neurodevelopmental disorder. Childhood mental arithmetic skills predicted not only adult mental arithmetic, but also adult functional numeracy, the ability to apply knowledge about numbers to typical life tasks such as making change, performing price comparisons, and understanding graphs and charts. For individuals with hydrocephalus, poor mental arithmetic skills in childhood are associated with problems in using numbers in a functionally useful manner as an adult.
Correspondence: *Maureen Dennis, Psychology Research, The Hospital for Sick Children, 555 University Avenue, Toronto, ON M5G 1X8, Canada.*

G.A. STEFANATOS, J. BROWN, K. CONWAY, & H. RABINOVICH. Visual–Spatial Disorder in Noonan Syndrome.
Noonan syndrome is a dysmorphogenetic condition associated with multiple congenital anomalies including dysmorphic facial features, short stature, chest deformity and cardiac abnormality. A behavioral phenotype characterized by clumsiness, irritable behavior, stubbornness and difficulties with communication has been suggested. We describe a case of a $19\frac{1}{2}$-year-old female with normal verbal intelligence and specific cognitive deficits suggestive of substantial visual–spatial disorder. This was accom-

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

panied by behavioral disturbances that included severe difficulties with understanding the implications of actions, concrete thinking, perseveration, organizational problems and difficulty reading the intentions of others. Overall, the pattern strongly resembled a nonverbal learning disability. The etiologic basis of the visual–spatial disorder and the relationship to the behavioral phenotype will be discussed. Correspondence between Noonan syndrome and other dysmorphogenetic disorders will be addressed.
Correspondence: *Gerry Stefanatos, Center for Clinical and Developmental Neuropsychology, Thomas Jefferson University, 1201 Chestnut Street, Suite 400, Philadelphia, PA 19107, USA.*

B. KLEIN, B. LEVIN, M. DUCHOWNY, S. HARVEY, J. BRUCE, & H. KATZEN. Cognitive outcome of Unilateral Developmental Lesions in Children with Epilepsy.
Children with intractable epilepsy provide an important opportunity to investigate the relationship between developmental lesions acquired *in utero* and cognitive outcome. Forty-seven pediatric patients underwent cortical resection and were grouped according to type of developmental lesion: cortical dysplasia *versus* mass lesions. ANOVA analyses revealed that subjects with mass lesions performed significantly better on a standardized IQ test than subjects with cortical dysplasia, and that subjects with right hemisphere lesions performed significantly better than subjects with left hemisphere lesions on verbal measures of intellectual functioning. These data indicated that circumscribed mass lesions have a less deleterious effect on cognitive development compared to diffuse brain involvement, and support the functional specialization hypothesis which holds that anatomical and functional asymmetries are already specified in intrauterine life.
Correspondence: *Bonnie Levin, Division of Neuropsychology, Department of Neurology, 1150 N.W. 14th Street, Suite 715, Miami, FL 33136, USA.*

L.K. PAUL, K.B. BOONE, A. LEE, B.L. MILLER, A. HADDAL, & R. SWERDLOFF. Neurocognitive Profile of Adults with Klinefelter's Syndrome.
Klinefelter's syndrome (KS) is a congenital disorder that has been associated with behavior problems and language learning disorders in children, but has not previously been examined in adults. This study examined the neuropsychological performance of 25 adults with KS. The results indicate that in adulthood individuals with KS continue to exhibit language related learning disabilities, as well as mild to moderate impairments in other cognitive domains.
Correspondence: *Lynn K. Paul, 170 S. Madison Avenue, #14, Pasadena, CA 91101, USA.*

J. SCHOENFELD, C. INGLESE, K. HECOX, K. MACK, A. WOODARD, B.P. HERMANN, & M. SEIDENBERG. Neuropsychological Status and Behavioral Adjustment in Children with Complex Partial Seizures.
Neuropsychological functioning and behavioral adjustment was examined in 57 children with complex partial seizures (CPS) and compared with the performance of an age- and sex-matched group of 27 sibling controls. A robust epilepsy effect emerged for both neuropsychological status and behavioral adjustment. Age of recurrent seizure onset and active seizure duration emerged as the strongest correlates of neuropsychological performance; later age of onset and less seizure activity were associated with better scores. There was also a higher incidence of comorbid diagnosis of attention deficit disorder in the CPS group which was associated with poorer neuropsychological performance and increased problems in behavioral adjustment.
Correspondence: *Michael Seidenberg, Department of Psychology, FUHS/The Chicago Medical School, 3333 Green Bay Road, North Chicago, IL 60064, USA.*

K.O. YEATES, N. LOSS, & B. ENRILE. Memory Functioning as a Predictor of Academic Achievement in Children with Myelomeningocele and Normal Siblings.
This study examined the relationship between memory test performance and academic achievement among 63 children with myelomeningocele (MM) and 27 of their siblings, all between 8 and 15 years of age. They completed the WISC–III, California Verbal Learning Test (CVLT–C), WRAML Story Memory subtest, and the Wechsler Individual Achievement Test-Screener (WIAT–S). Hierarchical regression analyses were conducted using WIAT–S subtests as dependent variables. Predictors included group membership, CVLT–C total recall, WRAML Story Memory recall, and Performance IQ (PIQ), as well as interaction terms. Memory test performance was a significant predictor of academic achievement among children with MM and their siblings. Among children with MM, story recall was a significant predictor of all three WIAT–S subtests when controlling for PIQ. Among siblings, story recall was a significant predictor only of mathematical reasoning. Word list learning predicted reading and spelling in both groups, but did not predict spelling after controlling for PIQ. The results support the ecological validity of memory testing in children.
Correspondence: *Keith O. Yeates, Department of Psychology, Children's Hospital, 700 Children's Drive, Columbus, OH 43205, USA.*

M. NORTZ, D. WHITE, B. DOWTON, & R. STEINER. Nonverbal Memory and Strategy Use in Children with Prefrontal Dysfunction Related to Phenylketonuria.
Phenylketonuria (PKU) is a disorder characterized by monoamine depletion due to insufficient phenylalanine metabolism. Impaired verbal learning and strategy use without impaired retention and recognition have been identified in PKU children and in other populations with prefrontal dysfunction. In this study, we assessed nonverbal memory and strategy use in PKU children using the Boston Qualitative Scoring System for the Rey–Osterrieth Complex Figure. PKU children exhibited inefficient strategy use while copying the figure but showed intact memory for figure elements. This inefficient use of encoding strategies was, however, associated with distortion of the figure's gestalt at recall. The current findings support previous evidence of deficits in learning and strategy use related to neurochemically mediated prefrontal dysfunction and extend previous findings in PKU children to the nonverbal domain.
Correspondence: *Marsha J. Nortz, Box 1125, Washington University, St. Louis, MO 63130, USA.*

PSYCHOPATHOLOGY

S.K. HILLIS & M. CROSSLEY. Neuropsychological Concomitants of Major Depression.
The nature, extent and cause of the cognitive changes associated with major depression are of interest to neuropsychologists. In the present study, young well-educated, nonpsychotic individuals ($N = 16$) diagnosed with major depression and normal controls ($N = 16$) completed a dual-task paradigm combining cognitive tasks and speeded finger tapping. The experimental data confirm that there are attentional changes associated with major depression. These include compromised ability to sensitively shift attentional resources in response to task demands when performing a verbal task, and a capacity limitation that is specific to processing spatial information. In addition, depressed participants had minimal performance deficits on standardized neuropsychological tests, a finding that contrasts sharply with subjective impression of cognitive loss by the same participants.
Correspondence: *Sarah Hillis, Department of Clinical Health Psychology, 103 Hospital Drive, Royal University Hospital, Saskatoon, SK S7N 0W8, Canada.*

P.F. MALLOY, M.S. ALOIA, S. RASMUSSEN, & M. JENICKE. Neuropsychological Effects of Gamma Knife Capsulotomy for Intractable OCD.
Of all surgical procedures investigated for the treatment of intractable OCD, anterior capsulotomy has been the most successful. Capsulotomy is thought to disrupt frontal–subcortical pathways considered dysfunctional in OCD. We tested 16 OCD patients before and after Gamma knife capsulotomy. Tests consisted of neuropsychological measures and traditional measures of symptom severity. Patients did not show any significant cognitive de-

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

cline as a result of the surgery. They significantly improved in verbal fluency, naming, IQ, and memory. Patients symptom severity also decreased significantly. Change in symptom severity was correlated with IQ and delayed recall. Overall, capsulotomy appears to be a safe and effective treatment for these patients. However, correlational analyses indicated that symptom change could only partially account for neuropsychological improvement after surgery.
Correspondence: *Paul F. Malloy, Butler Hospital and Brown University School of Medicine, 345 Blackstone Boulevard, Providence, RI 02906, USA.*

J. DUNKIN, I.A. COOK, A.F. LEUCHTER, J. KASL-GODLEY, M. ABRAMS, B. BETZ, & C. ANDERSON-HANLEY. Executive Systems Dysfunction Predicts Nonresponse to Fluoxetine in Major Depression.
For the past decade, studies have implicated dorsolateral prefrontal cortex-basal ganglia circuits in the etiology of major depression. We sought to determine whether major depression would be associated with specific deficits in frontal lobe skills and develop a theoretical model of the neuropsychology of depression that would integrate prior brain imaging findings with cognitive data. Prior to treatment, twenty subjects with major depression were administered a full neuropsychological battery. Treatment nonresponders performed significantly poorer relative to responders on baseline measures of executive systems functioning. Results support the hypothesis that some depressed subjects demonstrate executive systems deficits and that this impairment appears to predict response to treatment. Thus, deficits in executive functioning may identify patients with abnormalities in brain function that may interfere with treatment response.
Correspondence: *J. Dunkin, UCLA NPI 37-439, 760 Westwood Plaza, Los Angeles, CA 90024, USA.*

P.S. FASTENAU, I.C. SMET, B. GIORDANI, A.C. MILLER, R. TANDON, & S. BERENT. Spared Visual–Spatial Recall and Recognition in Medically Refractory Depression.
In depression, free recall is impaired whereas recognition is preserved when using auditory–verbal stimuli. This pattern has not been established using visual–spatial stimuli, however. To examine the effects of clinical depression on free recall and recognition for visual–spatial information, we compared 32 medicated depressed patients (BDI, 25.5 $\pm$ 11.9) and 32 nondepressed controls (BDI, 5.2 $\pm$ 4.3) who were matched on age (58.1 $\pm$ 13.6), years of education (14.3 $\pm$ 2.5), and sex (66% female). The groups did not differ on recognition and recall trials ($p > .10$). They differed on matching-to-sample only ($p < .0005$), a difference that was attenuated but not eliminated after controlling for attentional deficiencies. These findings have implications for assessment and for neural modeling of the interface between depression and cognition.
Correspondence: *Philip S. Fastenau, Department of Psychology, LD 124, 402 North Blackford Street, Indiana University and Purdue University, Indianapolis, IN, 46202-3275, USA.*

L. CONANT, B. GIORDANI, M. NAYLOR, F. GRADSTEIN-KARO, & C. KING. Eating Disorders and Cognition: Comparison of Adolescents and Adults with Anorexia Nervosa or Bulimia Nervosa.
The purpose of the current investigation is to examine the similarities and differences in the neuropsychological performance of adolescent and adult anorexic (AN) and bulimic (BN) women. The participants were 23 adolescent AN, 19 adult AN, 10 adolescent BN, and 37 adult BN inpatients. An ANOVA indicated that both AN and BN adults reported more emotional distress than adolescents. Separate MANOVAs indicated that there were no age or diagnostic group effects on tests of verbal abilities, but there were significant interaction effects for measures of primary and secondary memory as well as visuospatial reasoning. Whereas AN adolescents performed better on such tasks than BN adolescents, BN adults surpassed AN adults. These interactions may suggest long-term detrimental effects of AN and may help explain conflicting findings previously reported.
Correspondence: *Lisa Conant, Neuropsychology Division, University of Michigan, 480 Med Inn Building, Box 0840, 1500 East Medical Center Drive, Ann Arbor, MI 48109, USA.*

L.M. GRATTAN, K.S. MARTINKOWSKI, J.E. HERRON, J.K. TRACY, & T.R. PRICE. Positive Personality Change After Right Middle Cerebral Artery Infarction.
Little is known about the distinguishing features of those individuals with positive personality changes and adjustment post-stroke. Patient L.U., a 56-year-old, right handed professional woman with self-reported positive personality change after a right MCA (involving frontal, temporal, and parietal–occipital regions) was studied. Post-stroke, L.U. demonstrated disinhibition in social situations and a significant increase in her use of humor. General intellect, attention and concentration, language, and verbal memory were intact. Performance on measures of visual memory, visuospatial judgement and the WCST was impaired. Personality testing (NEO) indicated an increase in Extroversion post-stroke and the COPE identified humor and acceptance as primary coping mechanisms. Disinhibition may be viewed as positive in a premorbidly introverted individual if mechanisms of social self-awareness and self-monitoring remain intact.
Correspondence: *Lynn Grattan, Department of Neurology, University of Maryland Medical Center, Baltimore, MD 21201, USA.*

C. ANDERSON-HANLEY, J. DUNKIN, I.A. COOK, A.F. LEUCHTER, M. ABRAMS, & J. KASTLE-GODLY. Frontal Brain Activation and Asymmetry Abnormalities in Depressed Patients with Executive Function Compromise.
The neurobiological basis of depression related cognitive impairment is unclear; the basis for compromise in executive function that can appear in patients with major depression remains unknown. A decrease in metabolism has consistently been found in the left dorsolateral prefrontal cortex of depressed subjects. Sixteen depressed subjects were assessed using quantitative EEG and neuropsychological measures of executive function (Wisconsin Card Sort, Stroop Color–Word task, Trails B, and FAS–Word Fluency). The findings in the alpha band are largely consistent with results of previous research and suggest that frontal asymmetry is related to compromised brain function. The neuropsychological measures that appear to most clearly tap inhibiting aspects of executive functioning were significantly and negatively related to hypoactivation in the left prefrontal region.
Correspondence: *Cay Anderson-Hanley, Geriatric Psychiatry, NPI (37-425), University of California, Los Angeles, 760 Westwood Plaza, Los Angeles, CA 90024-1759, USA.*

R. LAJINESS-O'NEILL, J.K. ZUBIETA, M. KILBOURN, K. FREY, R. KOEPPE, & B. GIORDANI. Increased Monoaminergic Synaptic Density in Bipolar Disorder Measured with [^{11}C]dihydrotetrabenazine and PET: Relationship to Neuropsychological Functioning.
The purpose of this study was to test the hypotheses that bipolar disorder may be characterized by an abnormally high density of monoaminergic synaptic terminals and that neuropsychological test performance would be related to the brain regions characterized by increased synaptic terminal densities. Terminal density was measured using the vesicular monoamine transporter (VMAT2) marker (+) [^{11}C]dihydrotetrabenazine (DTBZ) and positron emission tomography (PET). Five euthymic Familial Bipolar I patients were age, sex, and education-matched with healthy control subjects (mean age = 32.2 years). Unpaired, two-tailed *t* tests revealed significantly higher [^{11}C]DTBZ binding in bipolar patients compared to controls in the medial temporal cortex bilaterally and thalamic region, with trends in the amygdala region. The increase in the density of VMAT2 binding in bipolar illness was associated with poorer performance on tests sensitive to attention, verbal memory, motor skills and simultaneous processing (e.g., Logical Memory, Paired Associates, Digit Span, Stroop Test). This data supports the hypothesis that bipolar disorder is characterized by brain regional anomalies either in the formation or postnatal, programmed elimination of synaptic formations, and suggests a possible trait marker for this illness.
Correspondence: *Renee Lajiness-O'Neill, Neuropsychology Division, C-480 Med Inn Building, Box 0840, University of Michigan Medical Center, 1500 East Medical Center Drive, Ann Arbor, MI 48109-0840, USA.*

D. KAREKEN, A. HAKE, A. CHEN, & M. FARLOW. "Singing in the Brain": Compulsive Singing in Postencephalitic Dementia and Obsessive Compulsive Disorder.
A 39 year old, right handed woman began singing her speech 6 weeks after developing Herpes encephalitis. This continued without interruption for 2 weeks before recurrent encephalitis brought mental status decline. Rather than resembling a particular melody, her speech prosody was stereotyped, repetitive, and similar to how opera singers or musical actors speak lines melodically ("sing-song," or *recitative*). Other compulsive behaviors included hand-washing and counting. Magnetic resonance imaging revealed hyperintense areas of signal in the orbital and medial frontal lobes, and in the anterior temporal lobes. Functional and structural imaging of obsessive compulsive disorder (OCD) has shown abnormalities in the basal ganglia, and orbital- and mesial-frontal regions. This patient may have neurologically induced OCD from defective inhibitory mechanisms mediated by orbital frontal regions.
Correspondence: *David A. Kareken, Department of Neurology (RI 3751), Indiana University School of Medicine, Indianapolis, IN 46202, USA.*

L. TIERSKY, J. DeLUCA, N. HILL, V. SCAVALLA, & B. NATELSON. Longitudinal Assessment of Neuropsychological Functioning in Chronic Fatigue Syndrome (CFS).
In the present investigation the subjective and objective neuropsychological functioning of individuals with chronic fatigue syndrome (CFS) was investigated longitudinally. A sample of 29 subjects, who initially met the 1988 CFS case definition criteria, were evaluated 2 to 4 years following their initial participation in a study that investigated neuropsychological functioning in individuals with CFS. The findings of the present investigation indicated that subjects significantly improved on a measure of complex information processing. Moreover, significant improvement was noted on measures of subjective cognitive functioning and mood. At follow-up, 28 subjects continued to meet the 1988 case definition criteria with 1 subject demonstrating complete recovery. The results of the present investigation suggest that over time, cognitive functioning improves in CFS.
Correspondence: *Lana A. Tiersky, EO-VAMC, 385 Tremont Avenue, #127A, East Orange, NJ 07018, USA.*

S. J. SEGALOWITZ, H. CHEVALIER, L. ROSE-KRASNOR, & R. NADON. ERP Correlates of Neuroticism, Extraversion and Shyness.
Childhood temperament theory suggests that a tendency towards behavioral inhibition is a result of high nervous system reactivity. In applying this model to adults, we found earlier that adult shyness is significantly correlated with P3 amplitude of the ERP. The current study replicates and extends these findings. We presented standard auditory and visual oddball paradigms to 36 young adult women representing a large range on scales of neuroticism and extraversion–introversion, and related their ERP components to their scores on neuroticism, extraversion–introversion, and situational inhibition (shyness). We found that situational inhibition related to P3 amplitudes and latencies, neuroticism related to N1 amplitudes, but extraversion did not relate to any of the ERP components. There were also modality effects. Implications for cortical *versus* subcortical correlates of these personality constructs are discussed.
Correspondence: *Sidney J. Segalowitz, Department of Psychology, Brock University, St. Catharines, ON L2S 3A1, Canada.*

SCHIZOPHRENIA-1

K. BREHENY & L. BURTON. The Performance of Schizophrenics and Head Trauma Patients on the Wisconsin Card Sorting Test.
The Wisconsin Card Sort performance of 20 head trauma and 12 schizophrenic patients was evaluated. Of the 20 head trauma patients in this study, 8 showed clear evidence of frontal lobe damage on either a CT Scan or MRI. The present study found trends for the schizophrenic patients to make *more* perseverative errors and *more* perseverative responses than the head trauma patients (40% of whom had clear evidence of frontal lobe damage). These data lend support to the idea of frontal lobe dysfunction in schizophrenia. Other contributing factors are discussed.
Correspondence: *L. Burton, Psychology Department, Fordham University, 441 East Fordham Road, Bronx, NY 10458, USA.*

Y. BATTLE, T.L. WALDECK, & L.S. MILLER. Proprioceptive Deficits in Schizophrenia and Its Relationship to Neuroleptic Medication.
We examined the effects of haloperidol, clozapine, and psychopathological dysfunction on proprioception in schizophrenia. Proprioceptivity was quantified into a measure of force accuracy. Data were collected on 30 schizophrenics (15 haloperidol, 15 clozapine) and 21 controls. Statistical tests revealed significant differences between haloperidol, clozapine and control groups for right (ANOVA, $F = 3.83$, $p < .03$) and left (ANOVA, $F = 4.67$, $p < .01$) hands. *Post hoc* tests (Scheffé) showed significant differences between haloperidol and control groups independent of age effects for both right (ANOVA, $F = 5.44$, $p < .03$) and left (ANOVA, $F = 12.19$, $p < .001$) hands. No significant differences were found between clozapine and control groups, and nonsignificant trends were found between haloperidol and clozapine groups. Results suggest force displacement as useful in detecting neuroleptic effects on motor function.
Correspondence: *Yusef Battle, Department of Psychology, University of Georgia, Athens, GA 30602-3013, USA.*

P. BRUGGER & R.E. GRAVES. Associative Processing and Magical Belief.
In schizophrenia, individuals may subjectively find strong connections between ideas/events that others see as nonassociated. Similarly, normals vary dramatically in belief in "paranormal" (ESP) or magical forces (superstitions). We test a theory that these phenomena result from individual variation in a basic cognitive process, the perceived strength of semantic association between objectively neutral stimuli. A list of 101 word pairs was presented to 34 students, whose task was to rate the semantic distance between the two words. Subsequently, the raters filled in the "Magical Ideation" scale, which inquires about superstitious and ESP type beliefs. As predicted, higher mean semantic closeness rating correlated with a higher number of "magical" beliefs, $r = .38$, $p = .028$.
Correspondence: *R.E. Graves, Department of Psychology, P.O. Box 3050, University of Victoria, Victoria, BC V8W 3P5, Canada.*

B.W. PALMER, R.K. HEATON, J.D. EVANS, & D.V. JESTE. Functional Status of Older Schizophrenia Patients: Relationships to Neuropsychological and Psychiatric Characteristics.
The relationships of neuropsychological (NP) performance and psychiatric symptoms to functional status were examined in a sample of 55 older, clinically stable schizophrenia outpatients. Functional status (employment history, driving status, and independence in living) was significantly correlated with global NP performance. The specific NP ability areas that tended to have the strongest relationships to functional status included attention, motor skill, perceptual–motor skill, and abstraction–cognitive flexibility. Among psychiatric symptoms, negative symptoms had the strongest relationship to driving and independence in living, whereas, global psychopathology and severity of depressive symptoms had the strongest correlations with employment history. Results of stepwise regression analyses suggested that the relationship between NP ability and functional status was at least partially independent of psychiatric symptoms.
Correspondence: *Barton W. Palmer, University of California, San Diego, VA Medical Center 116A-1, 3350 La Jolla Village Drive, San Diego, CA 92161, USA.*

B.W. PALMER, R.K. HEATON, & D.V. JESTE. The Association Between Extrapyramidal Symptoms and Neuropsychological Deficits in Older Schizophrenia Patients.
The relationship between extrapyramidal symptoms (EPS) and neuropsychological (NP) functioning was examined in a sample of 98 middle-aged and elderly outpatients with schizophrenia. EPS were associated with worse NP performance; the strongest correlations with EPS were in the areas of

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

learning and motor skill, as well as a global NP performance. Results from stepwise regression analyses suggested that neither mental processing speed, nor any demographic, psychopathologic, or medication status variable accounted for the association between EPS and NP deficits. Possibilities of a common neurophysiological basis for EPS and NP deficits in schizophrenia are discussed.
Correspondence: *Barton W. Palmer, University of California, San Diego, VA Medical Center 116A-1, 3350 La Jolla Village Drive, San Diego, CA 92161, USA.*

E. GRANHOLM, D. CHOCK, & S. MORRIS. Phonologic and Semantic Verbal Fluency are not Differentially Impaired in Schizophrenia.
Studies have found impaired letter or phonologic fluency (timed generation of words beginning with a specific letter) and category or semantic fluency (words describing exemplars of a semantic category) in schizophrenia patients. However, studies have not directly compared the relative severity of impairment for these two types of fluency. We attempted to replicate a recent study by Gourovitch, Goldberg, & Weinberger, who found better letter than category fluency in schizophrenics, whereas normals showed the opposite pattern of performance. However, in our study, although 15 patients with schizophrenia showed significantly impaired overall fluency relative to 15 age-matched normal controls, both groups showed better category than letter fluency and the two types of fluency were not differentially impaired in the two groups. These findings do *not* suggest a breakdown in automatic spreading of activation in the semantic network, and can be explained by an impairment in executive–frontal controlled search and retrieval processes.
Correspondence: *Eric Granholm, VA San Diego Healthcare System (116B), 3350 La Jolla Village Drive, San Diego, Ca 92161, USA.*

S.P. VERNEY & E. GRANHOLM. Span of Apprehension Task Performance Does not Support a Dementia Hypothesis in Schizophrenia.
A meta-analysis review of the literature concerning the early visual information processing deficits of schizophrenics on a well-studied task, the span of apprehension task (SOA), was conducted. Thirteen cross-sectional SOA studies comparing schizophrenia patients with age-matched nonpatient controls at all stages of life (childhood through late-life) were identified and effect sizes, *d*s, were obtainable for 12 of the studies. Schizophrenia patients across the lifespan demonstrated an overall effect size of 1.0, as compared to age-matched nonpatient controls. Neither linear not quadratic regressions of age with *d* scores were significant in describing the lifespan visual information processing changes in schizophrenia, indicating the stability of these deficits. These data suggest that the SOA task taps a stable cognitive trait of schizophrenia and are *not* suggestive of a dementia process in schizophrenia.
Correspondence: *Steven Verney, SDSU/UCSD Joint Doctoral Program in Clinical Psychology, 6363 Alvarado Court, Suite 103, San Diego, CA 92120-4913, USA.*

S. BERNS, J. JAEGER, P. FREYEISEN, S. PANOPOULUS, & E. DOUGLAS. Neuropsychological Deficits and Functional Disability in Patients with Schizophrenia.
Difficulty in living independently is the most costly aspect of schizophrenia both in economic and personal terms and what causes this disability is largely unknown. Rehabilitation programs and pharmacologic treatments have been only minimally successful in improving independent functioning (IF). While neuropsychological (NP) deficits such as impairment in attention, memory, and executive functioning are known to be prevalent in schizophrenia, their contribution to IF has barely been explored. This study assessed patients with schizophrenia, age 18 to 45, on a set of NP tests, psychopathological symptom ratings, and IF measures. The primary hypothesis is severity of NP deficits will be correlated with IF. A significant relationship between specific NP deficits and IF would provide a guide for the development of more effective interventions.
Correspondence: *Stefanie Berns, Hillside Hospital, Department of Psychiatric Rehabilitation, 75-59 263rd Street, Glen Oaks, NY 11004, USA.*

R.S. GOLDMAN, R.M. BILDER, E. PAPPADOPULOS, & J. ALVIR. Neuropsychological Prediction of Functional Outcome in First-Episode Schizophrenia.
The present study examined the relative contribution of neuropsychological function and degree of symptomatic resolution in the prediction of functional outcome in patients with schizophrenia. The patients in this study were undergoing treatment and follow-up subsequent to their first-episode of illness. Neuropsychological and symptom measures at 6 months were used as predictors in a series of multiple regression analyses to functional outcome at 2 years and 5 years following illness onset. The findings demonstrated that the integrity of attentional function was the neuropsychological domain most associated with functional outcome. Neuropsychological function was superior to degree of symptom resolution in the prediction of functional outcome. The present study suggests that cognitive deficits are distinct characteristics of the disorder and may be essential targets for intervention.
Correspondence: *Robert S. Goldman, 75-59 263rd Street, Glen Oaks, NY 11004, USA.*

V.N. IANNONE, J.M. GOLD, & R.W. BUCHANAN. Cognitive Determinants of Vocational Outcome in Schizophrenia.
This study was designed to examine the role of neuropsychological performance in mediating vocational outcome in patients with schizophrenia. We contrast the performance of 13 patients who have held competitive employment ($>$ 20 hr/wk for more than 75% of the last 2 years) to a control group of 27 patients drawn from the same treatment setting. There were striking cognitive differences between the outcome groups across a board neuropsychological battery. Due to group differences in level of education, a more careful individual matching analysis (by age, sex, race, and education) revealed a prominent role for working memory and social reasoning in mediating good outcome. The results suggest that some cognitive deficits are associated with the presence of illness, while others may mediate functional outcome.
Correspondence: *James M. Gold, Maryland Psychiatric Research Center, Outpatient Research Program, P.O. Box 21247, Baltimore, MD 21228, USA.*

S. MORRIS, J.M. OLICHNEY, V. J. IRAGUI, M. KUTAS, R. NOWACKI, & D.V. JESTE. Association of P300 and N400 Event-Related Potentials (ERPs) with Negative Symptoms and Cognitive Performance in Middle-Aged and Elderly Schizophrenia Patients.
We explored the relationship of the P300 and N400 Event-Related Potentials (ERPs) to category fluency, letter fluency, global cognition, and negative symptoms in 24 middle-aged and elderly schizophrenia outpatients. Prior studies have shown that schizophrenia patients have abnormalities of both the P300 and N400, perhaps related to impaired allocation of attentional resources and impaired modulation of semantic expectancy, respectively. We expected that reductions in both the P300 amplitude and the N400 amplitude would predict severity of cognitive impairment and negative symptoms. Also, we expected the amplitude and latency of the N400 congruity effect would predict verbal fluency. Forward step-wise multiple regression analyses showed that the amplitude of the N400 congruity effect predicted significant variance in negative symptoms and global cognition, whereas P300 latency predicted significant variance in category and letter fluency. A total of 71% of these patients had either an abnormal P300 or N400 waveform. These findings suggest that, within a group of schizophrenia patients, cognitive ERP abnormalities are significantly associated with negative symptoms and specific cognitive impairments.
Correspondence: *Shaunna Morris, University of California, San Diego, VA Medical Center 116A-1, 3350 La Jolla Village Drive, San Diego, CA 92161, USA.*

M.R. BASSO, H.A. NASRALLAH, S.C. OLSON, & R.A. BORNSTEIN. Negative and Disorganized Symptoms Predict Neuropsychological Deficit in Schizophrenia.
Recent studies suggest that three symptom dimensions (psychotic, disorganized, and negative) categorize schizophrenic subsyndromes. A developing literature indicates distinct cerebral correlates of each symptom

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

cluster, but few investigations have determined their neuropsychological correlates. In the present study, symptoms of 62 schizophrenics were assessed using the Schedules of Negative and Positive Symptoms, and subsequent factor analysis revealed three symptom dimensions. Factor scores, chlorpromazine dosage, age, education, and chronicity of illness, were entered into hierarchical multiple regression equations that predicted performance on a broad neuropsychological battery. Negative symptoms predicted intellectual, executive function, attention, and sensory deficits, whereas disorganized symptoms predicted intellectual, attention, and motor impairment. Psychotic symptoms predicted fewer executive function and sensory deficits. These data support hypotheses that these three symptom dimensions have distinct neurobehavioral correlates.
Correspondence: *M.R. Basso, Department of Psychology, University of Tulsa, 600 South College Avenue, Tulsa, OK 74104, USA.*

TRAUMATIC BRAIN INJURY-1

D.E. TRAHAN & C. ROSS. Base Rates of Postconcussional Symptoms in Neurologically Normal Young Adults.
This study reports data from a continuing examination of base rates of postconcussional symptoms in neurologically normal adults. An initial sample of 179 participants completed the Beaumont Post-concussional Symptom Index. This index surveys rate of endorsement of postconcussional symptoms, considering intensity and duration of symptoms as well as frequency of occurrence. Data are reported for the Post-concussional Index (PCI), as well as for a Headache Index (HI) and Sleep Index (SI). Data revealed a low level of overall symptomatology when intensity and duration were considered along with frequency. These data allow direct comparisons of symptoms reported by victims of head trauma with those of neurologically normal adults.
Correspondence: *Donald E. Trahan, Center for Behavioral Studies, 3560 Delaware, Suite 105, Beaumont, TX 77706, USA.*

D.E. TRAHAN & C. ROSS. Relationship Between Postconcussional Symptoms, Anxiety, and Depression in Normal Adults.
This study examined the relationship between postconcussional symptoms and measures of depression and anxiety in neurologically normal adults. An initial sample of 179 participants completed the Beaumont Post-concussional Symptom Index, the Beck Depression Inventory–2, and the Beck Anxiety Inventory. Results revealed a low rate of endorsement of postconcussional symptoms, when intensity and duration were considered along with frequency of occurrence. Correlations between Post-concussional Index scores and Beck Depression and Anxiety Inventory scores were .69 and .60, respectively. Both correlations were significant. While these findings underscore the importance of considering the role that psychological factors may have in exacerbating and maintaining postconcussional symptoms, the findings of such high correlations in neurologically normal adults would suggest that this relationship is not unique to victims of head trauma.
Correspondence: *Donald E. Trahan, Center for Behavioral Studies, 3560 Delaware, Suite 105, Beaumont TX 77706, USA.*

C. PANIAK, J. MacDONALD, G. TOLLER-LOBE, A. STOCK, & J. NAGY. Investigation of Recently Proposed Criteria for Diagnosing Mild Traumatic Brain Injury.
The purpose of this study was to investigate the diagnostic criteria for mild traumatic brain injury (MTBI) proposed by the American Congress of Rehabilitation Medicine (Kay et al., 1993). Participants were 119 adults, drawn from consecutive admissions to two hospital emergency wards, who were diagnosed using the aforementioned MTBI criteria. Results showed that retrograde amnesia did not occur without PTA, alteration in mental state infrequently occurred without PTA or LOC, and almost all patients suffered a blow to the head. "Normative data" from the sample are presented to assist in the diagnosis of individual MTBI patients.
Correspondence: *Chris Paniak, Psychology Service, Glenrose Rehabilitation Hospital, Edmonton, AB T5G 0B7, Canada.*

L.M. McGUIRE, P.J. DONOVICK, R.G. BURRIGHT, & R. WILLIAMS. Prevalence of Head Injury in Psychiatric Patients, Medical Patients, and Staff and Students.
Head injury (HI) may play a role in the emergence, expression, and treatment outcome of psychiatric disorders. Few estimates of prevalence of HI with loss of consciousness exist for the general population or psychiatric patients. This study examined prevalence of HI in patients from several mental health settings, patients from a nonpsychiatric general medical clinic, and hospital and university staff and students. The percentage of subjects reporting HI was greatest in psychiatric patients. Multiple injuries were reported, across a range of HI situations, and the severity of HI was typically mild to moderate.
Correspondence: *Lynanne McGuire, Psychology Department, Binghamton University, Binghamton, NY 13902-6000, USA.*

M.M. BRULOT, J.M. SAWCHYN, & E.H. STRAUSS. Subtle Effects of Self-Reported Repeated Mild Head Injury in a University Sample.
Subtle effects of mild head injury (HI) were investigated in 436 university undergraduates. Approximately 18% of students reported at least one HI while 7.6% reported more than one HI (Total = 25.7%). Although men and women were equally likely to report sustaining one HI, men reported more repeated head injuries. Effects of repeated HI were investigated by comparing No HI, 1 HI, > 1 HI groups on the Beck Depression Inventory (BDI), Dysexecutive Questionnaire (DEX), and Postconcussion Syndrome Checklist (PCSC). No significant group differences were obtained, but a gender effect was noted. Females endorsed more complaints on the BDI and PCSC, and males endorsed more problems on the DEX. These results contrast with previous research findings of increased self-reported depression in relatively high functioning individuals with HI.
Correspondence: *Magali Brulot, Department of Psychology, University of Victoria, P.O. Box 3050, Victoria, BC V8W 3P5, Canada.*

S.R. KESLER, H.A. FOLEY, & E.D. BIGLER. Relationships Between Brain Abnormalities and Cognitive–Neurobehavioral Symptoms in Traumatic Brain Injury (TBI) Using Single Photon Emission Computed Tomography (SPECT), Clinical (MRI) and Quantitative (QMR) Magnetic Resonance.
SPECT, MRI, QMR and neuropsychological findings were compared in 48 TBI patients. Fifty-eight percent of patients had abnormal SPECT, 58% had abnormal MRI, and 31% had abnormal QMR volumes. Mean general memory index was within normal limits ($M = 92$, $SD = 14$). There were no significant differences between memory indices for patients with imaging abnormalities compared to patients with normal imaging results. The correlation between number of SPECT abnormalities and visual memory indices was significant ($r = -.24$, $p = .05$). Mean SCL-90 GSI was 65 ($SD = 12$), indicating clinically significant distress. The relationship between GSI and number of SPECT abnormalities was also significant ($r = .33$, $p = .02$). Of note, the correlation between general memory and number of QMR abnormalities approached significance ($-.24$, $p = .07$).
Correspondence: *Shelli R. Kesler, 284 TLRB, Brigham Young University, Provo, UT 84602, USA.*

G. IVERSON, M. LOVELL, S. SMITH, & M. FRANZEN. Base Rate of Abnormal CT Scans Following Mild Head Injury.
The purpose of this study was to examine the base rate of day-of-injury intracranial abnormalities in a large sample of patients with mild head injuries who were admitted to a trauma service. These data are unique in that all patients seen in the emergency department of this hospital who have any indication of possible head injury undergo CT scanning. There were 620 patients who obtained admission Glasgow Coma Scale (GCS) scores of 13–15. The base rate of complicated mild head injuries (i.e., abnormal CT scans) in this sample was 20%. There was tremendous overlap in injury characteristics between patients with complicated and uncomplicated mild head injuries. Nonetheless, there were modest, yet statistically significant, relationships between the presence of CT abnormalities and lower GCS scores, greater frequency of positive loss of consciousness, and

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

lower GOAT scores. There was no relationship between skull fracture and complicated mild head injury.
Correspondence: *Grant Iverson, Department of Psychiatry, University of British Columbia, 2255 Wesbrook Mall, Vancouver, BC V6T 2B4, Canada.*

E. HERON, E. FIEDLER, & H. HILL. Recovered Head Injury: Cognitive Status *Versus* Stress Resilience.
Ninety subjects from a sample 2,237 Air Force recruits reported a history of prior head injury (HI). We compared these subjects to their noninjured peers in regard to cognitive performance, usage of medical services, and resilience to military stressors. No difference in cognitive scores or number of outpatient medical visits was found, but HI subjects were significantly more likely to fail basic training, receive early discharges from the military, and be discharged for mental health reasons. We hypothesize that noncognitive factors continue to influence a HI victim's adaptability to stress long after they have apparently recovered.
Correspondence: *Elizabeth Heron, 8929 Willmon Way, San Antonio, TX 78239, USA.*

F.C. GOLDSTEIN, H.S. LEVIN, A.N. CLARK, & T. KENEHAN. Depression and Cognitive Functioning in Older Adults with Traumatic Brain Injuries.
This study examined the relationship between depression and cognitive outcome in older adults with traumatic brain injuries (TBI). Twenty-five TBI patients ≥50 years old were administered the Geriatric Depression Scale and measures of overall cognitive status, attention, memory, language, and visuospatial functioning approximately 1 month postinjury and again at 7 and 13 months postinjury. The degree of self-reported depression was not strongly related to initial cognitive outcome but did emerge as a predictor of attentional and memory performance at both follow-up occasions. These findings highlight the importance of early identification and treatment of depression in TBI patients.
Correspondence: *Felicia C. Goldstein, Department of Neurology, Wesley Woods Health Center, 1841 Clifton Road, N.E., Atlanta, GA 30329, USA.*

P. TATE, C. BOMBARDIER, D. FREED, & S. HARTER. The Effects of Blood Alcohol Level at Time of Traumatic Brain Injury on Wisconsin Card Sort Test Performance.
Deficits in higher order cognitive functions (abstraction, concept formation, mental flexibility) are common sequelae of TBI and chronic alcohol abuse. Although alcohol intoxication has been determined to play a prominent role in the incidence of traumatic brain injuries (TBI), few studies have been conducted to examine the impact of blood alcohol levels at time of TBI on severity of cognitive impairment. A study was conducted examining the relative influence of blood alcohol level (BAL) on three indices of the Wisconsin Card Sort Test for TBI patients during the post-acute stage of recovery. Hierarchical regression analyses reveal that BAL was a significant predictor of the number of perseverative errors made and neared significance for number of failures to maintain set. It was not associated, however, with number of categories achieved.
Correspondence: *Phillip S. Tate, Veterans Affairs Puget Sound Health Care System: American Lake Division (GRECC 182B), Tacoma, WA 98493, USA.*

K. BAKER, C. BOLIEK, G. MORRIS, & L. TURKSTRA. Long-Latency Event-Related Potentials after Mild Traumatic Brain Injury.
This study investigated early changes in long-latency event related potentials with an emphasis on the N200/P300 complex in a group of mild traumatic brain injured (TBI) adults. A group of TBI subjects and a matched group of noninjured subjects were presented three auditory oddball paradigms differing in degree of difficulty. Subjects with TBI were initially tested within 72 hr of the injury event and again at 20 days postinjury. Noninjured subjects also underwent two test sessions spaced 18 days apart. Event-related potentials were recorded from four midline sites (Fpz, Fz, Pz, Cz). Amplitude and latency values for N100, P200, N200, and P300 components were obtained. Both TBI and matched subjects showed the expected increased latencies associated with increased task difficulty. Amplitude and latency measures were found to be relatively stable in the noninjured group, whereas the TBI group exhibited greater variability in component amplitude across visits. Changes in amplitude were found to vary by recording site, time postinjury, and task. Amplitude measures for all components differed between TBI and noninjured subjects at Time 1 and Time 2. These results indicate that long-latency evoked potentials derived from auditory oddball paradigms are sensitive to early changes associated with mild TBI. In addition, amplitude differences found in the mild TBI group were similar to those reported by Segalowitz and colleagues in subjects 6 years postinjury.
Correspondence: *C. Boliek, Center for Neurogenic Communication Disorders, University of Arizona, Tucson, AZ 85721, USA.*

E. WILDE, J. BARTHOLOMEW, E.D. BIGLER, D. NIELSEN, M. BROOKS, C. LOWRY, H.A. FOLEY, D. RYSER, & D. BLATTER. PTA and QMRI Outcome in TBI Patients with Positive Blood Alcohol Levels at Time of Injury.
It has been estimated that 30–50% of traumatic brain injury (TBI) patients are under the influence of alcohol or other substances at acute hospital admit (Kelly, 1995). Despite this frequency, the effects of such substances upon the traumatically injured human brain have not been investigated systematically. This study investigates the effects of alcohol abuse in TBI, on both length of postcoma disturbance (PCD) and brain parenchyma according to QMRI measures. Our initial findings indicate that TBI patients with positive blood alcohol level at time of injury had worse outcome on both measures than did TBI subjects without a blood alcohol level at acute admit when adjusted for injury severity by using Glasgow Coma Scale scores as a covariate.
Correspondence: *Erin D. Bigler, Department of Psychology, Brigham Young University, 1082 SWKT, Provo, UT 84602, USA.*

A.I. DRAKE, D. WESTER, & N. GRAY. Vestibular Dysfunction and Cognitive Impairment Following Traumatic Brain Injury: Implications for Outcome.
The integrity of the vestibular system was evaluated in 40 patients following mild to severe closed head injury. The patients demonstrated a pattern of vestibular dysfunction which was distinct from that observed in patients with peripheral ear disease and there was little evidence of sensory hearing loss. Instead, the head injury patients demonstrated a high incidence of central processing abnormalities on the vestibular evaluation. They also had a high number of functional disabilities which were found to be significantly related to their vestibular symptoms. The patients also underwent extensive neuropsychological testing and assessment of psychosocial functioning as part of the protocol. The degree of cognitive impairment was found to be significantly associated with the degree of vestibular dysfunction and with functional disability ratings. We hypothesized that impairment of the vestibular system may overtax higher level attentional systems, resulting in poorer outcome than would be expected based on scores from neuropsychological testing or severity of head injury. The current findings suggest recovery following head injury may be impeded in patients with concomitant vestibular dysfunction.
Correspondence: *Angela T. Drake, Department of Neurosciences Code 42DGH, Naval Medical Center, San Diego, CA 92134-5000, USA.*

Special Session/6:00–7:00 p.m.

ANPA/BNS INVITED LECTURE

David Snowden

Aging and Alzheimer's Disease in Catholic Sisters: Findings from the Nun Study

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

THURSDAY MORNING, FEBRUARY 5, 1998

Paper Session 1/9:00–10:40 a.m.

IMAGING

K. BAYNES, B. CHONG, & M.H. BUONOCORE. Left Inferior Gyrus Activation in Functional MRI Studies: Phonology, Semantics, or Something Else?
Functional MRI studies afford a new look at old processes that should give a clearer picture of how complex mental processing proceeds *in vivo*. However, localization of semantic and phonological processing in lesion studies and imaging studies is not consistently related. This fMRI study of 8 normal subjects utilizes whole brain imaging with EPI gradient coil. An auditory semantic task was employed to try to eliminate the need for letter-to-sound translation rules, but still yielded consistent left inferior frontal cortex activation. Activations with greater intersubject differences were noted for left temporal and parietal areas. An analysis of the task and other possible contributions to this activation are considered.
Correspondence: *Kathleen Baynes, Center for Neurosciences, University of California at Davis, Davis, CA 95616, USA.*

B. CROSSON, R.W. BRIGGS, J.R. SADEK, A. J. FREEMAN, D. GOKCAY, M.B. GORDON, & C.M. LEONARD. Medial Frontal Cortex in Internally and Externally Guided Language Production.
Thirteen neurologically normal subjects performed four word production tasks during fMRI. All tasks showed increased activity in left medial frontal cortex. Repetition demonstrated the smallest area of activation, limited to posterior supplementary motor area (SMA). All three word generation tasks also activated posterior SMA but caused varying degrees of extension into anterior SMA. Generation tasks requiring greater internal than external guidance produced larger extensions into anterior SMA. Posterior SMA activity appears related to preparation for a motor response, while anterior SMA activity is further upstream in word production processes. Anterior cingulate cortex, a limbic structure, was not activated during any lexical production activity in this study.
Correspondence: *Bruce Crosson, University of Florida Health Science Center; Department of Clinical and Health Psychology, Box 100165, Gainesville, FL 32610-0165, USA.*

R.M. LAZAR, R.S. MARSHALL, J. PILE-SPELLMAN, L. HACEINBEY, W.L. YOUNG, R.L. DeLaPAZ, G.M. PERERA, & J.P. MOHR. Language Reorganization in Cerebral AVM using Superselective Wada Testing and fMRI.
Cerebral arteriovenous malformations (AVMs) are evaluated before embolization by superselective injection of amytal to determine regions of eloquent function. We assessed the localization of language features in two right-handed patients with left frontal AVMs. Patients then underwent fMRI activation for word list generation using the BOLD technique. Superselective Wada testing in the inferior division of the MCA in both patients produced receptive aphasias. Left frontal injections resulted in right paresis in both patients but no language deficits. The fMRI language activation then showed activation of the right hemisphere in both patients. These findings suggest that the combination of fMRI and superselective Wada testing could provide complementary information regarding the cerebral relocalization and offer new insights about regions related to function *versus* those essential for it.
Correspondence: *Ronald M. Lazar, Department of Neurology, Neurological Institute, Columbia-Presbyterian Medical Center, 710 West 168th Street, New York, NY 10032, USA.*

L. MEAD, S. RAO, J. BOBHOLZ, S. WOODLEY, A. ROSEN, J. CUNNINGHAM, & T.A. HAMMEKE. Functional Neuroanatomy of the Stroop Attentional Conflict Paradigm.
Whole brain functional MRI was used to determine brain activation in response to the Stroop interference paradigm. Three conditions were studied: (1) color words shown in congruous colors, (2) color words shown in incongruous colors (interference condition), and (3) color neutral words shown in one of four colors. Subjects ($N = 20$) responded to the printed color of the word via a manual response. Subtraction of the congruous condition from the interference condition revealed activation of left prefrontal cortex. Comparison of the neutral condition with the interference condition revealed bilateral activation of prefrontal regions and activation of the right inferior parietal lobule. This selective activation of prefrontal areas is consistent with lesion studies and is presumably related to the response inhibition component of the interference condition.
Correspondence: *Larissa A. Mead, Section of Neuropsychology, Medical College of Wisconsin, 9200 W. Wisconsin Avenue, Milwaukee, WI 53226, USA.*

K.A. WELSH-BOHMER, E.R. MacCORMAC, C. J. McKINNEY, T.G. TURKINGTON, C.M. CULLEN, & R.E. COLEMAN. Working Memory and Secondary Memory Deficits in Alzheimer's Disease: A PET Activation Study.
This was a feasibility study examining the neural correlates of working memory and secondary memory, functions deficient in Alzheimer's disease (AD), using a brain activation paradigm involving [^{15}O]-labeled H_2O and positron emission tomography (PET). Five early AD patients and three age matched normal couples performed tests of working memory, delayed word recognition, and simple word detection (control condition) while undergoing functional imaging. In the normal controls, robust activation occurred in the left frontal lobe on the working memory test. The secondary memory test activated discrete areas in the left mesial temporal and mesial frontal lobes. AD patients failed to show the normal pattern of brain activation. These preliminary results suggest that the two memory deficits associated with AD are partially dissociable in terms of their neural circuitry.
Correspondence: *K.A. Welsh-Bohmer, 2200 W. Main Street, Suite A230, Durham, NC 27705, USA.*

J.L. WOODARD, S.T. GRAFTON, J.R. VOTAW, R.C. GREEN, M.E. DOBRASKI, & J.M. HOFFMAN. Compensatory Neural Recruitment During Maintenance Rehearsal in Alzheimer's Disease and Normal Aging.
Positron emission tomography (PET) imaging of cerebral blood flow was used to investigate functional neuroanatomical correlates subserving maintenance rehearsal in 6 normal older participants and 6 patients with mild Alzheimer's disease (AD). The groups did not show significant differences with respect to rehearsal performance. Both groups showed activation in the right dorsolateral prefrontal cortex during both rehearsal conditions, suggesting this region's importance in the short-term maintenance of verbal information, and a shift in cortical processing resources to anterior brain regions was seen with increased list length. In both rehearsal conditions, patients demonstrated bilateral frontal activation, whereas controls demonstrated exclusively right hemisphere activation. Given that both groups performed equivalently, the greater spatial extent of activation in AD patients may reflect compensatory neural recruitment during maintenance rehearsal.
Correspondence: *John L. Woodard, Department of Neurology, Emory University School of Medicine, 1841 Clifton Road, N.E., Atlanta, GA 30329, USA.*

Paper Session 2/9:00–10:40 a.m.

SCHIZOPHRENIA-2

S. MORRIS, E. GRANHOLM, D. CHOCK, & D.V. JESTE. Pupillary-Response and Attentional Impairment in the Span of Apprehension Task in Middle-Aged and Elderly Schizophrenia Patients.
While no specific areas of the brain have been clearly implicated in schizophrenia, there is some evidence to suggest that a neurophysiological cir-

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

cuit involving the frontal cortex, basal ganglia, medial temporal–limbic structures, and thalamic–reticular thalami may be involved. Problems in this circuit have been hypothesized to lead to a cascade effect, where incoming information is not filtered appropriately, thereby overloading available processing resources. In this study, pupillary responses, which have been shown to index resource allocation and overload during cognitive tasks, were recorded during the span of apprehension (SOA) task, which is a well researched paradigm shown to index cognitive impairment in schizophrenia. Twenty-eight schizophrenia outpatients and 31 normal individuals participated. We found that, compared to controls, patients showed decreased detection accuracy and decreased pupillary responses to high load (6-letter & 12-letter) conditions but not to a low-load (1-letter) condition. These findings indicate that schizophrenia patients are overloaded during more challenging tasks which do not overload controls. Parallels between the neurocircuitry thought to be involved in pupil response, cognitive resources, and schizophrenia pathophysiology are discussed.
Correspondence: *Shaunna Morris, University of California, San Diego, VA Medical Center 116A-1, 3350 La Jolla Village Drive, San Diego, CA 92161, USA.*

P. SZESZKO, R.M. BILDER, T. LENCZ, M. REDMOND, H. WU, & J. LIEBERMAN. Anterior Cingulate Gyrus Volume Reductions are Associated with Executive Dysfunction in First-Episode Schizophrenia.
Few studies have investigated frontal lobe structure–function relations in schizophrenia using MR imaging. We previously applied a method (adapted from Rademacher et al., 1992) for parcellation of the human frontal lobes using MR imaging that was based on the sulcal anatomy to acquire functionally relevant subregions (i.e., superior frontal gyrus, anterior cingulate gyrus and orbital frontal cortex) in a sample of first-episode schizophrenia patients. Patients also completed a comprehensive neuropsychological battery comprising 38 tests that tapped six functional domains. In this study we investigated the relationship between these six functional domains and the frontal lobe subregions. Reduced anterior cingulate gyrus volume was significantly and selectively correlated with worse executive functioning in male patients, but not female patients. These results complement our previous study (Bilder et al., 1995), which demonstrated that anterior hippocampal volume reductions predicted executive dysfunction in first-episode schizophrenia, and are consistent with the hypothesis that an abnormality in the frontolimbic system may play a role in the pathophysiology of schizophrenia.
Correspondence: *Philip R. Szeszko, Department of Psychiatry Research, Hillside Hospital, 75-59 263rd Street, Glen Oaks, NY 11004, USA.*

P. J. MOBERG, R. AGRIN, R.E. GUR, R.C. GUR, B.I. TURETSKY, & R.L. DOTY. Olfactory Dysfunction in Schizophrenia: A Qualitative and Quantitative Review.
Olfactory dysfunction in patients with schizophrenia has engendered increasing interest over the last decade. A number of studies have now documented deficits in odor identification, detection threshold and memory. Despite these advances, controversy exists about possible differential deficits among olfactory tests as well as influences of gender, smoking, and medication on olfactory function. To address this controversy, we conducted a meta-analytic review of the English language literature concerning studies of odor identification, detection threshold and memory in schizophrenia. The effects of medication, gender and smoking were also examined. Results indicate moderate olfactory deficits across all domains in this patient group, with effect sizes ranging from 0.10 to 3.25. No differences between various olfactory measures was observed, suggesting a more generalized deficit in olfactory functioning. The influences of medication status, sex, and smoking on effect sizes were not significant across studies.
Correspondence: *Paul J. Moberg, Brain-Behavior Laboratory, Department of Psychiatry, 10th Floor, Gates Bldg., HUP, 3400 Spruce Street, Philadelphia, PA 19104, USA.*

B.I. TURETSKY, P. J. MOBERG, L. HARPER MOZLEY, R. AGRIN, R.C. GUR, & R.E. GUR. CVLT Memory Subtypes in Schizophrenia: Relationship to Clinical, Neuroanatomic, and Physiologic Measures.
Performance on the California Verbal Learning Test in 116 schizophrenics and 129 healthy controls was examined to determine whether there are distinct patient subgroups that conform behaviorally to the cortical and subcortical dementia subtypes and to identify any differences in clinical, demographic, neuroanatomic, and neurophysiologic measures across these cognitively delineated subgroups. The results provide strong confirmation that the cortical–subcortical distinction may be meaningfully applied to schizophrenia. That this patient categorization may have much broader import is demonstrated by the consistent differences in clinical profiles, symptomatology, neuroanatomy, and neurophysiology that we observed across these cognitively derived subtypes. These data suggest that different pathophysiologic processes may underlie the observed cognitive differences.
Correspondence: *Bruce I. Turetsky, Brain-Behavior Laboratory, Department of Psychiatry, 10th Floor, Gates Building, HUP, 3400 Spruce Street, Philadelphia, PA 19104, USA.*

R.M. BILDER, E. TURKEL, D.F. WILLSON, R.S. GOLDMAN, J.A. BATES, & G. REITER. Memory Deficits in Schizophrenia: Working or Unemployed?
Research has focused on "memory" and "working memory" dysfunctions in schizophrenia, but the experimental and anatomic distinctions between the constructs are often arbitrary. Delay effects are critical to interpretation of either construct, but existing literature frequently confounds delay effects with baseline competency. We developed a series of tasks (Delayed Match to Sample, Conditional Discrimination Learning with Delay, Variable Interval Delayed Alternation) incorporating titration procedures to equalize baseline performance. These tasks yielded no significant group-by-delay interaction in samples of 94 first-episode patients and 52 healthy subjects. Separate analyses showed that patients' forgetting rates on clinical neuropsychological tests were mediated by attentional and executive deficits. These findings challenge current hypotheses about memory or working memory deficits in schizophrenia, and suggest that concepts of network capacity may have stronger explanatory power.
Correspondence: *Robert M. Bilder, Center for Advanced Brain Imaging, Nathan Kline Institute, 140 Old Orangeburg Road, Orangeburg, NY 10962, USA.*

P. ZUFFANTE, C.M. LEONARD, R.M. BAUER, R.A. COHEN, & J.M. KULDAU. Magnetic Resonance Imaging of the Dorsolateral Prefrontal Cortex, Working Memory Performance, and the Negative Symptoms of Schizophrenia.
Functional imaging and neuropsychological studies have implicated the dorsolateral prefrontal cortex (DLPFC) as a possible site of neuropathology in schizophrenia. We examined the relationship between negative symptoms and the volume of a subregion within the DLPFC (i.e., area 46). Magnetic resonance images of 23 schizophrenics (SCZ) and 23 normal controls (NC) were obtained and volumetric measures were made of a section of the middle frontal gyrus (MFG) occupied by area 46. Symptoms were rated and IQ scores were obtained. Two working memory tasks sensitive to DLPFC damage were administered along with a control task requiring phonemic discrimination. The SCZ group performed more poorly than NCs on all cognitive tasks, but group differences in brain measurements were not significant. Negative symptom severity was associated with poorer performance on all cognitive measures; most strongly associated with IQ. Brain measures alone were not predictive of negative symptoms, but MFG measures and IQ accounted for 56% of the variance of negative symptoms. These findings suggest that negative symptoms may be more associated with general cognitive impairment than impaired working memory, *per se*. Alternatively, reduced IQ in SCZ may be a byproduct of impaired working memory and associated executive control deficits. That MFG measures contributed significantly to the predictive value of IQ suggests that this region may be involved in negative symptoms, but the nature of this relationship needs further investigation.
Correspondence: *Paula Zuffante, Department of Clinical and Health Psychology, Box 100-165, University of Florida, Gainesville, FL 32601, USA.*

Symposium 1/9:00–10:40 a.m.

ESTROGEN, MEMORY, AND AGING

Organizer and Chair: Paul A. Spiers

P.A. SPIERS, C. KAWAS, M. O'CONNOR, B. SHERWIN, & G.S. HOCHANADEL. Estrogen, Memory and Aging: A Symposium.
This symposium will address the changes in memory functioning that accompany aging. It will pay particular attention to the role of hormones and of estrogen in the memory changes that have been documented in association with menopause. The neuroanatomical, neurophysiological and neuropharmacological aspects of this topic will be reviewed. Methods for the appropriate evaluation and assessment of memory in this population will be discussed. The possible role of hormonal treatment for Alzheimer's disease will be presented by one of the participants, including her own recently published research. Other participants will discuss their ongoing work that deals with the use of estrogen and phytoestrogen replacement therapy as treatments for the memory changes associated with menopause. The discussant will suggest new directions for research into the assessment and treatment of these hormonally mediated memory disorders.
Correspondence: *Paul A. Spiers, Neuropsychology Associates, 66 Prospect Street, Topsfield, MA 01983-1716, USA.*

P.A. SPIERS. Introductory Remarks: Memory and Aging.
Dr. Spiers will review the current literature on changes in memory associated with aging and discuss his own recently published research on the treatment of these changes with an investigational new drug, Citicoline. He will discuss that evidence which suggests that these memory changes may be the precursors of dementing illness and should be addressed. He will present the results of ongoing research into age-associated memory impairment and discuss the treatment for this and other disorders of memory with pharmacological or, as will be discussed in the symposium, hormonal agents.
Correspondence: *Paul A. Spiers, Clinical Research Center, Massachusetts Institute of Technology.*

C. KAWAS. Neurobiology of Estrogen, Memory and Aging.
Dr. Kawas will discuss the recently discovered hormone receptors in basal forebrain and the anatomical projections of these areas to structures crucial to the mediation of learning and memory. She will also discuss changes in hormone metabolism with age and how these alterations may be associated with the neuropharmacology of memory loss.
Correspondence: *Claudia Kawas, Alzheimer's Disease Research Center, Johns Hopkins School of Medicine.*

M. O'CONNOR. Assessment of Memory in Aging.
Dr. O'Connor will present appropriate methods for the assessment of memory in older patients. She will review the research on this topic and focus on how the examiner can be sensitive to changes in cognitive functioning that may alter learning abilities in the aged. She will also suggest the most appropriate ways to evaluate memory in the aged and what factors need to be considered in order to correctly assess memory loss.
Correspondence: *Margaret O'Connor, Behavioral Neurology Unit, Beth Israel–Deaconess Medical Center.*

C. KAWAS. Estrogen Therapy & Alzheimer's Disease.
In controlled studies, estrogen therapy has been shown to effect the rate of occurrence and the onset of senile dementia of the Alzheimer's type. This presentation will review studies demonstrating such findings, will focus on the author's own research on this topic, and will discuss potential neural mechanisms to account for these findings.
Correspondence: *Claudia Kawas, Alzheimer's Disease Research Center, Johns Hopkins School of Medicine.*

B. SHERWIN. Menopause and Memory I: Estrogen/Androgen.
Dr. Sherwin will discuss the alterations in behavior, cognitive functioning, and memory associated with alterations in the levels of androgen and estrogen in women that occur with aging and, more specifically, as a function of both surgical and natural menopause. She will review her own extensive body of research on this topic and will discuss potential treatment strategies for dealing with these behavioral and cognitive changes.
Correspondence: *Barbara Sherwin, Department of Psychology, McGill University.*

G.S. HOCHANADEL. Menopause and Memory II: Phytoestrogen.
Dr. Hochanadel will review the epidemiology of symptoms associated with menopause in countries where the diet is rich in phytoestrogens. These dietary phytoestrogens are naturally occurring estrogenic compounds found in plants. Unlike animal estrogen, phytoestrogens do not appear to have any carcinogenic effects and may, in fact, be protective in this regard. Initial results of ongoing research at MIT to determine whether therapy with phytoestrogens has an effect on the somatic and neurocognitive symptoms of natural menopause will also be presented.
Correspondence: *Gail S. Hochanadel, Clinical Research Center, Massachusetts Institute of Technology.*

Poster Session 2/9:00 a.m.–12:00 p.m.

PEDIATRICS-2: TBI

D. DEWEY & S.G. CRAWFORD. Parental Adaptation to Pediatric Head Injury.
Factors associated with adaptation of parents of children with head injuries (HI) were investigated within 6 months of injury. Results revealed no differences in maternal or paternal psychological distress between families of children with mild HI and families of children with moderate–severe HI. Examination of the factors associated with adaptation suggested that parents of children with moderate–severe HI experienced more family life stress than parents of children with mild HI. Investigations of the factors that influence maternal and paternal adaptation revealed that higher levels of maternal distress were associated with a lower level of education and lower social support, while higher levels of paternal distress were associated with lower family cohesion, more family life events, and coping patterns that focused on maintaining family integration and cooperation.
Correspondence: *Deborah Dewey, Behavioural Research Unit, Alberta Children's Hospital, 1820 Richmond Road S.W., Calgary, AB T2T 5C7, Canada.*

D. DEWEY & S.G. CRAWFORD. Adaptive Functioning and Behavior Problems in Children with Mild and Moderate–Severe Head Injuries.
Adaptive functioning and behavior problems in children with mild and moderate–severe head injuries were assessed. Children were excluded if they had a history of previous HI, an acquired or congenital CNS insult, a documented history of child abuse or neglect, evidence of mental retardation, or evidence of prior behavioral problems. Results indicated that children with mild head injuries did not display impaired behavior or impaired adaptive functioning. In contrast, children with moderate–severe HI displayed significant impairments in adaptive functioning relative to the children with mild HI. Although children with moderate–severe HI scored significantly higher on the CBCL compared to the children with mild HI on attention problems and delinquent behavior, their average scores on these measures were within the clinically normal range.
Correspondence: *Deborah Dewey, Behavioural Research Unit, Alberta Children's Hospital, 1820 Richmond Road S.W., Calgary, AB T2T 5C7, Canada.*

G. JAVORNISKY. Preinjury IQ Score Decline Following Mild Head Injury: What Does This Reflect?
Eleven children with mild head injury were evaluated and IQ scores compared to IQ scores obtained prior to the head injury. Declines in Verbal and

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

Performance IQ scores were noted with the Verbal IQ scores significantly lower on postinjury evaluation. A comparison group of children matched by age, sex, and learning disability reveal similar declines in IQ scores over a similar evaluation–reevaluation interval. Declines in IQ in the mild head injury group can be attributed to the learning problems rather than mild head injury.
Correspondence: *Gregory Javornisky, Neuropsychology Service, CT Children's Medical Center, Hartford, CT 06106, USA.*

A. COLVIN, S. GREWE, & R. BATLEY. Performance of Preschool Children with Traumatic Brain Injuries on the Differential Abilities Scale.
Assessment of cognitive outcome in preschool children with TBI is complicated by many factors, including the lack of a measure that can be used over a large age range. The Differential Abilities Scale (DAS; Elliot, 1990) samples cognitive abilities based on several models of intelligence. Because of this theoretical framework, children can be assessed from late infancy to late adolescence. The purpose of this study was to examine the performance of preschool children with TBI on the DAS and to investigate the impact of medical and environmental variables on post-injury cognitive functioning. Twenty preschool children on a postacute rehabilitation unit were assessed using the DAS. The overall cognitive ability of these children was below average. Severity of injury and premorbid socioeconomic status were related to overall cognitive ability.
Correspondence: *Andrew Colvin, Department of Psychology, Columbus Children's Hospital, 700 Children's Drive, Columbus, OH 43205, USA.*

E. VRIEZEN. Verbal Memory Deficits in Children with Head Injury.
To investigate verbal memory deficits in children with head injury, the Children's Auditory Verbal Learning Test–2 was administered to 42 children with moderate to severe head injury, 23 children with mild head injury and 14 normal controls. The performance of children with mild head injury, 4 months postinjury, did not differ from controls. Children with moderate to severe head injury, however, demonstrated a specific pattern of verbal memory deficits. Immediate memory span was intact as was the ability to consolidate and retrieve information from long-term memory soon after presentation. However, level of learning with repetition was reduced and impaired delayed recall suggests rapid rates of forgetting. Implications for educational planning and rehabilitation will be discussed.
Correspondence: *Ellen Vriezen, Psychology, London Health Sciences Centre, 800 Commissioners Road East, London, ON N6C 2V5, Canada.*

C. LOFTIS, M. ROMAN, & D.C. DELIS. Visual Scanning After Pediatric TBI Evaluated by Stimulus Cancellation Tasks.
Visual attention and scanning in children and adolescents with traumatic brain injury (TBI) were investigated using four cancellation tasks. Two of these tasks employed structured displays of stimuli (numbers of shapes in rows and columns) and two presented unstructured displays of stimuli (pictures of small buildings in a quasirandom array). Subjects with severe TBI or mild-to-moderate TBI were compared with non-head-injured, traumatically injured control subjects. Analysis of cancellation task performance included the number of targets detected, speed of search, and organization of search. Severe TBI subjects detected significantly fewer targets on the unstructured cancellation tasks, but did not evidence impairments in target detection on the structured cancellation tasks. Impairment in target detection were not associated with deficits in organization of search or search speed.
Correspondence: *Chris Loftis, P.O. Box 100165, Department of Clinical and Health Psychology, Health Sciences Center, University of Florida, Gainesville, FL 32610-0165, USA.*

R. LAJINESS-O'NEILL, H.A. FOLEY, E.D. BIGLER, & G. BURLINGAME. Age at Injury is Not a Significant Predictor of Neuropsychological Outcome in Children and Adolescents with Traumatic Brain Injury.
The literature has generally been equivocal with regard to the mediating effect of age at time of injury onset and outcome in children with brain injury, forcing issues of CNS plasticity in children into question. Recent investigations have begun to purport "critical periods" during early childhood in which neurologic insult may actually compromise functioning to a greater extent (Anderson & Moore, 1995). This study hypothesized a quadratic relationship between age at injury and neuropsychological functioning in children with traumatic brain injuries. Sixty-five brain-injured children and adolescents injured from 1 month through 18 years of age were examined. The effectiveness of Glasgow Coma Scale (GCS) scores, length of unconsciousness, and time interval since the onset of injury in predicting outcomes were also evaluated. Age at injury was a significant predictor of reading (word recognition) ability, ($R^2 = .29$, $p < .05$). However, the revealed quadratic relationship was opposite that hypothesized, as children injured early in life and adolescents tended to perform better on the Reading subtest of the WRAT–3 compared to older children. As expected, length of unconsciousness was a significant predictor of memory performance, (Test of Memory and Learning–Verbal Memory Index, $R^2 = .28$, $p < .01$; Composite Memory Index, $R^2 = .28$, $p < .01$; and Delayed Recall Index, $R^2 = .27$, $p < .01$). Age at injury, GCS score, and time postinjury were not significant predictors of memory, intellectual, or language abilities.
Correspondence: *Renee Lajiness-O'Neill, Neuropsychology Division, C-480 Med Inn Building, Box 0840, University of Michigan Medical Center, 1500 E. Medical Center Drive, Ann Arbor, MI 48109, USA.*

M. ROMAN, M. MAGULAC, T.L. DEMADURA, C. LOFTIS, J.A. GLADSJO, & D.C. DELIS. Acute Psychiatric Sequelae of Pediatric Traumatic Brain Injury.
The Diagnostic Interview Schedule for Children–Parent Version (DISC) was utilized to examine the incidence of psychiatric disorders and symptoms in the early stages of recovery from pediatric traumatic brain injury (TBI). Severe TBI subjects were compared to mild-to-moderate TBI and traumatically injured, non-head-injured control subjects. Parents first completed the DISC 1 month after resolution of PTA regarding their child's preinjury functioning, and again 3 months later regarding their child's functioning since injury. Anxiety, mood, and disruptive behavior disorder modules were examined. Subject groups did not differ significantly in incidence of anxiety, mood, or disruptive behavior disorder *diagnoses*, but severe TBI subjects had an increase in disruptive behavior disorder *symptoms* after TBI, due to a significant increase in ADHD symptoms.
Correspondence: *Mary Roman, UTMB–Open Gates Program, 301 University Boulevard, Room 5-108, Galveston, TX 77555-0119, USA.*

L. EWING-COBBS, M. PRASAD, J.M. FLETCHER, H. LEVIN, M. MINER, & H. EISENBERG. A Multidimensional Assessment of Attention Following Pediatric Traumatic Brain Injury.
Although attentional disturbance is a common complaint after TBI in children and adolescents, few studies have assessed posttraumatic attentional functions. The attentional constructs proposed by Mirsky et al. (1991) provided a multidimensional framework for prospective assessment of late attentional disturbance after mild–moderate ($N = 34$) and severe ($N = 57$) traumatic brain injury. Attention was evaluated from 5 to 8 years after TBI in children ages 0 to 15 years at the time of injury. Children with severe TBI performed more poorly than children with mild–moderate TBI on tests comprising the focus/executive and shift constructs. Younger children scored below older children irrespective of injury severity on the Digit Span subtest and interstimulus interval scores from an adaptive rate continuous performance test reflecting impairment on the encode and sustain constructs. Age-by-severity interaction effects were found for speeded perceptual–motor tests; scores were reduced following mild–moderate and severe TBI in younger children and following severe TBI in older patients (NICHD R01-27597; NINDS R01-29462).
Correspondence: *Linda Ewing-Cobbs, Department of Pediatrics, University of Texas Health Science Center–Houston, MSB 3.252, Houston, TX 77030, USA.*

M. PRASAD, L. EWING-COBBS, & L. KRAMER. Crush Head Injuries in Young Children.
Crush head injuries result from mechanical loading of the head by static forces applied slowly (duration > 200 ms) over a large area which slowly

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

deforms the skull. Crush injuries have been hypothesized to result in less severe neurological damage and better outcome because of the cranium's great flexibility and ability to absorb slowly applied force. In a review of 8 children under the age of 3 years who sustained crush head injuries, all children sustained multiple skull fractures and extra-axial bleeds or parenchymal contusions. The type and distribution of fractures was highly unusual. Glasgow Coma Scale scored indicated 64% if the children sustained severe head injuries at the time of hospital admission. Neuropsychological testing revealed that 63% of the children had deficits in intellectual, motor, or language skills. Crush injury to the head in young children results in a pattern of neurological involvement which is unique to this mechanism of injury and frequently results in deficits in cognitive and motor domains (NINDS R01-29462; M01-RR-02558).
Correspondence: *Mary Prasad, Department of Pediatrics, MSB 3.252, University of Texas Health Science Center–Houston, Houston, TX 77030, USA.*

C. BARRY, H.G. TAYLOR, & K.O. YEATES. Prevalence and Correlates of Neurobehavioral Symptoms in Children 1 Year Postinjury.
The prevalence and correlates of neurobehavioral symptoms (i.e., headaches, dizziness, inattention) were investigated in children 12 months following traumatic brain injury (TBI). The purpose was to determine if neurobehavioral symptoms persisted 1 year after injury, and whether these symptoms were related to child and family outcomes. Participants followed to 12 months included 64 children with TBI (27 with severe TBI, 37 with moderate TBI) and 44 with orthopedic injury only (OI). Children with severe TBI had a higher prevalence of neurobehavioral symptoms than children in the other two groups. For children with TBI, the number of neurobehavioral symptoms predicted new behavioral problems, adaptive behavior levels, and family functioning. Children with more neurobehavioral symptoms also performed more poorly on neurocognitive and academic achievement tests. Results suggest that neurobehavioral symptoms persist over time and predict problems in family, neurocognitive, and behavioral functioning.
Correspondence: *C. Barry, Department of Pediatrics, Division of Behavioral Pediatrics and Psychology, 11100 Euclid Avenue, Cleveland, OH 44106, USA.*

TRAUMATIC BRAIN INJURY-2

J. DONDERS & D. STROM. Learning Disability Complicated by Traumatic Brain Injury.
The performance of 10 children with a history of learning disability (LD) who subsequently experienced a moderate to severe traumatic brain injury (TBI) was evaluated. Compared to premorbid psychometric data, children with LD experienced after their TBI a statistically significant decline in WISC–III FSIQ whereas their performance on measures of academic achievement remained stable. On specific neuropsychological measures, children with LD and TBI did not differ significantly postinjury from matched controls who also had TBI but no prior history of LD. It is concluded that moderate to severe TBI tends to cause significant additional cognitive impairment in children with LD, and that review of premorbid psychometric data is crucial in this respect to separate preexisting from acquired deficits (i.e., just considering postmorbid neuropsychological test data does not suffice).
Correspondence: *Jacques Donders, Psychology Service, Mary Free Bed Hospital, 235 Wealthy S.F., Grand Rapids, MI 49502, USA.*

J. BARTHOLOMEW, D.E. NILSSON, E. WILDE, M. BROOKS, & D. NIELSEN. Attentional Performance Across Various Forms of Neurological Trauma as Measured by the Continuous Performance Test.
Attention has been a difficult construct to conceptualize, given the myriad cerebral anatomical regions hypothesized to be involved in maintaining good attention. Furthermore, a comprehensive definition of attention has yet to gain full acceptance in the literature. In this study we examined the attentional performance of four different clinical groups (including TBIs, TBIs with secondary seizures, idiopathic seizure disorder, and cerebral tumors), using Zubin's typology of attention and the Conners' Continuous Performance Test. Findings to date indicate that children with TBI, children with idiopathic seizure disorder and children with TBI-induced seizures evidence substantially higher scores than normal subjects on measures of attention focus, sustain, and shift. Children with brain tumors, however, exhibit difficulty only with the focus aspect of attention.
Correspondence: *Jenny Bartholomew, 284 TLRB, Brigham Young University, Provo, UT 84602, USA.*

R.E. HANLON, J.A. DEMERY, J.M. DUCHEK, & W.E. LUX. Classifying Subtypes of Mild Traumatic Brain Injury Based on Acute Injury Characteristics.
The heterogeneity of mild traumatic brain injury (MTBI) results in equivocal predictions of outcome. Despite recent attempts to define acute injury characteristics of MTBI, neuropsychological outcome is often unpredictable. We prospectively collected 60 MTBI cases and examined the role of various acute neurologic variables in relation to neuropsychological outcome. We found significant differences between the following subgroups of patients on selective neuropsychological measures: (1) CT negative *versus* CT positive; (2) acceleration–deceleration trauma *versus* blunt head trauma; (3) history of posttraumatic amnesia (PTA) *versus* no history of PTA. There was no difference, with respect to neuropsychological status, between patients who suffered brief loss of consciousness (LOC) and those without LOC. These findings suggest that acute injury characteristics may be used to classify subtypes of MTBI patients.
Correspondence: *Robert Hanlon, Department of Neurology, Washington University School of Medicine, Box 8111, 660 S. Euclid, St. Louis, MO 63110, USA.*

A.D. HINTON-BAYRE, G. GEFFEN, K. McFARLAND, & L.B. GEFFEN. Application of the Reliable Change Index for Prospective Assessment of Speed of Information Processing after Mild Traumatic Brain Injury in Contact Sport.
The sensitivity of speed of information processing measures (Speed of Comprehension, SC; Symbol Digit Modalities, SDM; Digit Symbol Substitution, DSS) to the effects of mild traumatic brain injury (TBI) was investigated prospectively. Professional rugby league players ($N = 54$) were tested twice preseason. Twelve concussed players and 10 matched controls were retested 2 days, 1–2 weeks, and 3–5 weeks later. Within 48 hr of a concussion, the mild TBI players showed slower performance than uninjured players on all three tests. Reliable Change Indices (RCIs), calculated for individual players based on their preseason performance, indicated that SC was more sensitive to impairment and displayed longer recovery periods than SDM and DSS. RCI enables comparisons between tests and sessions and provides an objective criterion for return to contact sport.
Correspondence: *Gina Geffen, Cognitive Psychophysiology Laboratory, School of Psychology, University of Queensland, St. Lucia, Queensland, 4072, Australia.*

M. WATSON, G. GEFFEN, & L.B. GEFFEN. Effects of Delay and Response Complexity on Visuospatial Working Memory in Footballers.
Delayed response tasks (DRT) require an intact prefrontal cortex (PFC) to maintain information in working memory and inhibit prepotent responses. A visuospatial DRT was given to football players who touched remembered positions of a target on a computer screen after delays of 1, 2, or 4 s. Memory trials were compared to sensory trials in which the target remained on the screen. Half of the trials required mirror image responses. Participants made fewer correct and less precise responses on memory than sensory trials. Left visual field targets produced superior memory performance than right targets implicating right hemisphere specialization for visuospatial working memory. Mirror image responding made players more inaccurate and slower to respond, especially on sensory trials. Longer delays increased these effects. Three concussed players were impaired on memory but not sensory conditions compared to controls.
Correspondence: *Gina Geffen, Department of Psychology, University of Queensland, St. Lucia, Queensland, 4067, Australia.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

J.M. HILL. The Effects of Depression on Test–Retest Scores in Adult TBI Patients.
Introduction: The effect of depression on test–retest change scores in a cohort of adult TBI patients was examined. *Methods*: Seventy-six adult TBI patients were tested and retested with the WAIS–R, WMS–R, Trail-making A & B, Wisconsin Card Sorting Test (WCST), and the Beck Depression Inventory (BDI). *Results*: Significant increases from test to retest were noted on: WAIS–R FSIQ ($p < .001$), VIQ ($p < .01$), PIQ ($p < .001$); WMS–R General Memory Index ($p < .01$), Delayed Recall Index ($p < .01$); and Trails B ($p < .001$). Age and BDI were significant predictors of PIQ and WMS–R Delayed Recall. BDI was the only significant predictor of Trails B. *Conclusions*: These findings confirm the need to assess depression in TBI patients and to consider mood when evaluating test performance.
Correspondence: *James M. Hill, Department of Psychiatry, UMDNJ–New Jersey Medical School, 185 South Orange Avenue, Newark, NJ 07103-2714, USA.*

MEDICAL ILLNESS-1

M. LINDGREN, H. THOSTRUP, & M. SVANNÄS. The Effect of Felodipine in Patients with Organic-Solvent-Induced Chronic Toxic Encephalopathy: A Double-Blind Crossover Study.
Twelve male patients with solvent induced chronic toxic encephalopathy were treated with felodipine ER 5–10 mg in a double-blind crossover study. The treatment was evaluated with semistructured interviews, Target Complaints, and psychometric testing of visuospatial capacity and visuospatial memory function. The study showed no overall difference between felodipine treatment and placebo. However, two subgroups were identified, responders (7 patients) and nonresponders (5 patients). The responders reported a reduction of symptoms of at least 10% by the use of Target Complaints when treated with felodipine. Prior to the study, the responders performance in the psychometric tests were more impaired and they reported more pronounced symptoms, than the nonresponders. The results thus indicate that felodipine may be used in the treatment of those TE patients who suffer from a large number of pronounced symptoms and perform poorly in psychometric testing.
Correspondence: *May Lindgren, Department of Rehabilitation Medicine, Kalmar County Hospital, S-391 85 Kalmar, Sweden.*

R. RUCHINSKAS, H. SINGER, & N. REPETZ. Performance and Perseveration on Luria's Reciprocal Coordination Tasks in Elderly Medical Patients.
While many neuropsychological instruments have incorporated Luria's tasks of reciprocal coordination to test neurological integrity, little research is evident on this concept's validity. Hence, four motor tasks were included in a neuropsychological screening battery with 126 geriatric rehabilitation inpatients. Failure on motor tasks and number of perseverations correlated with lowered cognitive functioning. Controlling for cognition, patients with neurological conditions performed significantly worse than patients with other medical conditions. Classification of neurological or nonneurological group membership was only fair. Hence, while suggestive of neurological disease, failure of reciprocal coordination is not necessarily a "pathognomonic sign."
Correspondence: *Robert Ruchinskas, Department of PM&R, Temple University Hospital, Philadelphia, PA 19140, USA.*

R. PTAK, K. GUTBROD, & A. SCHNIDER. Association Learning in the Acute Confusional State.
The acute confusional state (ACS) is associated with disturbances of attention, sleep–wake cycle and orientation. Clinical evidence indicates a severe memory dysfunction in ACS, but explicit learning in the ACS has never been investigated. We compared the performance of ACS patients and amnesics in two learning paradigms. On 2 days subjects learned simple associations of words presented either in written form only or with additional pictorial representations. ACS patients retained pictorially supported associations better than solely verbal associations. Delayed recall was better on the second than the 1st day. These findings demonstrate that acutely confused patients are capable of some explicit learning.
Correspondence: *Radek Ptak, Inselspital, Abt. Neuropsychol, Rehab., 3010 Bern, Switzerland.*

A. MATT MADDREY, C.M. CULLUM, & C. PRESTIDGE. Neuropsychological Dysfunction in Adults with Cystic Fibrosis.
Adult cystic fibrosis (CF) patients ($N = 26$) were assessed for potential memory deficits using the California Verbal Learning Test (CVLT). Of the total study sample, 38% demonstrated deficits on the total learning score. Among those with impairment, 2 exhibited mild deficits, 3 showed moderate impairment, 1 subject's score fell in the moderate to severe range, and 4 patients demonstrated severe memory impairment. Learning characteristics, recall errors such as intrusions and perseverations, and recognition measures were also investigated. It is hypothesized that the degree and chronicity of hypoxia in the adult CF patient may be the cause of the memory dysfunction in this relatively unstudied medical population.
Correspondence: *C. Munro Cullum, Department of Psychiatry, University of Texas Southwestern Medical Center, 5323 Harry Hines Boulevard, Dallas, TX 75235-8898, USA.*

L. WHITE. Susac's Syndrome: Associated Neuropsychological Deficits and Clinical Course: A Case Study Analysis.
Susac's syndrome is a neurological condition involving a triad of encephalopathy, hearing loss, and retinal artery branch occlusions. The syndrome is often misdiagnosed as multiple sclerosis but is characterized by a different clinical course, with remission usually occurring within 2 years of onset. Serial neuropsychological evaluations were performed over a 12-month period in a 38-year-old female. Results were consistent with a diffuse encephalopathy preferentially affecting subcortical and frontal areas with impairment in attention and executive functions. Learning and memory were relatively preserved, but organizational problems interfered with learning unstructured material. Neuropsychiatric sequelae have commonly been reported with this condition and were also observed in this patient. Progressive improvement was noted over time in cognitive abilities, but mild residual deficits were evident 16 months following onset of illness.
Correspondence: *Laura White, Good Samaritan Hospital, 407 14th Avenue S.E., P.O. Box 190, Puyallup, WA 98371, USA.*

D. STORZBACH, L.M. BINDER, K.A. CAMPBELL, D.S. ROHLMAN, M.C. SALINSKY, & MEMBERS OF THE PORTLAND ENVIRONMENTAL HAZARDS RESEARCH CENTER. MMPI–2 Profiles of Symptomatic and Asymptomatic Persian Gulf War Veterans Contrasted with Epileptic and Nonepileptic Seizure Patient Profiles.
MMPI–2 profiles of 84 epileptic seizure (ES) patients, 70 nonepileptic seizure (NES) patients, 125 symptomatic Persian Gulf veterans (PGW cases) and 69 asymptomatic Persian Gulf veterans (controls) were compared. Groups were similar in age and education. Seizure diagnosis was based upon intensive EEG monitoring. PGW cases were mildly elevated on MMPI–2 Hs and D and were significantly lower than NES patients on Hs, Hy, MF, and Sc. These results are consistent with the hypothesis that PGW cases are dissimilar psychologically to persons with a well-documented conversion disorder and are more similar to persons with the chronic eurologic illness of epilepsy.
Correspondence: *Daniel Storzbach, Mental Health Division 116P, Department of Veteran Affairs Medical Center, Portland, OR 97207, USA.*

A. J. LAZOSKY, G.B. YOUNG, & R. PHILLIPS. Outcome Following Severe Septic Illness.
Survivors of severe septic illness (experimental group) and acute myocardial infarction (control group) completed the Neuropsychological History Form (NHF) and the Sickness Impact Profile (SIP; Individual and Family Member forms). The aim was to obtain an estimate of the prevalence and general nature of reports of cognitive, emotional, and psychosocial functioning in survivors of severe septic illness at least 1 year following dis-

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

charge from hospital. Results indicated significant group differences for the emotional behavior and work categories of the SIP, with the sepsis group reporting greater emotional dysfunction and difficulty working than the control group. Family members reported greater difficulty working and greater need for sleep–rest in the sepsis group than the control group on the SIP. Implications for outcome of multiple trauma are discussed.
Correspondence: *Andrea J. Lazosky, Neuropsychology Service, London Health Sciences Center (Victoria Campus), 375 South Street, London, ON N6A 4G5, Canada.*

J. PICKETT, D. THEBERGE, W.S. BROWN, S. SCHWEITZER, & A. NISSENSON. Neurocognitive Function, Cognitive Event-Related Potentials, and the Treatment of Anemia in Patients Receiving Dialysis.
Chronic renal failure leads to a uremic syndrome involving compromised neuropsychological status. Recombinant human erythropoietin (EPO) has been successfully used to treat severe anemia which persists following treatment with dialysis. This study examined the neurocognitive effects of increasing hematocrit (Hct) with EPO to normal levels in 19 patients receiving hemodialysis treatment. The Continuous Performance Task was employed to elicit endogenous components of the event-related potential at low–high–low Hct levels. Higher Hct levels resulted in decreased frontal P300 amplitude and tended to reduce P300 latency. Behavioral performance and the early processing negativities were not significantly affected. These findings suggest that correcting anemia to normal levels results in improved ability for task-relevant focused attention, and tends to result in quicker neurocognitive processing speed.
Correspondence: *W.S. Brown, Travis Institute, 180 N. Oakland, Pasadena, CA 91101, USA.*

M.M. CHERRIER, S. CRAFT, W. BREMNER, B. ANAWALT, L. GIBSON, & A. MATSUMOTO. Cognitive Effects of Exogenous Testosterone Administration in Eugonadal and Hypogonadal Males.
Recent investigations have suggested potential therapeutic effects of gonadal hormones on cognitive abilities. In particular, testosterone administration has been shown to improve certain cognitive abilities such as spatial and mathematical reasoning. In this study, testosterone (100 mg) was administered to young, eugonadal males along with a battery of cognitive tests as part of a larger study of male contraceptive effects. Verbal memory was significantly reduced for subjects while they were on testosterone in comparison to their off medication performance. A similar effect of decreased verbal memory was also found for a hypogonadal individual (Kallmann's syndrome) on testosterone (200 mg). In addition, the hypogonadal patient demonstrated improved spatial memory. Results suggest testosterone may have varying effects on certain cognitive domains as well as a particular dose response effect.
Correspondence: *Monique Cherrier, GRECC 182B, VAPSHCS, 1660 S. Columbian Way, Seattle, WA 98108-1597, USA.*

H. GILL, H. LINK, E. FOREST, N. PARADISE, D. STUBBS, D. DORNER, R. KOLLMORGEN, M. O'BOYLE, & D. MOORMAN. Cognitive Changes Following Aortic Reconstruction.
A symbol–language integration task and a memory scanning task were administered to two groups of surgical patients (aortic reconstruction and laparoscopy) and an age-matched nonsurgical control group, 1 week before surgery, on the day of discharge, and 2 and 8 weeks after discharge. In aortic reconstruction patients, the cognitive impairment detected preoperatively was accentuated at the time of discharge. Subsequently, a significant cognitive improvement on both tasks occurred in the 2-week and 8-week postdischarge sessions. In fact, cognitive performance for the memory scanning task became equivalent to that of the age-matched nonsurgical controls. Thus, preoperative and immediate postoperative cognitive impairment in patients undergoing repair of an aortic aneurysm does not appear to be the direct consequence of short-term memory loss, but may rather be related to a decrement in encoding, decision, and/or response in execution processes.
Correspondence: *Michael W. O'Boyle, Department of Psychology, Iowa State University, Ames, IA 50011, USA.*

A.D. KALECHSTEIN, C.H. HINKIN, N. VAN SLUIS, S. KUCUKASCI, S.A. CASTELLON, S. SIMON, & W. LING. The Neurocognitive Sequelae of Methamphetamine Use: A Preliminary Report.
Thirteen chronic, high-dose methamphetamine abusers and 5 normal controls participated in a study designed to investigate the neurocognitive sequelae of methamphetamine abuse. Results of *t* tests revealed that methamphetamine abusers performed poorly on tests of sustained attention, procedural memory, and nonverbal learning relative to normal controls. Methamphetamine abusers were more likely to report emotional and cognitive deficits. Mixed results were obtained on tests of psychomotor speed while the two groups were similar on indices of reaction time. The data preliminarily suggest that methamphetamine abuse is associated with a particular pattern of cognitive dysfunction in long-term, high-dose abusers.
Correspondence: *Ari D. Kalechstein, UCLA Drug Abuse Research Center, 1100 Glendon Avenue, Suite 763, Los Angeles, CA 90024-1759, USA.*

C. FUCHS & K.R. KRULL. The Effects of Androgen Excess on Cognitive Functioning in Women.
The effects of androgens on cognitive functioning in women were evaluated. Twenty-three women with hyperandrogenism (HA) were compared to 24 age, education, SES, and IQ matched control women. Groups did not differ in their general ability on measures of spatial perception, verbal fluency, attention, or perceptual speed. However, significant negative correlations were noted between free testosterone levels and verbal fluency, attention, and perceptual speed and accuracy. Free testosterone levels were also negatively correlated with spatial ability. This may have been the result of reduced spatial experience in women with HA due to increased weight. The results suggest that free testosterone levels have a small influence on cognitive functioning in women and offer modest support to the hypothesis that hormones have an activational effect on brain functioning.
Correspondence: *Kevin R. Krull, Department of Psychology, University of Houston, 4800 Calhoun, Houston, TX 77204-5341, USA.*

C.F. SALORIO, D.A. WHITE, J.F. PICCIRILLO, & S.P. DUNTLEY. Evidence for Frontal Dysfunction in Patients with Obstructive Sleep Apnea.
Obstructive Sleep Apnea (OSA) is a respiratory disorder characterized by repeated cessation of breathing during sleep due to obstruction of upper airways. The high metabolic rate of the frontal lobe region makes this area particularly vulnerable to damage associated with chronic hypoxia. In the current study, tests measuring various aspects of executive function were administered to patients with OSA and uncompromised controls. Results indicate that patients with OSA exhibit impairments in executive function; more specifically, these impairments are related to difficulties in cognitive fluency, working memory, maintaining and shifting set, and the employment of memory strategies. Taken together, our results support the presumption that cognitive dysfunction in OSA is related to frontal lobe hypoxia, and that increasing OSA severity results in significantly greater impairments in abilities related to frontal integrity.
Correspondence: *Desirée A. White, Box 1125, Department of Psychology, Washington University, St. Louis, MO 63130, USA.*

E. VERSTRAETEN, R. CLUYDTS, J. VERBRAEKEN, & W. DE COCK. Primary Insomnia *Versus* Nocturnal Nonapneic Snoring: Neuropsychological Sequelae.
Morning neuropsychological functioning is found to be impaired in obstructive sleep apnea syndrome. The role of nighttime hypoxia and sleep fragmentation in inducing cognitive deficits in sleep apneics is a matter of controversy. In addition, there are few data regarding neuropsychological functioning in nonapneic snorers. In the present study, cognitive and motor function in 34 middle-aged nonapneic snorers is compared to 22 primary insomniacs. Insomniacs showed less slow wave and REM sleep; snorers showed the lowest arterial oxygen saturation and apnea–hypopnea index. Insomniacs perform worse than snorers on immediate visual memory, visuospatial reasoning and reaction time. Rather than nocturnal breathing

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

disturbances, sleep disruption is the best predictor of morning neuropsychological functioning.
Correspondence: *Raymond Cluydts, Department of Psychology, University of Brussels, Pleinlaan 2, 1050 Brussels, Belgium.*

MS AND DEMYELINATING DISEASES

D. SLICK, D. NYENHUIS, D. CELLA, & C. CHANG. Cross-Validation of the Chicago Multiscale Depression Inventory for Evaluation of Depressive Symptoms in Persons Diagnosed with Multiple Sclerosis.
The diagnosis of mood disorders in medical patients is often complicated by symptoms of disease that mimic vegetative symptoms of depression. The Chicago Multiscale Depression Inventory (CMDI), a self-report instrument with separate subscales for evaluative, vegetative and dysphoric symtoms of depression was developed by Nyenhuis, et al. (1993) for use in such populations. This paper describes a cross validation study of the CMDI in which it was administered to 249 persons diagnosed with multiple sclerosis. Their data was compared to data from a matched sample of healthy controls. Among MS patients, average T scores for all three CMDI subscales were mildly elevated relative to controls. The prevalence of clinical elevations ($T \geq 65$) differed by subscale among the patients with MS, however, with elevated Vegetative scales more frequent than either Negative Self-Evaluative or Depressed Mood subscales. These findings support previous findings of increased prevalence of depression among patients with MS. The findings also suggest caution in using unidimensional depression scales when assessing patients with MS, as scores may be inflated due to vegetative symptoms associated with MS.
Correspondence: *Daniel Slick, Department of Psychology, Rush Presbyterian-St. Luke's Medical Center, 1653 W. Congress Parkway, Chicago, IL 60612-3864, USA.*

D. SLICK, D. NYENHUIS, D. CELLA, & C. CHANG. Patterns of Depressive Symptoms in Multiple Sclerosis: Relationships to MS Type and Severity of Physical Disability.
Self-report measures of depression and physical disability were administered to 157 patients diagnosed with relapsing–remitting MS (RRMS) and 122 patients diagnosed with chronic–progressive MS (CPMS). The depression measure (Chicago Multiscale Depression Inventory: CMDI) included separate subscales for vegetative symptoms, negative self-evaluation, and dysphoria. Patterns of depression subscale elevations were found to differ by type of MS and level of physical disability. Self-evaluative and dysphoric symptoms of depression were more prevalent in CPMS relative to RRMS, but vegetative symptoms were equally prevalent in both groups and more prevalent than evaluative and dysphoric symptoms in RRMS. Vegetative symptoms were more prevalent than evaluative or dysphoric symptoms among patients with moderate physical disability. Implications for assessing and diagnosing depression in MS are discussed.
Correspondence: *Daniel Slick, Department of Psychology, Rush Presbyterian-St. Luke's Medical Center, 1653 W. Congress Parkway, Chicago, IL 60612-3864, USA.*

B. CONNOR, A.B. FROL, E. FROHMAN, & C.M. CULLUM. Comparative Memory Performance by Multiple Sclerosis Patients Classified by Disease Type.
Multiple sclerosis (MS) can be associated with a decline in neurocognitive abilities, with learning and memory being one of the more consistently impaired domains. Given the heterogeneity of the disorder, there is an interest in whether cognitive functioning differs depending on MS disease type. This study examined 37 patients with clinically definite MS using the California Verbal Learning Test (CVLT) as a measure of learning and memory. Patients were classified by disease type as relapsing–remitting ($N = 11$), secondary–progressive ($N = 13$), or primary–progressive ($N = 13$). Performance between groups on total score, long-delay free recall, and discriminability was not statistically significant when age and sex referenced norms were used. However, a trend for better performance on these measures was observed for the younger relapsing–remitting group.
Correspondence: *C. Munro Cullum, Department of Psychiatry, University of Texas Southwestern Medical Center, 5323 Harry Hines Boulevard, Dallas, TX 75235-8898, USA.*

A. WEINSTEIN, S. SCHWID, & R. SCHIFFER. Neuropsychological Outcome in Clinical Trials for Multiple Sclerosis: Issues in Trial Design.
Therapeutic interventions that reduce exacerbations, slow progression, or improve symptoms of multiple sclerosis (MS) are rapidly emerging. Cognitive impairment affects employability and quality of life for MS patients, suggesting that neuropsychological function should be one of the outcomes to determine treatment efficacy. We examined cognitive function in 251 patients randomised to 20 mg of glatiramer acetate (Copaxone) daily or placebo for 2 years. Results showed a trend toward improved performance (drug group) for processing speed–attention. Previous studies showed improved visual memory with high dose Interferon beta-1b (IFNB) and no change with 4-aminopyridine. Clinical trial design issues include: baseline assessment, sample size, time periods, washout periods, practice effects, and patient selection. Continued work toward design improvement for future MS therapeutic trials is paramount.
Correspondence: *Amy Weinstein, Department of Neurology, University of Rochester Medical Center, Rochester, NY 14642, USA.*

C. HIGGINSON, P. ARNETT, & W. VOSS. The Ecological Validity of Clinical Tests of Memory and Attention in Multiple Sclerosis.
The degree to which clinical tests of cognitive functioning predict impairment in everyday living has been labeled ecological validity, and has recently become an area of interest. The current study used a sample of 31 cognitively and functionally impaired multiple sclerosis (MS) patients to determine if tests commonly used to assess cognitive functioning are ecologically valid, and compare two methods of improving the ecological validity of cognitive testing. Stepwise multiple regression analyses suggested that tests of memory and attention more analogous to everyday tasks are better predictors of the functional impairment in MS than both standard clinical tests of memory and attention, and memory questionnaires completed by the patient and a significant other.
Correspondence: *Christopher I. Higginson, Department of Psychology, Washington State University, P.O. Box 644820, Pullman, WA 99164-4820, USA.*

J. FISCHER, R. RUDICK, D. GOODKIN, K. PERKINS, D. BARILLA, M. MESSMER UCCELLI, K. SCHWETZ, & S. VANDERBRUG MEDENDORP. Patterns of Cognitive Impairment in Chronic Progressive Multiple Sclerosis (MS): Impact on Clinical Trial Outcomes and Implications for Trial Design.
A comprehensive neuropsychological (NP) battery was administered to chronic progressive MS patients upon enrollment in a 2-year methotrexate trial and yearly thereafter. Hierarchical cluster analysis of standardized residual scores on five measures (adjusted for age and education) identified: (1) a relatively intact group ($n = 20$); (2) a group ($n = 24$) with circumscribed deficits in selective attention (PASAT-2") and secondary memory (CVLT Long Delay Free Recall); and (3) a globally impaired group ($n = 10$). Univariate ANCOVAs (DV = 2 year change scores) with two between-subject factors (Treatment $\times$ Cluster) and three covariates (age, education, and baseline score) were superior to simpler models in detecting treatment effects (WAIS–R Block Design, $p = .03$; PASAT-2", $p = .002$; and WCST Perseverative Responses, $p = .024$). The stability of NP patterns and considerations in designing trials with neuropsychologically heterogeneous populations are discussed.
Correspondence: *Jill Fischer, Mellen Center (U-10), Cleveland Clinic Foundation, 9500 Euclid Avenue, Cleveland, OH 44195-5244, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

EPILEPSY-1

G.P. LEE, D.W. LORING, K. J. MEADOR, & J.A. BAUZÁ. Wada and EEG Evaluation Prior to Arteriovenous (AVM) Embolization.
AVM embolization is a common treatment to reduce AVM size by sending pellets or coils into blood vessels that supply the AVM core to block blood flow and "shrink" the AVM. Because significant neurological deficits occur in patients undergoing AVM embolization, we conducted 34 Wada and EEG evaluations in 16 patients prior to AVM embolization to assess the risk for creating irreversible neurological or cognitive deficits. There were 9/34 (26%) "positive" amobarbital evaluations (6 Wada and 3 EEG), and embolization was undertaken in 2 of these patients without subsequent deficit. The only complication after "negative" evaluation involved expansion of a superior quadrantanopia. These, in conjunction with other, preliminary results suggest simultaneous WADA–EEG evaluation may be useful in guiding clinical decision making prior to AVM embolization.
Correspondence: *Gregory P. Lee, Section of Neurosurgery, Medical College of Georgia, Augusta, GA 30912-4010, USA.*

J. SWEARER, K. KANE, C. PHILLIPS, J. WEAVER, T. ANDERSON, & M. LAVOIE. Predictive Value of the Intracarotid Amobarbital Test in Bihemispheric Seizure Onset.
The intracarotid amobarbital test (IAT) is used to lateralize language function, assess hemispheric memory, and has been found to have value in predicting cognitive and seizure outcome following anterior temporal lobectomy for refractory epilepsy. In this study 23 nonlesional patients were evaluated. The IAT correctly lateralized seizure focus in 19. The magnitude of the difference in IAT scores between the two hemispheres was significantly greater ($p = .003$) in the patients who lateralized than in the 4 patients with bihemispheric seizure onset on subsequent intracranial EEG (5.40 ± 2.82 *vs.* 0.50 ± 1.73). This suggests that the IAT is useful not only in predicting lateralized seizure focus, but bihemispheric onset as well.
Correspondence: *Joan Swearer, Department of Neurology, University of Massachusetts Medical Center, 55 Lake Avenue North, Worcester, MA 01655, USA.*

R. HART, K. HOLLOWAY, J. WADE, W. CORRIE, T. BARNES, & S. CHOI. Quantitative Prediction of Change in Verbal Memory with Dominant Temporal Lobectomy.
Stepwise multiple linear regression was used to construct models for prediction of verbal memory change following dominant temporal lobectomy for intractable epilepsy. Independent variables included preoperative verbal memory scores, seizure outcome, age at onset, age at time of surgery, findings on magnetic resonance imaging, and the extent of resection. The obtained models accounted for 71% and 92% of the variability in verbal memory change. Results from a regression model considered within the larger clinical context may be useful in evaluating the relative risks and benefits of surgery.
Correspondence: *Robert P. Hart, Consultation/Liaison Psychiatry, Medical College of Virginia/Virginia Commonwealth University, P.O. Box 980268, Richmond, VA 23298-0268, USA.*

D. DRANE, D.W. LORING, G.P. LEE, & K. MEADOR. Trial Length Sensitivity of the Verbal Selective Reminding Test to Lateralized Temporal Lobe Impairment.
The sensitivity of 6- *versus* 12-trial versions of the Verbal Selective Reminding Test (VSRT) to the material-specific memory deficits that are often observed in patients with lateralized temporal lobe (TL) impairment was investigated in 84 patients with complex partial seizures of temporal lobe origin (L = 45; R = 39). Left TL patients tended to perform worse than right TL patients on both long-term storage and continuous long-term retrieval using either 6- or 12-trial versions. When employed to classify individual patients, comparable classification was obtained using either 6- or 12-trial formats. These results indicate that a shortened 6-trial format may be employed without any significant loss of sensitivity to left TL impairment.
Correspondence: *Daniel Drane, Northeast Georgia Medical Center, 743 Spring Street, Gainesville, GA 30501, USA.*

M. PADULA, J. RITCHIE, E. RANKIN, & K. SIGLER. Estimating Premorbid Intelligence in Patients with Epilepsy.
This study compared the utility of premorbid intelligence estimation methods, the Barona, the Reading subtest of the WRAT–3, the Oklahoma Premorbid Intelligence Estimate (OPIE) and the Oklahoma Premorbid Intelligence Estimate–Revised (OPIE–R). Subjects were 68 epilepsy patients and 52 nonneurological chronic pain patients serving as controls. Results confirmed the utility of the OPIE in estimating premorbid intelligence in controls. Both the OPIE–R and Barona formulae resulted in overestimates, while the WRAT–3 resulted in underestimates, of premorbid functioning in controls. As expected, OPIE, OPIE–R, and Barona estimates were significantly different from WAIS–R FSIQ scores in the epilepsy patients. Only the WRAT–3 estimate was not significantly different in this group.
Correspondence: *Marjorie A. Padula, Department of Psychology, University of Nebraska Medical Center, 600 S. 42nd Street, Omaha, NE 68198-5577, USA.*

W.B. BARR, V. WARMFLASH, G. NEY, & N. SCHAUL. Use of Various "Long" and "Short" Forms of the Boston Naming Test in Epilepsy Surgery Candidates.
This study compares the 85- and 60-item versions of the Boston Naming Test to various short forms. All stimuli from the 85-item version were administered to 185 patients undergoing seizure monitoring. The stimuli were divided into the subsets used in the shorter forms. Correlations among total scores ranged from $r = .82$ to .99. Adequate levels of internal consistency were obtained for forms including greater than 30 items. Examination of ROC curves and effect sizes indicates that all forms identify the laterality of focal patients with comparable levels of success. No differences were observed between the 85-item and 60-item versions. All versions with 30 items or more were comparable in terms of their distributions and in their ability to classify patients with focal-onset seizures.
Correspondence: *William B. Barr, Department of Neurology and Psychiatry, Hillside Hospital, Long Island Jewish Medical Center, Glen Oaks, NY 11004, USA.*

S.L. REMINGER, A.M. HERRING, G.L. AHERN, M.E. WEINAND, & D.M. LABINER. The Utility of Neuropsychological Test Measures in the Prediction of Seizure Lateralization in Temporal Lobe Epilepsy.
Neuropsychological assessment results were evaluated for their utility in determining lateralization of seizure onset in temporal lobe epilepsy (TLE). Forty-four patients completed neuropsychological batteries that included tests of intellectual, memory, language, attention, motor, and executive function. Seizure lateralization was determined for these patients through comprehensive analysis of electroencephalographic and imaging data, and subsequently confirmed by surgical outcome. The two patient groups (24 right-, 20 left-TLE) differed significantly on subtests from four tasks (CVLT; WMS–R; Warrington Recognition; Finger Tapping). Discriminant function analysis demonstrated that these four tasks correctly lateralized 68.2% of patients. This hit rate was higher than the predictive value of all battery tests combined (59.1%). The clinical applications of these data are discussed.
Correspondence: *Sheryl Reminger, Department of Psychology, University of Arizona, Tucson, AZ 85721, USA.*

C. GROTE, D. NYENHUIS, D. BERGEN, J. BUELOW, A. GILNAGEL, A. KANNER, & M. SMITH. Prevalence of and Risk Factors for Depressive Symptoms in Epilepsy.
Previous investigations of depression in epilepsy have largely relied on atypical and small samples of patients, and have not comprehensively examined the role of risk factors. Therefore, we collected self-report, demographic, and seizure-related data from 138 outpatients with epilepsy to determine whether they reported depressive symptoms more often than normal controls, and to identify risk factors for depression. Results indicate that epilepsy patients report a significant level of depression 2.7 times more often than did community controls. Increased seizure frequency, later age of onset, and a left hemisphere seizure focus were more predictive of depressive symptoms than demographic, medication, or psychosocial vari-

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

ables. This investigation suggests that depressive features in epilepsy may be a consequence of the illness itself, and not simply a reaction to it.
Correspondence: *Christopher Grote, Department of Psychology, Rush Medical College, 1653 W. Congress Parkway, Chicago, IL 60612, USA.*

S. J. SWANSON, A.C. ROSEN, J. VOSTERS, A. BEYKOVSKY, G.L. MORRIS, W.M. MUELLER, K. SCHAUER, & T.A. HAMMEKE. Detecting Change in Naming and Verbal Fluency after Tailored Temporal Lobectomy Using Regression-Based Change Norms.
Recent studies have used sensitive empirical methods such as reliable change indices and regression-based norms for change to detect meaningful neuropsychological change after temporal lobectomy (TL). In the present study previously published regression-based change norms were used to assess language outcome after tailored TL. Forty-one left hemisphere dominant patients underwent either left or right TL. Using a regression-based prediction equation, a subset of left TL patients who experienced postoperative dysnomia was detected which was not observed by examining group differences (left TL *vs*. right TL) in object naming change scores. In addition a subgroup of left but no right TL patients experienced significant improvements in fluency. Regression-based change norms can be used to examine rates of decline or improvement after standard or tailored resections.
Correspondence: *Sara J. Swanson, Section of Neuropsychology, Department of Neurology, Medical College of Wisconsin, 9200 W. Wisconsin Avenue, Milwaukee, WI 53226, USA.*

D.D. CAUDLE, J.I. BREIER, K.L. FUCHS, B.L. BROOKSHIRE, J. WHELESS, A.B. THOMAS, J. CONSTANTINOU, & L. J. WILLMORE. Laterality Effects on MMPI–2 Profiles in Temporal Lobe Epilepsy.
The MMPI–2 profiles for 81 patients with intractable temporal lobe epilepsy (TLE) who eventually underwent unilateral temporal lobectomy were subjected to a multivariate profile analysis. Side of seizure onset (left-TLE, right-TLE) was the between subjects variable while MMPI–2 clinical scales were the within-subjects variables. Analyses indicated a significant elevation by group effect, suggesting a difference in MMPI–2 profile patterns between groups. Follow-up analyses indicated that profiles of patients with LTLE suggested a significantly greater degree of depression, anxiety, and social isolation, as well as more difficulty with concentration and memory than those with RTLE. This dissociation may reflect a difference in the effects of left and right seizure onset on brain areas associated with emotional functioning, or self-awareness of psychological stress, or both.
Correspondence: *Donald D. Caudle, University of Houston, Department of Psychology, 4800 Calhoun, Houston, TX 77204-5341, USA.*

T. LAZARUS. Prevalence of Epilepsy in a Selected Community.
There is a relative lack of data regarding the prevalence of neurological conditions in developing countries. The prevalence of epilepsy in a selected community in South Africa was ascertained using a survey method. The WHO screening device comprising three questions was modified and administered to a sample of 7596 residents. Those responding positively to the questions were clinically examined by a neurologist using the International League Against Epilepsy criteria. About 10% of the subjects were diagnosed with epilepsy. There was a significantly higher prevalence of all types of epilepsy among females. A relative lack of knowledge regarding the role of neuropsychological services for basic education, assessment and monitoring of drug therapy was reported. The findings are discussed against the background of those obtained in developed countries. Recommendations are made regarding the role of neuropsychology as a discipline in developing effective early identification and intervention strategies in epidemiological studies.
Correspondence: *T. Lazarus, Department of Psychology, University of Durban Westville, Private Bag X54001, Durban. 4000. South Africa.*

HEMISPHERIC ASYMMETRY-1

Z. EVIATAR. Cross-Language Tests of Hemispheric Strategies in Reading Nonwords.
Four experiments are described that explore the effects of specific language characteristics on hemispheric functioning in reading nonwords. All of the experiments used a lateralized CVC identification task. Previous research has shown that percent errors reveal a right visual field advantage in both Hebrew and English. Qualitative error patterns that index hemispheric strategies have shown that the RH uses a sequential strategy while the LH uses a more parallel strategy in English, but show the opposite pattern in Hebrew. Experiment 1 tested whether this resulted from the language of the test or the native language of the participants. The results show that it is the native language of the speakers that determines the pattern of this asymmetry. Experiment 2 tested whether this is true of Arabic, as it is similar to Hebrew on critical dimensions. The results with native Arabic speakers were similar to the Hebrew pattern and different from the English pattern. Experiment 3 tested whether the sequential–parallel distinction will show up in latency, and whether there is more phonological variability in Hebrew than in English. The second hypothesis was supported. The RT results were equivocal. Experiment 4 used horizontal presentation. This eliminated all evidence of sequential processing in both hemispheres in Hebrew, while English speakers still showed evidence for sequential processing in both hemispheres. This is interpreted as resulting from the morphological differences between the languages where reading Hebrew requires attention to be deployed to all the constituents of the stimulus in parallel, whereas reading English allows sequential processing of the letters in both hemispheres.
Correspondence: *Zohar Eviatar, Psychology Department, University of Haifa, Haifa, 31905, Israel.*

K. YOSHIZAKI & Y. TSUJI. The Benefits of Interhemispheric Integration on the Japanese Kana Scripts Matching Tasks.
We examined the effects of task complexity on interhemispheric integration in Japanese Kana (Hiragana and Katakana) scripts matching. In Experiment 1, we gave the right-handed subjects both Katakana matching task (Physical Identity: PI) and Katakana-Hiragana matching task (Name Identity: NI). The results showed that while the bilateral visual-field advantage was found in NI, the unilateral visual-field advantage was found in PI. In Experiment 2, we gave the right-handed subjects both the NI and more complex task (vowel matching). The results showed that the size of the bilateral visual-fields advantage in NI was the same as in the vowel matching task. We reconfirmed the benefits of bihemispheric processing even though the effect of the scanning habit on the bilateral visual-field performance was attenuated.
Correspondence: *Kazuhito Yoshizaki, Department of Communication Science, Aichi Shukutoku University, 9, Nagakute-Katahira, Nagakute-cho, Aichi, Japan, 480-11.*

N.K. MADIGAN, J.C. BOROD, H. EHRLICHMAN, & J. TWEEDY. Evidence for Interhemispheric Asymmetries in Withdrawal Responses in Patients With Unilateral Lesions.
Occurrence of avoidant responses was examined in subjects with right hemisphere damage (RHD), and left hemisphere damage (LHD), and in normal controls (NCs). These responses were examined in order to evaluate the hypothesis that there is a right hemisphere dominance in withdrawal-related affective behaviors. Results revealed that avoidant responses were more frequently observed in subjects with LHD than those with RHD and healthy controls. A greater number of avoidance responses were also found for unpleasant than pleasant stimuli. Intrahemispheric effects of lesion site were also examined. The findings can be explained by a mechanism proposed by Davidson (1984), where there is a contralateral disinhibition of right hemisphere functions following left hemisphere lesions, suggesting there is a right-hemisphere dominance in withdrawal or avoidant action tendencies.
Correspondence: *Nancy Madigan, % Dr. Joan Borod, Dept. of Psychology, NSB E-318 Queens College, CUNY, 65-30 Kissena Blvd., Flushing, NY 11367, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

S. LANGER, M. ZAK, L. PETTIGREW, & L. BLONDER. Awareness of Paralinguistic Expressivity Following Unilateral Stroke.
Neuropsychological research suggests that the right hemisphere controls facial and prosodic expression. Individuals with right hemisphere damage (RHD) often speak in a monotone and are less facially expressive than are individuals with left hemisphere damage (LHD) or normal controls (NC). The purpose of the present study was to further examine RHD paralinguistic expressivity by means of both self-report and spousal report. Ten LHD, 11 RHD, and 7 NC patients made judgments about their recent nonverbal behavior (e.g., facial expressivity, frequency of smiling). Spouses made similar judgments with respect to their partner's behavior. Aggregate analyses based on a summary of eight nonverbal behaviors revealed the RHD patients to see themselves as less nonverbally expressive than the NC patients. (Patient self-ratings did not differ between RHD and LHD patients, nor between LHD and NC patients.) Spouse ratings mirrored these findings. We conclude that not only are RHD patients lacking in paralinguistic expressivity, but that they are aware of such deficits.
Correspondence: *Shelby Langer, Department of Behavioral Science, College of Medicine, Lexington, KY 40536-0086, USA.*

J.T. KAPLAN & E. ZAIDEL. Effect of Lateralized Feedback on Lexical Decision.
Each hemisphere may have its own monitoring and control systems. This experiment investigates the ability of the hemispheres to process feedback information. We used a lateralized lexical decision task in which accuracy feedback was presented after each trial in either the left visual field (LVF) or right visual field (RVF) during different blocks of trials. Performance was better in the visual field that was receiving feedback, and accuracy was greater overall during LVF feedback blocks. Each hemisphere had a different response to negative feedback. Trials following negative feedback to the LVF were more accurate and slower, whereas trials following negative feedback to the RVF were slightly less accurate and no faster. These results suggest that each hemisphere can independently process and respond to feedback information.
Correspondence: *Jonas T. Kaplan, Department of Psychology, UCLA, Box 951563, Los Angeles, CA 90095-1563, USA.*

N.Y. WEEKES, L. CAPETILLO-CUNLIFFE, M. IACOBONI, J. RAYMAN, & E. ZAIDEL. Individual Differences in the Hemispheric Dual Route Model of Word Recognition?
The dual route model suggests that reading of letter strings occurs through both a lexical and a nonlexical route. Hemispheric specialization of these routes has also been posited. The purpose of the present study then was to investigate individual differences in the hemispheric specialization of these routes. The effect of four individual difference factors were explored: biological sex, handedness, menstrual stage (i.e., fluctuations in estrogen), and degree of masculinity (i.e., sexual attribution). We looked at the effect on performance of the following dual route variables: (1) frequency, (2) regularity and (3) length, using a bilateral lexical decision task. We observed that sex, menstrual stage, and masculinity each affected the hemispheric specialization of the dual route variables, but did so in different ways.
Correspondence: *Nicole Y. Weekes, UCLA Department of Psychology, 1282A Franz Hall, Box 951563, Los Angeles, CA 90095-1563, USA.*

S.M. BERMAN, B. SOYENOBU, & E. ZAIDEL. Multiple Callosal Channels: Evidence from Alcohol and ERP.
Event-related potentials (ERPs) and behavioral measures were obtained from 10 college students in response to a large unilateral letter made of small letters. Subjects made a forced-choice press to identify the large letter (global task) or small letter (local task). Peak latency of deflections from scalp locations contralateral to the visual field of presentation were subtracted from corresponding ipsilateral measures to derive interhemispheric transfer time (IHTT) for the P1, N1, and P2 ERPs. The major finding is that the ERP–IHTT can contain at least two callosal channels. The P1 deflection peaked earlier over the right scalp, was transmitted faster from left to right, and was prolonged by alcohol only ipsilaterally. P2 peaked earlier over left scalp, was transmitted faster from right to left, and was alcohol-delayed at all scalp locations. The robust multiple callosal channels in the ERP should be a rich substrate for investigations of physiology of interhemispheric transfer. The alcohol-induced disparity in availability of peripheral visual information to the two hemispheres may have important implications for bimanual coordinated tasks, such as driving.
Correspondence: *Steve Berman, UCLA NP1, 760 Westwood Plaza, Box 11, Los Angeles, CA 90024-1759, USA.*

S.M. BERMAN, E. ZAIDEL, & M. MANDELKERN. PET Activations Dissociate Hemispheric Specializations for Auditory Word and Accent Detection.
In 16 adult volunteers, we recorded PET blood flow images during dichotic presentation of four words in four foreign accents. A right ear advantage is usually recorded when discriminating words differing in initial stop consonants. This index of left hemisphere specialization agrees with functional imaging activations of classical speech areas by words. We reasoned that accent discrimination might depend on prosodic linguistic processing involving homologous regions of the right hemisphere. PET data was analyzed by statistical parametric maps. There was a right ear advantage (left hemisphere specialization) for words, but equal ear performance (both hemispheres) for accents. Two left frontal regions, including Broca's area, and an inferior left temporal region, were activated more in the word task. Three right frontal areas and an area in homologous right temporal lobe were more activated by the accent task. There were no activations in the unexpected hemispheres. Results are interpreted both in terms of differential lateralization for different aspects of speech and a strategy featuring verbal episodic retrieval in the accent task.
Correspondence: *Steve Berman, UCLA NP1, 760 Westwood Plaza, Box 11, Los Angeles, CA 90024-1759, USA.*

J.M. KEILLOR, G.M. GRIMSHAW, & M.P. BRYDEN. Sex Differences in Interhemispheric Interaction.
The present study investigated the interhemispheric interactions that occur in bilateral lexical decision. Several researchers have suggested that bilateral presentation of words (but not nonwords) produces activation of homologous areas of opposite hemispheres. Further, this bilateral activation is proposed to inhibit interhemispheric interaction, forcing the hemispheres to process independently (direct access), and magnifying the right visual field advantage that is typically observed for lexical decision. We provide evidence that this independent processing occurs reliably only in female subjects, whereas male subjects seem to rely more on callosal relay to the linguistically competent left hemisphere.
Correspondence: *G.M. Grimshaw, Program in Psychology, California State University, San Marcos, CA, USA.*

S. SUDIA, D. BOLON, & D. VAN LANCKER. Linguistic–Prosodic Performance in Dysprosodic Apraxia Following Left *Versus* Right Hemisphere Damage: Two "Matched" Case Studies.
Inconsistent results in group studies of speech prosody may be attributable to lack of clinical diagnosis of dysprosody in individuals. To augment group studies, 2 dysprosodic cases (LBD and RBD) were tested on linguistic–prosodic comprehension and production, using listening tests and acoustic analyses. Contrasting phrases were identified well by normal listeners when produced by a normal speaker but not by either BD subject. Of the three acoustic parameters investigated (pitch, intensity, and syllable duration), our measurements indicated robust use by the normal speaker of pitch and duration. Both BD speakers used pitch but both did so aberrantly in distinguishing members of the pairs, while aberrant use of temporal contrasts was observed only in the LBD speaker. We conclude that linguistic–prosodic cues are interactive and complex.
Correspondence: *Shelly Sudia, Neurolinguistics and Speech Science Laboratory (126) VAOPC, 351 E. Temple Street, Los Angeles, CA 90012, USA.*

B. SCHIEFFER, L.K. PAUL, & W.S. BROWN. Deficits in Complex Problem Solving in Agenesis of Corpus Callosum.
Agenesis of the corpus callosum (ACC) is sometimes found in neurologically aymptomatic individuals with normal IQ. However, an as yet un-

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

specified pattern of subtle neuropsychological deficits may be present. Two individuals with complete ACC and 2 with partial ACC (all with normal IQ) were given the Wisconsin Card Sorting Test (WCST) and Halstead Category Test (HCT) to measure perceptual abstraction and problem solving. The HCT requires greater abstraction and problem solving ability than the WCST. All complete ACC subjects performed significantly more poorly on the HCT than on the WCST. The degree to which this difference was evident in the partial ACC subjects depended on the amount of residual callosal fibers. This performance discrepancy indicates that the corpus callosum is important for complex problem solving.
Correspondence: *Warren S. Brown, Travis Institute and Fuller Graduate School of Psychology, 180 N. Oakland Avenue, Pasadena, CA 91101, USA.*

D.H. WEISSMAN, M.T. BANICH, & E.I. PUENTE. The Across-Hemisphere Advantage for Complex Tasks Does Not Depend on Directing an Input to a Hemisphere with a Lighter Processing Load.
To determine whether interhemispheric interaction (IHI) produces better performance by capitalizing on a lighter processing load per hemisphere relative to intrahemispheric trials, we performed a four-item version of Banich and Belger's (1990) three-item paradigm, which originally yielded a greater advantage for across-hemisphere processing in a more complex name-identity (NI) matching task (e.g., A a) than in a less complex physical-identity (PI) matching task (e.g., A A). Whereas Banich and Belger displayed a target item to one hemisphere along with two probes, one per hemisphere, we had two target items, one in each hemisphere, either of which could match a probe. Confirming prior results, IHI aided performance more for the NI than for the PI task, but less for each individual task than in previous studies.
Correspondence: *Daniel Weissman, Department of Psychology and the Beckman Institute, University of Illinois at Urbana-Champaign, Champaign, IL 61820, USA.*

Paper Session 3/11:00 a.m.–12:30 p.m.

TOXIC EXPOSURE

A.M. BROWN-DEGAGNE & J. MCGLONE. Multiple Chemical Sensitivity (MCS): A Test of the Olfactory–Limbic Model.
Studies have failed to find cognitive deficits in persons with MCS. However, the cognitive profile of MCS has not been examined within the framework of Bell's olfactory–limbic model. It predicts that cognitive weaknesses will be associated more with limbic (i.e., frontal and/or temporal) than with nonlimbic (i.e., posterior) brain regions. Matched MCS, asthma, and healthy control groups were tested on cognitive measures with localizing value. The MCS group performed as well as controls. However, both the MCS and asthma groups performed significantly worse on tasks sensitive to frontal and temporal than posterior regions. The olfactory–limbic model may provide a useful heuristic to describe the cognitive profile of MCS. However, there is no evidence on norm-based cognitive measures that brain damage, *per se*, has occurred.
Correspondence: *Anne-Marie Brown-DeGagne, Department of Psychology, Dalhousie University, Halifax, NS B3H 4J1, Canada.*

P.D. CONNOR, A.P. STREISSGUTH, P.D. SAMPSON, F.L. BOOKSTEIN, H. BARR, & J.A. WEGELIN. Fluency and Speed of Information Processing as Related to Quantitative Neuroimaging in Fetal Alcohol Syndrome and Fetal Alcohol Effects: Preliminary Findings.
Twelve adult subjects (4 FAS, 4 FAE, and 4 controls) were assessed on measures of verbal and nonverbal fluency as well as tasks assessing speed of information processing. In addition, each subject received MR imaging. Compared with controls, patients with FAS/FAE had lower verbal and figural production and slower speed of information processing. Performance on neuropsychological measures was significantly correlated with a neuroanatomic landmark-based measure of size called *centroid size*. Patients with FAS/FAE who had the poorest performance on neuropsychological tests also had the smallest brain sizes. The implications of these functional and structural deficits are discussed.
Correspondence: *Paul D. Connor, Department of Psychiatry and Behavioral Sciences, University of Washington, Fetal Alcohol and Drug Unit, 180 Nickerson Street, Suite 309, Seattle, WA 98109, USA.*

C. SHELTON, J. SAXTON, & M. BUTTERS. Length of Abstinence and Recovery of Function in Elderly Alcoholics.
The degree to which elderly alcoholics show improvement in neuropsychological test performance with abstinence from alcohol is a continuing area of debate. In this study we compared the neuropsychological test performance of elderly alcoholics who had been abstinent for less than 6 months and elderly alcoholics who had been abstinent for more than 6 months with normal elderly control subjects. The results suggest that although elderly alcoholics recover some function over time they exhibit persisting deficits in a number of cognitive domains, for example, letter fluency, clock drawing, intrusions, and planning–strategy deficits. We suggest that these cognitive functions are subserved by frontal–executive abilities and that this deficit accounts for the persisting difficulties encountered by elderly abstinent alcoholics.
Correspondence: *Cynthia A. Shelton, University of Pittsburgh Medical Center, Western Psychiatric Institute and Clinic, Room 1086, 3811 O'Hara Street, Pittsburgh, PA 15213, USA.*

O.M. ALHASSOON, R.M. DUPONT, M.J. TAYLOR, B.C. SCHWEINSBURG, P.P. LEHR, & I. GRANT. SPECT Cerebral Perfusion in Recently Detoxified and Long-term Abstinent Alcoholics and Polydrug Abusers.
We examined whether long-term abstinent alcoholics (LTA, abstinent min. 18 months) had better SPECT cerebral perfusion compared to recently detoxified alcoholics (RDA, abstinent min. 3 weeks), indicating full brain recovery after initial abstinence. We also examined whether recently detoxified alcoholics who were polydrug users (PDA) had worse perfusion compared to RDA. *Method*: 20 LTA, 17 RDA, 15 PDA, and 16 nonalcoholic controls (NAC) were compared using technetium-99m-hexamethylpropylene-amine-oxime SPECT in a cognitive activation paradigm. *Results*: RDA and PDA had reduced global uptake compared to NAC; regional analysis showed reduction in prefrontal and superior-posterior frontal areas and greater uptake in parieto–occipital and parieto–temporal areas. LTA uptake was intermediate between NAC and RDA/PDA. *Conclusion*: Adding polydrug use to alcohol abuse is not reflected in further SPECT perfusion changes beyond those related to alcoholism *per se*.
Correspondence: *Omar Alhassoon, Department of Psychiatry, University of California, San Diego, 2760 Fifth Avenue, Suite 200, San Diego, CA 92103, USA.*

L. TERRYBERRY-SPOHR, W. LEBER, & J. COLE. Persian Gulf War Veterans: The Relationship Between Complaints of Memory Difficulties, Performance on Neuropsychological Measures of Memory, and Depression.
Thirty-one Persian Gulf War Veterans who complained of memory difficulties were compared to 31 matched pairs who did not complain, on neuropsychological measures of memory (WMS–R Logical Memory, WMS–R Visual Reproduction and the CVLT) and MMPI–2 Depression Scales (Scale 2 and DEP). The results indicate that PGW veterans who complain of memory deficits show some differences when compared to their non-complaint peers, particularly in the area of visual memory. Many of the differences are likely due to the effects of depression, although some differences remained even after accounting for these effects. In spite of these differences, neither group demonstrated clinically significant memory deficits, indicating that memory complaint may be more related to level of depression, even mild levels, than deficits on measures of memory.
Correspondence: *Lori S. Terryberry-Spohr, Clinical Neuropsychologist, Alegent Health–Immanuel Rehabilitation Center, 6901 North 72nd Street, Omaha, NE 68122-1799, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

R.F. WHITE, M. KRENGEL, J. WOLFE, S. PROCTOR, T. HEEREN, M.S. BORGOS, J.D. DAVIS, L. PEPPER, J. VASTERLING, P. SUTKER, & D. OZONOFF. Neuropsychological Findings Among Persian-Gulf-War-era Veterans.

Veterans of the Persian Gulf War have complained of chronically experiencing a variety of symptoms, some of which may reflect CNS dysfunction. This is of particular concern because several neurotoxic agents appear to have been present in the Gulf. We have examined four cohorts of PGW veterans using neuropsychological and stress measures. When comparing veterans deployed to the Gulf to those deployed elsewhere, differences emerge on several tests. These are related to self-reported war theater exposures.

Correspondence: *Roberta F. White, Boston Environmental Hazards Center, Boston DVAMC–116B-4, 150 S. Huntington Avenue, Boston, MA 02130-4893, USA.*

Paper Session 4/11:00 a.m.–12:30 p.m.

ALZHEIMER'S DISEASE

B. REED, J. EBERLING, L. KWAN, N. SCHUFF, M. WEINER, R. WALLACE, D. MUNGAS, & W. JAGUST. Memory Performance is Related to Function in Different Brain Regions in Alzheimer's Disease and Subcortical Stroke.

The relationship of cerebral glucose metabolism to memory performance was examined in two groups, patients with Alzheimer's disease (AD; $N = 22$) and patients with subcortical stroke (SS; $N = 21$). Subjects performed a continuous verbal recognition memory test during the uptake period of the tracer [^{18}F]-fluorodeoxyglucose and images were obtained on a high resolution PET scanner. Volumes of interest were constructed using volumetric MRI images and then co-registered with the PET data set to obtain regional activity rates which were then atrophy corrected and normalized to whole brain activity. A series of multiple regressions which included terms for age and education showed that memory performance was associated with hippocampal activity in AD but not SS, and with frontal lobe activity in SS but not AD.

Correspondence: *Bruce Reed, UC Davis Alzheimer's Disease Center (127a), 150 Muir Road, Martinez, CA 94553, USA.*

M. JACOBSON, D.C. DELIS, T.L. DEMADURA, C. LOFTIS, D. SALMON, D. GALASKO, & M.W. BONDI. Asymmetric Cognitive Profiles in the Preclinical Phase of Alzheimer's Disease.

The prevalence of asymmetric cognitive profiles was investigated in 11 nondemented elderly subjects who, retrospectively, were determined to be in a preclinical phase of Alzheimer's disease (pre-AD), and 67 age- and education-matched normal control (NC) subjects who did not go on to develop AD. The pre-AD patients all had the ApoE-E4 genotype, and 9 of the 11 patients had a positive family history of AD. The NC subjects all had a negative family history of AD and those tested did not have the ApoE-E4 genotype. Ten of the 11 pre-AD subjects (91%) exhibited an asymmetric cognitive profile (Boston Naming Test z score was either 1 standard deviation higher or lower than Block Design z score), whereas only 21 of the 67 normal control subjects (31%) exhibited an asymmetric cognitive profile ($\chi^2 = 15.5$; $p < .01$). The initial presentation of cognitive deficits in AD may be analogous to the initial presentation of motor deficits in Parkinson's disease, with asymmetrical involvement being a common feature.

Correspondence: *Mark Jacobson, Psychology Service 116B, VA Medical Center, 3350 La Jolla Village Drive, San Diego, CA 92161, USA.*

S.C. JOHNSON, A.J. SAYKIN, L.A. FLASHMAN, & H.J. RIORDAN. Reduction of Hippocampal Formation in Alzheimer's Disease and Correlation with Memory: A Meta-Analysis.

Studies reporting hippocampal formation (HF) measurements in Alzheimer's Disease (AD) and matched controls, and studies reporting correlations between HF and memory were subjected to meta-analysis. All studies reported significantly smaller HF in AD patients than controls. The overall effect size (ES) of HF reduction was large, $d = -1.56$ ($p < .0001$), representing a 27% reduction. The mean ES was significantly greater ($p = .009$) for volumetric studies $d = -1.86$ when compared to studies using area estimates of the HF, $d = -1.32$. For memory functioning, the average Z-transformed ES of the correlations between immediate, delayed and recognition memory and the HF was $Z = .34$, .46, and .69 respectively. These results highlight the anatomic and functional effect of HF atrophy in AD, and the improved statistical power associated with methodological advances.

Correspondence: *Sterling C. Johnson, Department of Psychiatry, Dartmouth Medical School, One Medical Center Drive, Lebanon, NH 03756, USA.*

R.C. PETERSEN, C.R. JACK, JR., G.E. SMITH, S.C. WARING, & R.J. IVNIK. MRI in the Diagnosis of Mild Cognitive Impairment and Alzheimer's Disease.

Patients with a mild cognitive impairment (MCI) have a memory impairment but are not demented. The distinction between these patients and those with very mild Alzheimer's disease (AD) can be difficult to make. We assessed the utility of MR-based volumetric measurements of the hippocampal formation including the head, body, and tail in 32 patients with MCI (Clinical Dementia Rating 0.5) and 21 patients with very mild AD (Clinical Dementia Rating 0.5). While the MCI patients' hippocampal volumes were approximately 0.97 *SD* below age- and sex-matched control subjects ($N = 124$), the very mild AD subjects were an additional *SD* ($SD = -1.92$) below the MCI patients. These data imply that volumetric MRI measurements may be useful in making the clinical distinction between MCI and AD.

Correspondence: *Ronald C. Petersen, Department of Neurology, Mayo Clinic, Rochester, MN 55905, USA.*

P.J. MOBERG, R.L. DOTY, R.N. MAHR, R.I. MESHOLAM, S.E. ARNOLD, B.I. TURETSKY, & R.E. GUR. Olfactory Identification in Elderly Schizophrenia and Alzheimer's Disease.

Olfactory identification ability using the University of Pennsylvania Smell Identification Test (UPSIT) was assessed in 16 elderly patients with schizophrenia (ES), 20 patients with a diagnosis of probable Alzheimer's disease (AD), and 20 elderly controls (EC). Both patient groups exhibited marked deficits in UPSIT performance relative to controls. ES and AD patients with similar levels of general cognitive impairment did not differ on the UPSIT, suggesting that the two disorders may share a common dysfunction in olfactory brain regions. Despite recent reports of greater olfactory deficit in males, neither patient group exhibited significant gender differences on the UPSIT. The findings of similar olfactory deficit in AD and ES is consistent with recent neuropathological investigations suggesting similarities in the topographical distribution of aberrant cytoarchitecture, neuronal morphology, and modest astrocytosis observed in schizophrenia with the topographical distribution of neurofibrillary tangles in AD.

Correspondence: *Paul J. Moberg, Brain-Behavior Laboratory, Department of Psychiatry, 10th Floor, Gates Bldg., HUP, 3400 Spruce Street, Philadelphia, PA 19104, USA.*

S. ROBYN, M.W. HAUT, R.W. KEEFOVER, C.S. WILSON, & E.D. RANKIN. The Nature of Semantic Memory Deficits in Alzheimer's Disease.

The nature of semantic memory deficits in AD has been subject to controversy. It is unclear whether semantic memory is impaired because of degradation of semantic knowledge or due to information processing deficits. This study compared patients with AD to control participants who did not differ in age or education on three working memory tasks. Variants of the Self Ordered Pointing Task (SOPT) which varied in degree of manipulation on semantic processing skills were utilized. Results indicated that patients with AD demonstrated working memory deficits compared to controls. Yet, patients with AD benefited from semantic processing

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

manipulations, to the same degree as controls. This suggests that semantic knowledge is not truly degraded at least in early, mildly impaired patients with AD.
Correspondence: *Marc W. Haut, Department of Behavioral Medicine & Psychiatry, P.O. Box 9137, WVU School of Medicine, Morgantown, WV 26506, USA.*

Special Topic Speaker/11:00 a.m.–12:30 p.m.

FROM GENE TO BRAIN TO MIND

Martha Bridge Denckla

THURSDAY AFTERNOON, FEBRUARY 5, 1998

Paper Session 5/1:30–3:10 p.m.

LOCALIZATION OF BEHAVIORAL FUNCTION

R.L. SCHWARTZ, A.M. BARRETT, G.P. CRUCIAN, & K.M. HEILMAN. Attentional and Intentional Influence on Awareness of Touch and Non-touch.
Extinction to double simultaneous stimulation (EDSS) has been attributed to dysfunction in lateralized, spatially-directed attentional systems. We studied a patient, W.B., with a right temporal-parietal stroke who had tactile EDSS and confabulated left-sided stimuli when he was not touched. We wanted to learn whether manipulation of attentional or intentional resources would influence W.B.'s awareness of touch (EDSS) and non-touch. Priming motor-intentional systems leftwards did not change W.B.'s left-sided tactile awareness. Overtly directing visual orientation leftwards also did not change W.B.'s awareness. However, covertly shifting W.B.'s attentional focus leftwards significantly improved his awareness of both touch and non-touch. We posit that tactile EDSS and unawareness of non-touch reflect dysfunction in gaze-independent attentional systems.
Correspondence: *Ronald L. Schwartz, University of Florida, Department of Neurology, 655 West 8th Street, Jacksonville, FL 32209, USA.*

K. PERRINE, T. SCHWARTZ, O. DEVINSKY, & W. DOYLE. Atypical Language Localization in Inferolateral Temporal Neocortex.
We examined the localization of naming and reading by subdural grid cortical stimulation in 67 left hemisphere language dominant patients with left temporal lobe seizure onsets. Patients with language sites in the inferolateral temporal cortex were younger at seizure onset, had lower IQs, and were more frequently left-handed, ambidextrous, or right hemisphere memory predominant than patients without inferolateral language sites. These patients with inferolateral temporal language cortex show greater cognitive impairment and a greater degree of brain reorganization than patients without this localization pattern. Atypical language localization should be considered when planning surgery in these patients.
Correspondence: *K. Perrine, Neurology Department, HJD-NYU School of Medicine, New York, NY 10003, USA.*

A.L. FOUNDAS, S.K. DANIELS, J. J. VASTERLING, S. OTTO, & J. ROBERTS. Mealtime Behavior in Left and Right Hemispheric Stroke.
To learn more about the contribution of limb apraxia to disturbances while eating, and whether disturbances in eating occur in right hemisphere damaged (RHD) patients, we studied mealtime behavior in left hemisphere damaged (LHD), RHD patients, and healthy controls. Both LHD and RHD patients differed from controls, but the nature of the disturbances differed. Whereas LHD and RHD patients did not produce fewer overall actions than controls, the tool actions they did perform were more likely to be degraded. RHD patients made fewer tool errors than LHD patients, and were more delayed in completing the meal. There was a significant relationship between mealtime action errors and the severity of limb apraxia in LHD patients, suggesting that limb apraxia may interfere with mealtime behaviors. There was no relationship of apraxia to mealtime behaviors in RHD patients, suggesting that other factors may be contributing to eating disturbances.
Correspondence: *Anne L. Foundas, Psychiatry and Neurology, Tulane University, 1430 Tulane Ave, New Orleans, LA 70112, USA.*

A.L. FOUNDAS, C. BROWNING, & D.R. WEINBERGER. MRI Asymmetries of the Frontal Operculum: Gender Differences
Anatomical asymmetries of anterior and posterior language related regions have been documented in postmortem and MRI studies, although gender specific variation in the frontal operculum has not been investigated *in vivo*. To investigate whether gender differences exist in portions of the frontal operculum, we studied the morphology of the pars triangularis (PTR) and pars opercularis (POP) using volumetric MRI techniques in a group of healthy right-handed males ($N = 12$) and females ($N = 12$). Since these regions comprise frontal speech–language regions, and gender differences have been reported in posterior speech–language areas (planum temporale), we posited that gender differences would also exist in the morphology of the PTR and POP. The surface area of the convolutions that form the PTR and POP were measured in the left and right hemisphere. Whereas males and females had a leftward asymmetry of the PTR, the asymmetry was reduced in females. In contrast, males had a leftward asymmetry of the POP and females had no directional asymmetry. Although it has been suggested that males have language asymmetrically represented to the left, while females have language more bilaterally represented, language functions were not directly assessed. Functional correlates to these anatomical gender differences are speculative, and further study with neurobehavioral correlation is needed to confirm these preliminary observations.
Correspondence: *Anne L. Foundas, TUMC, Department of Psychiatry & Neurology SL23, 1430 Tulane Ave, New Orleans, LA 70112, USA.*

L. J. BUXBAUM & H.B. COSLETT. A Selective Impairment of Body-Part Structural Descriptions in Autotopagnosia.
Patients with autotopagnosia are unable to localize body parts on themselves or others. The syndrome has been attributed to an impairment in the *body schema*, a representation of the relationships among body parts. Such accounts, however, fail to specify how a body schema might be represented. We report on an autotopagnosic patient whose pattern of performance permits us to refine recent models of spatial body representation. In addition to a striking inability to localize body parts, GL shows a category-specific deficit in the visual recognition of individual body parts. These and other data support the existence of three kinds of body representation, and suggest that GL exhibits relatively isolated deficits in one of them: a hierarchical system of visuospatial structural descriptions of the body and its parts.
Correspondence: *Laurel J. Buxbaum, Moss Rehabilitation Research Institute, 1200 W. Tabor Road, Philadelphia, PA 19141, USA.*

N.F. DRONKERS, B.B. REDFERN, & C. LUDY. Brain Regions Associated with Conduction Aphasia and Echoic Rehearsal.
Conduction aphasia is characterized by a repetition disorder in the absence of significant deficits in auditory comprehension. The collective theories

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

of Wernicke, Lichtheim, and Geschwind proposed that lesions to the arcuate fasciculus would cause a disconnection of Wernicke's to Broca's areas resulting in the repetition deficit so characteristic of conduction aphasia. More recently, research has questioned the relationship of repetition to the arcuate fasciculus. This paper will describe work done in our research group with focal lesion patients that addresses the role of the arcuate fasciculus and other brain regions in conduction aphasia. First, the results of behavioral testing with chronic conduction aphasic patients designed to characterize specific deficits will be discussed. Second, the lesion location in these patients with conduction aphasia will be represented.
Correspondence: *Nina F. Dronkers, VA Northern California Health Care System, 150 Muir Road (126s), Martinez, CA 94553, USA.*

Symposium 2/1:30–3:10 p.m.

NEUROPSYCHOLOGY OF CHILDHOOD EPILEPSY

Organizer: M. Lassonde; Chair: B. Levin

M. LASSONDE. Neuropsychology of Childhood Epilepsy.
Studies of adult epileptic patients have yielded an enormous amount of information about brain–behavior relationships. By contrast, very few studies have attempted to specify the neuropsychological consequences of childhood epilepsy. The present symposium will address this issue. Marie-Noelle Metz-Lutz will describe how the most frequent idiopathic childhood epilepsy, benign partial epilepsy, may be considered a good model to study the relationship between childhood epilepsy and cognitive development. Marie-Lou Smith will investigate the nature of the memory disorders seen in children with temporal-lobe seizure foci, both before and after surgery, and using multiple measures of both verbal and non-verbal memory. Maryse Lassonde will show that, just as in the adult patients, impairments in planning, working memory, impulse control and motor coordination are present in children with frontal lobe epilepsy. Finally, Bonnie Levin will present her findings indicating that cortical areas responsible for language do not relocate in children with prenatally acquired cortical anomalies even when epileptic activity originates in close proximity to language sites.
Correspondence: *Maryse Lassonde, Departement de Psychologie, Universite de Montreal, C.P. 6128, Succ. Centre-Ville, Montreal QC H3C 3J7, Canada.*

M.N. METZ-LUTZ & R. MASSA. Developmental Cognitive Consequences of Benign Partial Childhood Epilepsies.
Benign partial epilepsy of childhood, which is one of the most frequent idiopathic childhood epilepsies, may be considered as a model to study of the relationship between childhood epilepsy and cognitive development. They are characterized by rare stereotyped epileptic seizures related to focal epileptic spike and wave discharges occurring in absence of structural lesion and frequent interictal focal subclinical discharges that are activated during sleep. The immediate consequences of these discharges were investigated using computerized cognitive tasks performed online with EEG recordings. Their possible relationship with cognitive developmental and learning disorders were examined in a prospective group study. The results show that developmental cognitive disorders observed in epileptic children may be related to transient subtle cognitive impairments associated to interictal spike-wave discharges.
Correspondence: *Marie-Noëlle Metz-Lutz, INSERM U398, Clinique Neurologique, Hopitaux Universitaires de Strasbourg. 67091 Strasbourg-Cedex, France.*

M.L. SMITH. Are Material-Specific Memory Disorders Associated with Temporal-Lobe Seizure Foci in Children?
The purpose of the present study was to investigate the nature of the memory disorders seen in children with temporal-lobe seizure foci, both before and after surgery, and using multiple measures of both verbal and nonverbal memory. Thirty-five children (19 left temporal foci, 16 right) were administered tests of story recall, verbal list learning, memory for a complex design, and face recognition, both before and after undergoing temporal lobectomy. Memory was below the level expected for normal children. No group differences and no postoperative changes were found for verbal memory and for design recall. Face recognition distinguished between the groups preoperatively, with weaker performance by those with right temporal lobe lesions.
Correspondence: *Mary Lou Smith, Department of Psychology, Erindale College, University of Toronto, Mississauga, ON L5L 1C6, Canada.*

B. LEVIN, M. DUCHOWNY, S. HARVEY, & B. KLEIN. Representation of Language in Children with Prenatally Acquired Cortical Anomalies.
We utilized subdural grids to map language cortex in 34 surgical candidates (21L, 13R) with epilepsy due predominantly to prenatally acquired anomalies of cortical development. Subjects received tests of confrontation naming, oral reading, serial commands and standardized intelligence. Language cortex was identified in the expected anatomic location in 19 patients, 17 of whom lateralized to the left hemisphere. In 15 patients, the epileptogenic region was at or near language cortex. Subjects with left hemisphere involvement had a lower mean Full Scale and Verbal IQ compared to subjects with right hemisphere involvement. These findings indicate that language cortex does not relocate in children with prenatally acquired cortical anomalies and remains fixed even when epileptic activity originates in close proximity to language sites.
Correspondence: *B. Levin, Division of Neuropsychology, University of Miami, 1150 N.W. 14th Street, Suite 715, Miami, FL 33136, USA.*

M. LASSONDE, M.T. HERNANDEZ, & I. JAMBAQUÉ. Neuropsychology of Frontal Lobe Epilepsy in Children
Frontal lobe functions have been extensively investigated in adult brain-lesioned patients. Typically, damage to this area has been associated with impairments in planning, working memory, impulse control, attention and certain aspects of motor coordination. However, very few studies have attempted to assess the presence of frontal symptoms in children suffering from frontal epilepsy. The purpose of the present study was to determine whether some (or all) components of the frontal syndrome are present in children with this neurological disorder. A neuropsychological test battery was administered to 20 children with frontal epilepsy (age: 7–15 years) who were compared to children with absence seizures or temporal epilepsy. Among the four IQ indices (WISC-III), speed of perceptual processing was the lowest score in the frontal group. Both phonological and lexical word fluency was reduced in the frontal patients regardless of the verbal IQ level of the children. These children also failed the tasks that required planning (Tower of London, copy of Rey complex figure), mental flexibility (Wisconsin Card sorting test, Luria's sequences) or motor control (Purdue pegboard; Thurstone performance test). Finally, the deficits were more marked in children who had an early seizure onset indicating that childhood frontal epilepsy may impede the development of the functions normally mediated by the frontal lobes.
Correspondence: *Maryse Lassonde, Departement de Psychologie, Universite de Montreal, C.P. 6128, Succ. Centre-Ville, Montreal, QC H3C 3J7, Canada.*

Symposium 3/1:30–3:10 p.m.

FUNCTIONAL MRI: INNOVATIVE APPROACHES FOR STUDYING HIGHER BRAIN FUNCTIONS

Organizer and Chair: S.M. Rao

S.M. RAO. Functional MRI: Innovative Approaches for Studying Higher Brain Functions.
Functional MRI (FMRI) is a relatively new, noninvasive tool for imaging human brain function. Relative to other existing brain imaging technolo-

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

gies (PET, SPECT, ERP, MEG), FMRI provides the optimal combination of temporal and spatial resolution features. These advantages have enabled the generation of creative designs for conducting task activation experiments. The purpose of this symposium is to illustrate and critically analyze some of these novel techniques: real-time subtraction, continuous activation experiments (phase mapping), single-trial *versus* blocked designs, and sensitivity *versus* amplitude measurements. These designs will be illustrated with data from FMRI experiments involving visual, auditory–language, motor, and cognitive activation tasks. Methods for extracting functional images from complex time course series (e.g., regression techniques, ANOVA, Fourier analysis, cross-correlation) will also be discussed.

Correspondence: *Stephen M. Rao, Section of Neuropsychology, Medical College of Wisconsin, 9200 W. Wisconsin Avenue, Milwaukee, WI 53226, USA.*

P.A. BANDETTINI. Single-Trial FMRI.

Activation paradigm design is one growing area in FMRI methodology development. Block design paradigms, involving activation "blocks" lasting from 10 s to 1 min, are commonly used to allow the thermodynamics to reach a "steady state" during each task performed during the time series. While this is useful in many respects, it places a limit on the type of cognitive experiment that can be performed. Single-trial FMRI experiments, involving repeated application of single cognitive tasks or stimuli, have several advantages over blocked paradigms, including more complete task randomization, and the potential to bin data based on each behavioral response. These advantages and others, as well as issues regarding interstimulus interval, statistical power, and interpretation will be discussed.

Correspondence: *Peter A. Bandettini, Biophysics Research Institute, Medical College of Wisconsin, Milwaukee, WI 53226, USA.*

J.R. BINDER. FMRI: From Parameters to Populations.

Among its many advantages, FMRI is safe and can therefore be used to collect extensive datasets from very large numbers of subjects. These characteristics encourage experimental designs using larger sets of contrasting conditions, as well as parametric designs yielding dose–response functions in individual subjects. Given the safety and availability of FMRI, it now seems practical to consider functional brain imaging studies involving hundreds or thousands of subjects. Increased sample sizes should lead to increased reliability of group activation maps, more fine-grained examination of the distribution of variable brain activation patterns in target populations, and increased use of multivariate analyses to discover relationships between brain activation and other individual subject variables. These concepts will be illustrated with examples from auditory and language FMRI activation experiments.

Correspondence: *Jeffrey Binder, Department of Neurology, Medical College of Wisconsin, 9200 W. Wisconsin Avenue, Milwaukee, WI 53226, USA.*

E.A. DeYOE. Phase Mapping and Cortical Sensitivity Designs in FMRI Research.

This presentation will introduce two novel FMRI activation techniques: phase mapping and cortical sensitivity measurements. Phase mapping allows the mapping of spatially distinct brain regions through the use of slowly changing, continuous stimulus presentations. Using a temporally phase-shifted cross-correlation technique, it is possible to map the spatial topography of sensory and motor systems. Cortical sensitivity measurements circumvent the problems of non-linearities in the evoked FMRI response due to ceiling or floor effects associated with varying task demands. This approach measures cortical responsiveness by comparing the intensity of the stimulus rather than the intensity of the activation response, enabling a way to distinguish areas involved with sensory processing *per se* from areas involved in attentional control and response planning.

Correspondence: *Edgar A. DeYoe, Department of Cellular Biology and Anatomy, Medical College of Wisconsin, 8701 Watertown Plank Road, Milwaukee, WI 53226, USA.*

S.M. RAO. Statistical Analysis Considerations in FMRI.

This presentation will provide a critical review of the relative advantages and disadvantages of various statistical approaches for extracting functional activity from FMRI experiments. Specifically, this discussion will review: (1) parametric analyses of time course data, (2) cross-correlation and Fourier analysis techniques, (3) linear modeling techniques (e.g., *t* test, ANOVA, and regression), and (4) multivariate techniques (e.g., principal components analysis). The review will emphasize the problems in selecting statistically significant thresholds in functional imaging experiments and provide suggestions for minimizing Type 1 and Type 2 errors using randomization analyses. The various statistical approaches will be illustrated with recently published FMRI studies of motor timing and conceptual reasoning.

Correspondence: *Stephen M. Rao, Section of Neuropsychology, Medical College of Wisconsin, 9200 W. Wisconsin Avenue, Milwaukee, WI 53226, USA.*

Poster Session 3/1:30–4:30 p.m.

ASSESSMENT

J. DONDERS. The Kaufman Short Neuropsychological Assessment Procedure: Boon or Bust?

The Kaufman Short Neuropsychological Assessment Procedure (KSNAP) was administered to 20 patients with left-hemisphere stroke (LS), 20 patients with right-hemisphere stroke (RS), and 20 nonneurological control patients (NC) in an acute rehabilitation setting. The KSNAP demonstrated some (albeit limited) ability to discriminate the LS group from the NC group, but not the RS group from the NC group. Overall, specificity was good (95%) but sensitivity was poor (35%). It is concluded that the KSNAP may be more bust than boon when it comes to evaluating patients with unilateral stroke, and that great caution should be exercised when using this test for screening purposes.

Correspondence: *Jacques Donders, Psychology Service, Mary Free Bed Hospital, 235 Wealthy SE, Grand Rapids, MI 49502, USA.*

R. FRANKLIN & D. LeBLANC. Beyond the Bell Curve: Comparative Statistics in Neuropsychological Inference.

The objective measurement of individual differences, as introduced early in this century (Galton, Gosset), has formed the basis of comparative inference in neuropsychology. More recently, Reitan and others have introduced "cutting scores." Neither approach addresses the broader array of data distributions that have been incorporated into modern data analysis software. Only recently have alternative inference methods (i.e., Bayesian, uncertainty analysis) appeared in the psychological literature. This presentation provides several alternative models of analysis appropriate to neuropsychological inference, and the assumptions necessary for their use. We show that the dichotomous analysis "cutting scores" may be misleading.

Correspondence: *Ronald D. Franklin, Forensic and Neuropsychology, 21301 Powerline Road, Suite 201, Boca Raton, FL 33433, USA.*

M. WELSH, V. REVILLA, D. STRONGIN, & M. KEPLER. Validity and Reliability of a New One-Trial Version of the Tower of Hanoi.

Previous research in our laboratory has indicated substantial nonshared variance between the Tower of Hanoi (TOH) and the Tower of London (TOL). A new task (TOH1) that was identical to the TOL in several procedural characteristics was designed. Thirty-nine subjects received the TOL and one of four combinations of the TOH6 (original task) and TOH1 across two test sessions (5–7 weeks apart). The TOH1 correlated moderately with the TOL ($r = .40$, $r = .66$) and exhibited good test-retest stability ($r = .78$). The TOH6 showed a ceiling effect in Session 2, limiting both the correlation with the TOL and test-retest reliability. These data indicate that TOH1 may be a psychometrically sound alternative to the TOH6, and that differences in administration do not account for the nonshared variance between the TOH and TOL.

Correspondence: *Marilyn Welsh, Psychology, University of Northern Colorado, Greeley, CO 80639, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

J.M. SAWCHYN, M.M. BRULOT, & E.H. STRAUSS. Use of the Postconcussion Syndrome Checklist in a University Sample.
Symptoms of the Postconcussion Syndrome (PCS) were evaluated in a university sample, using the Postconcussion Syndrome Checklist (PCSC). Three hundred twenty-six participants completed a questionnaire including questions regarding history of head injury, cognitive or psychosocial difficulties, and demographic data. Contrary to previous reports, scores on the PCSC did not vary by self-report of head injury. Females, however, endorsed more frequent, intense, and prolonged symptomology, regardless of history of head injury. Only 5% of the sample endorsed more than six symptoms on the PCSC, suggesting a potentially useful cutoff for abnormality. The PCSC was significantly correlated with the Beck Depression Inventory, suggesting that general level of psychological distress is a key factor in evaluating PCS.
Correspondence: *J.M. Sawchyn, Department of Psychology, University of Victoria, P.O. Box 3050, Victoria, BC V8W 3P5, Canada.*

J.S. MARTZKE, K. GOOD, S. KAEGI, C. WEISS, & L.C. KOPALA. Unirhinal Norms for a Measure of Olfactory Identification (the University of Pennsylvania Smell Identification Test or UPSIT).
Over the course of research examining neurobehavioral correlates of olfactory agnosia we collected normative data for the unirhinal presentation of the University of Pennsylvania Smell Identification Test (UPSIT). This widely used olfactory identification measure consists of 40 "scratch and sniff," multiple choice, recognition items. We administered half the items to each nostril in 99 adults. Unirhinal scores were not correlated with age or education. The effects of sex and smoking status were insignificant. There were no internostril difference. A cut-off score of 14 (out of 20) for either nostril appeared most appropriate for identification of borderline impairment. To date, we have validated this measure by correlation with indices of lateralized temporal and frontal functioning in a clinical population (Good et al. 1996).
Correspondence: *Jeff Martzke, Department of Psychology, Vancouver Hospital and Health Sciences Centre, 855 W. 12th Avenue, Vancouver, BC V5Z 1M9, Canada.*

P. MOALLEF & L. LEACH. Factor Analysis of the Depression Scale of the Cognitive Behavior Rating Scales.
Ninety out-patients with suspected or confirmed brain damage were administered the Cognitive Behavior Rating Scales (CBRS). The 24 items comprising the Depression Scale were subjected to a principle axis factor analysis with promax rotation. The resulting solution failed to confirm a unidimensional structure, instead four meaningful factors were extracted. Three factors represented different aspects of depression but the fourth factor corresponded to awareness of memory problems. The results indicate that the current Depression Scale of the CBRS should be subdivided into a scale for depressive symptoms and an independent scale representing awareness of memory and cognitive problems.
Correspondence: *Larry Leach, Department of Psychology, Baycrest Centre for Geriatric Care, 3560 Bathurst Street, North York, ON M6A 2E1, Canada.*

M.K. JÓNSDÓTTIR & A.I. PÉTURSDÓTTIR. Warrington's Recognition Memory Test: Increased Difficulty and Validity.
The Recognition Memory Test (RMT) for words (RMW) and faces (RMF) has several shortcomings. There is a ceiling effect in the RMW scores in the standardization sample and the validity of the RMF has been questioned because all the pictures contain clothing information. This provides additional clues which can facilitate recognition. The goal of the present study was twofold: (1) to examine whether a faster presentation rate would eliminate the ceiling effects on the RMW; (2) to examine the effects of removing clothing information from the RMF. Faster presentation rate resulted in lower scores for both RMW and RMF and eliminated ceiling effects for the RMW. Removing the clothing information from the RMF resulted in significantly lower scores and increased split-half reliability of the test.
Correspondence: *María K. Jónsdóttir, Reykjavík Hospital, Departments of Neurology, Rehabilitation Medicine and Gerontology, Grensásvegi 62, 108 Reykjavík, Iceland.*

D. FEIN, M.K. GLEESON, S. BULLARD, R. MAPOU, & E. KAPLAN. The Biber Cognitive Estimation Test.
Normative data from 118 subjects, and cross-validation data from 49 additional subjects, are presented for the Biber Cognitive Estimation Test, a 20-item test with five estimation questions in each of four categories: time–duration, quantity, weight, and distance. The range of normal answers is provided for each item, and cut-offs for impaired performance are suggested. Although very low IQ or education levels would be expected to invalidate this test as a measure of estimation skills, subjects in the current sample made few errors. A cross-validation sample confirmed the suggested abnormality cut-off score.
Correspondence: *Deborah Fein, Department of Psychology, University of Connecticut, 409 Babbidge Road, U-20, Storrs, CT 06269-1020, USA.*

M. ROHLING & L.S. MILLER. Neuropsychological Test Data: Rohling's Interpretation Method.
Interpretation of large numbers of neuropsychological tests within a flexible battery approach remains a controversial topic. We present a method of interpretation (Rohling's Interpretation Method; RIM) that allows for varying numbers of tests along a varying number of cognitive domains, and remains psychometrically based. This method additionally requires informed clinical judgment in that the level of confidence for tests, cognitive domains, and global indices are utilized as the backdrop for interpretive decisions. Specific procedures are presented and examples of a small and a large test battery with patient data are presented. Discussion of the method's practicality, ease of use, and potential limitations are also presented.
Correspondence: *L. Stephen Miller, Department of Psychology, University of Georgia, Athens, GA 30602-3013, USA.*

D.B. BURTON, C.C. EVANS, & E.L. MANNING. A Structural Equation Analysis of the Wechsler Memory Scale–Revised and the California Verbal Learning Test in a Clinical Sample.
A maximum likelihood confirmatory factor analysis was performed by applying LISREL VII to a battery of memory measures consisting of the Wechsler Memory Scale-Revised (WMS–R) and California Verbal Learning Test (CVLT) in a heterogeneous sample of patients with cognitive dysfunction ($N = 103$). Competing latent variable models were identified with the goal of deriving an empirical model of memory functioning. Analyses were designed to determine which of seven hypothesized oblique factor solutions could best explain memory as measured by the memory battery. Findings supported a four-factor model (AGFI = .700) including Verbal Declarative Memory, Nonverbal Declarative Memory, Learning (i.e., CVLT trials), and Attention. These results support the contention that the WMS–R and CVLT measure qualitatively different aspects of memory.
Correspondence: *D. Bradley Burton, Department of Psychiatry and Human Behavior, University of Mississippi Medical Center, 2500 North State Street, Jackson, MS 39216-4505, USA.*

J.A. GLADSJO, B.W. PALMER, M. J. TAYLOR, & R.K. HEATON. Improving Estimates of Premorbid Neuropsychological Functioning.
The judgment of neuropsychological decline is typically made by comparing a patient's current cognitive performance to data from demographically similar individuals. Even within narrowly defined demographic categories, however, there is variability in level of performance, approximating the normal curve. The present study explored the degree to which oral reading (ANART) could predict a person's expected position among demographically similar peers. In a sample of 135 neurologically healthy subjects, the ANART explained 18% and 13% of the variance in Verbal and Full Scale IQ, respectively, beyond that explained by demographic correction. ANART score did not significantly improve estimation of Performance IQ, Average Impairment Rating, or memory score, however. Oral reading may be useful for accurately estimating premorbid verbal performance in combination with demographic variables, but it does not improve estimates of other neurocognitive abilities.
Correspondence: *J.A. Gladsjo, Geriatric Psychiatry CRC (116-A1), VA Medical Center, 3350 La Jolla Village Drive, San Diego, CA 92161, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

N. NABORS & M. ROSENTHAL. Normative Study of the Community Integration Questionnaire.
The Community Integration Questionnaire (CIQ) was developed to measure effective role performance in community settings following traumatic brain injury. This study was designed to collect normative information on the CIQ in an urban population. Participants were 157 staff and visitors from a midwestern, rehabilitation hospital. The participants were predominantly female (72%), White (77%), and highly educated (70% college graduate or higher). Results showed significant associations between the following CIQ scores and demographics: age with CIQ social and productivity; sex with CIQ home integration and total score; ethnicity with CIQ home integration; education with productivity and social integration; and income with home integration and CIQ total score. These results suggest caution in utilizing the original norms for the CIQ with diverse rehabilitation populations.
Correspondence: *Nina Nabors, Department of Psychology, Central Michigan University, Sloan Hall, Mt. Pleasant, MI 48859, USA.*

W. McMULLEN, C. SANTSCHI, K. PERRINE, & O. DEVINSKY. Trial-To-Trial Properties of the Ruff Figural Fluency Test (RFFT) in a Clinical Sample.
We examined trial to trial performance on the RFFT in a mixed neurologic sample to assess comparability of the trials with respect to perseveration, unique designs, and error ratio. Normative observations had suggested that the five trials were comparable. Results showed a linear increase in the number of perseverations across the five trials not explained by increased productivity. Findings suggested either that individuals prone to perseveration require a number of trials to "seed" perseverative behavior, or that less structured trials "pull" for perseveration in patients.
Correspondence: *William McMullen, Department of Neurology, HJD-NYU School of Medicine, New York, NY 10003, USA.*

K.L. FUCHS & H. J. HANNAY. The Construct Validity of the Continuous Recognition Memory Test.
An exploratory factor analysis was performed on variables derived from a large neuropsychological battery administered to 100 healthy young adults in order to investigate the construct validity of the Continuous Recognition Memory test (CRM). A principal factor analysis produced five factors that were labeled *Verbal Ability*, *Divided Attention*, *Visuoperception and Visuoconstruction*, *Visuomotor Integration* and *Learning and Memory*. CRM hits loaded significantly on the learning and memory factor and false alarms on the factor defined by moderate loadings from visuoperception and visuoconstruction tasks. This supports the view that CRM hits and false alarms are indices of separate abilities. A second analysis using variables from the delayed condition of the memory measures produced factors labeled *Verbal Ability*, *Divided Attention*, *Visuoconstruction/Nonverbal Memory*, *Verbal Memory*, and *Visuomotor Integration*. Unlike other factor analytic studies, there was a dissociation between verbal and nonverbal memory measures, and the CRM delayed recognition variable loaded significantly on both. This supports the construct validity of the CRM as a nonlateralizing test of memory.
Correspondence: *K. Fuchs, Department of Psychology, University of Houston, Houston, TX 77204, USA.*

M.H. KABAT, R.K. DiPINO, & R.L. KANE. Estimation of Premorbid Intelligence: The Utility of Five Measures.
Few studies have compared the effectiveness of several commonly employed instruments used to estimate premorbid functioning. The present study examined IQ estimates provided by the Armed Forces Qualifying Test (AFQT), the NART, the Shipley, WAIS-7 and Reading score from the WRAT–3. Data from 33 men wounded by depleted uranium during the Persian Gulf War were examined using a series of multiple regression analyses. Results indicated that the WRAT–3 Reading score was the best predictor of scores on the AFQT, the NART, and the WAIS–R. AFQT score was the best predictor of performance on the WRAT–3. Further analyses were conducted to examine the effects of IQ level, verbal–performance IQ, and level of education on measures of IQ estimation.
Correspondence: *Michael H. Kabat, Psychology Service (116B), VA Medical Center, 10 North Greene Street, Baltimore, MD 21201, USA.*

J. SUHR, J. BARRASH, & K. MANZEL. Effects of a Shortened Version of the Auditory Verbal Learning Test on Selected Memory Variables.
We present the comparability of primary memory measures on the standard Auditory Verbal Learning Test (AVLT) to a shortened version of the AVLT that eliminates the presentation of an intrusion list and the immediate recall of the list and alters the recognition format. In comparisons in a general neurological population with cognitive impairment and in a separate comparison with patients with probable Alzheimer's disease, there were no differences in delayed recall, number of intrusion words recalled during delayed recall, loss of recall from Learning Trial 5 to delayed recall, true positives, or false positives in recognition. Results suggest that the shortened version could be considered for use in situations when the extended version is inappropriate (severe cognitive impairment, high anxiety, lack of stamina, time constraints).
Correspondence: *Julie Suhr, Department of Psychology, Porter Hall, Ohio University, Athens, OH 45701, USA.*

D.S. TULSKY, J. ZHU, H. CHEN, & E. KAPLAN. The Utility of Incidental Learning and Copy Procedures for the WAIS–III.
An incidental learning and a copy procedure have been added to the Wechsler Adult Intelligence Scale–Third Edition (WAIS–III) to allow the examiner to identify weak areas if the examinee does not perform well on the Digit Symbol–Coding subtest. Concurrent validity data have been obtained through correlations with other WAIS–III subtests and external measures (e.g., CVLT, MicroCog, and Trails A & B). Moreover, the utility of these procedures was demonstrated by examining the performance of individuals with a variety of neurological disorders. The number of individuals who obtain low scores in clinical groups is often significantly different from those obtained by the standardization sample. The patterns of performance by neurologic condition will be examined.
Correspondence: *D. Tulsky, The Psychological Corporation, 555 Academic Court, San Antonio, TX 78204, USA.*

L.A. BIELIAUSKAS, C. DEPP, & M. LACY. IQ and Scores on the Mini-Mental State Exam (MMSE).
The MMSE and the Peabody Picture Vocabulary Test (PPVT) were administered to 217 VA nursing home patients, 104 of whom did not carry a diagnosis associated with brain impairment and 113 with a diagnosis associated with degenerative or cerebrovascular conditions. MMSE and IQ scores were shown to be significantly correlated in both groups, even controlling for the effects of education. It is suggested that while previous normative studies of the MMSE may provide good clinical guidance, interpretation of "impaired" performance on the MMSE for those with IQ scores below 90 should be approached with caution. Average MMSE scores for Wechsler IQ classifications are provided.
Correspondence: *Linas Bieliauskas, Psychology Service (116B), VA Medical Center, Ann Arbor, MI 48105, USA.*

D.W. EDWARDS, L. HOLMQUIST, R. WANLASS, J. WICKS, & C. DAVIS. Comparing Three Methods of "Neuro-Correction" for the MMPI–2.
Concern continues over the interpretation of the MMPI–2 with brain injured patients. Three methods of neuro-correction have been published as systems to improve the validity of the MMPI–MMPI–2 by removing items judged by experts to be neurologic. This study of 17 brain injured subjects showed the systems to make significant clinical changes in the MMPI–2 profiles for more than half the subjects using a 14-item correction scheme. Using 30-item and 40-item systems resulted in changes in code type for as many as 70% of the subjects, although the majority still had elevated profiles. Validation interviews on items from one system showed the majority

of the endorsed items to be due to the head injury. Only 10 of 119 endorsements were preexisting symptoms.
Correspondence: *D.W. Edwards, Department of Psychiatry, UCDMC, 4430 V Street, Sacramento, CA 95817, USA.*

J.L. WOODARD, R.H.B. BENEDICT, T.A. SALTHOUSE, J.P. TOTH, D. J. ZGALJARDIC, & H.E. HANCOCK. Normative Data for Odd and Even Forms of the Judgment of Line Orientation Test.
The Judgment of Line Orientation Test (JLO) permits assessment of visuospatial processing without making demands on motor skills. However, its administration can be time-intensive and frustrating for patients, particularly when used in a geriatric population. We present normative data for the odd- and even-numbered items for Form V of the JLO for a healthy geriatric sample. Mean scores and score frequency distributions for the odd- and even-item forms were nearly identical, and both forms showed significant correlations with the Beery Test of Visual Motor Integration. Cross-validation using the odd form of the JLO in an independent sample suggested good generalizability of the normative data. We conclude that these JLO short form normative data may be used in clinical screening situations or when serial assessments are needed.
Correspondence: *John L. Woodard, Department of Neurology, Emory University School of Medicine, 1841 Clifton Road NE, Atlanta, GA 30329, USA.*

FORENSICS

M. CATO, J. BREWSTER, T. RYAN, & A. GIULIANO. Can College Students Convincingly Simulate Brain Injury?
The purpose of this study was to determine if mild brain injury could be simulated on any of four tests: the Hiscock Forced Choice Procedure, Rey's Fifteen Item Test, the Dot Counting Test and the Warrington Recognition Memory Test. An additional purpose was to determine if test performance differed among the five groups in this study, including naïve and sophisticated simulators. Students given strategies were able to convincingly simulate brain injury. Among the tests, the HFCP had the most discriminating power and the RMT had the least, suggesting the need for further development of tests more resistant to strategies to feign brain injury.
Correspondence: *Allison Cato, 2120 Woodbine Avenue, Lakeland, FL 33803, USA.*

L. RAPPORT, T. FARCHIONE, R. COLEMAN, & B. AXELROD. Motor Function Profiles of Malingering in Brain Injury Simulators.
Profiles of motor functioning tests were evaluated to assess a nonphysiological performance pattern initially revealed in a sample of litigating postconcussive syndrome patients (grip strength < finger tapping < grooved pegs). The opposite pattern is observed in traumatic brain injury (TBI) patients, who show a gradient of increasing impairment corresponding to the sensory–motor complexity of these tasks. Naive ($N = 32$) and coached ($N = 31$) malingerers performed significantly worse on all three tests relative to controls ($N = 29$). The malingering groups differed from each other only in that grooved pegs was worse for naive relative to coached malingerers. The test profile observed in naive malingerers was consistent with that seen in bona fide TBI patients. Although worthy of additional study, the use of pattern analysis in evaluating malingered motor functioning has not been proven reliable or valid.
Correspondence: *Lisa Rapport, Department of Psychology, 71 W. Warren, Wayne State University, Detroit, MI 48202, USA.*

R. COLEMAN, L. RAPPORT, S. MILLIS, J. RICKER, & T. FARCHIONE. Effects of Coaching on the Detection of Malingering on the California Verbal Learning Test: An Analog Study of Malingered Head Injury.
This study examined the sensitivity of CVLT indices to detect malingering among naive malingerers ($N = 32$) and malingerers provided with information about head injury ($N = 31$) relative to controls ($N = 27$). Results support previous findings that malingerers overestimate memory impairment associated with mild head injury; however, they indicate that exposure to a simple instructional set may render insensitive many indices of malingering. In contrast, indices based on sophisticated principles of learning theory hold great promise in the detection of malingering, even in the presence of an instructional set.
Correspondence: *Renee Coleman, Department of Psychology, 71 W. Warren, Wayne State University, Detroit, MI 48202, USA.*

J. SALTZMAN, E. STRAUSS, M. HUNTER, & F. SPELLACY. Validity of the Wonderlic Personnel Test as a Brief Measure of Intelligence in Individuals Referred for Evaluation of Head Injury.
Some have argued that the Wonderlic Personnel Test (WPT) may represent a brief and efficient measure of intellectual functioning (e.g., Dodrill, 1980). The present study investigated the validity of the WPT as such a measure, in individuals with head injury. The findings suggested that, although the WPT showed relatively high agreement with the WAIS–R in the whole group, it did not have good agreement with WAIS–R scores on an individual-case basis. Since clinical practice typically seeks to evaluate individual performance, it is suggested that the WPT is not a suitable tool for psychological assessment of individuals with known or suspected head-injury.
Correspondence: *Jennifer Saltzman, Department of Psychology, University of Victoria, P.O. Box 3050, Victoria, BC V8W 3P5, Canada.*

J. ANDRIKOPOULOS. Potentially Inflated Cognitive Impairment in Compensable Mild Head Injury.
Forty-six consecutive patients with a compensable mild head injury were separated into a low performance (LPG, $N = 22$) and high performance group (HPG, $N = 24$) based on level of test performances. A third group consisted of 21 consecutive moderate-to-severe closed head injury patients (CHG). There were no statistically significant differences between the LPG and the CHG on Logical Memory and Visual Reproduction I & II, Controlled Oral Word, Token Test, Visual Naming and Judgment of Line Orientation. The present finding suggests that as many as half of the patients in this study who are in prolonged litigation following a compensable mild head injury may show a level of impairment out of proportion to the severity of their injury.
Correspondence: *Jim Andrikopoulos, Neuropsychology Clinic, 1750 48th Street, Suite 2, Des Moines, IA 50310, USA.*

J. BARRASH, J. SUHR, & K. MANZEL. A Brief, Sensitive, and Specific Procedure for Detecting Malingered Memory Impairment.
We hypothesized that malingerers' memory performances would show inconsistencies over time and progressively worse retention, in contrast to memory-impaired patients putting forth honest effort. A second delayed recall–recognition trial was added to the Rey AVLT 30 min after the standard delayed trial. Combining derivation and cross-validation samples, we studied 98 subjects with memory complaints: 20 malingerers, 50 brain-damaged subjects (BDs), and 43 psychiatric subjects (PSYs). Groups did not differ demographically or on conventional AVLT variables. Four variables reflecting inconsistency and progressively worse recall and recognition over the two delayed trials were tallied to form an Exaggeration Index. Scores greater than 4 identified 9/20 malingerers (45%); 3/50 BDs (6%) and 1/28 PSYs (3.6%), $p < .0001$. The 3 false positive BDs each had depression or anxiety that contributed to cognitive impairment. Findings strongly support this approach to detecting malingering.
Correspondence: *Joe Barrash, Department of Neurology, University of Iowa, Iowa City, IA 52242, USA.*

PEDIATRICS-3: ASSESSMENT

N.W. WALKER, M.S. BOLING, & H. COBB. The Training of School Psychologists in Traumatic Brain Injury (TBI): Results of a National Survey of Training Programs.
In 1990, the Education for All Handicapped Act was amended to incorporate traumatic brain injury (TBI) as a specific educational disability. School

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

psychologists are in a primary position to meet the unique needs of the TBI student and can have an impact on the provision of services for these students. The study purpose was to determine how training programs were meeting the needs of the school psychologist with respect to TBI. All graduate training programs in school psychology listed with the National Association of School Psychologists ($N = 203$) were asked to complete a survey describing their training practices in neuropsychology/TBI. Eighty-five programs (41.9%) responded, representing 32 states. Results showed that over 70% of the training programs did not have access to full or part time faculty members with either neuropsychological/TBI expertise. Of those offering such training, it appears to be limited in nature and content, suggesting that many training programs do not yet see the importance of this training in their curriculum.
Correspondence: *N.W. Walker, Psychology Department, James Madison University, Harrisonburg, VA 22807, USA.*

C. CHASE-CARMICHAEL, M. DOUGLAS RIS, A.M. WEBER, & B.K. SCHEFFT. The Neurologic Validity of the Wisconsin Card Sorting Test (WCST) With a Pediatric Population.
This study investigated the localizing ability of the WCST with a pediatric clinical population. Fifty children, referred for neuropsychological evaluation at a large hospital, were assigned to frontal, extrafrontal, or diffuse groups based on location of brain dysfunction as confirmed by CT, MRI, or EEG studies. Findings failed to support the hypothesis that WCST performance is more impaired by frontal lobe dysfunction than extrafrontal or diffuse dysfunction or that WCST performance is more impaired by left hemisphere dysfunction than right. Full Scale IQ was found to be significantly correlated with WCST scores, confirming the notion that WCST performance is correlated with intellectual growth in children.
Correspondence: *M. Douglas Ris, Department of Psychology, Children's Hospital Medical Center, 3333 Burnet Avenue, Cincinnati, OH 45229-3039, USA.*

L. RONDEAU & K. KERNS. Development of a Preschool Continuous Performance Task.
This study obtained preliminary results from a newly designed Continuous Performance Task (CPT) for preschool children. Control children and children referred for attentional difficulties between the ages of 3 and 5 years participated. This revised task utilized animals and animal noises as visual and auditory stimuli, and the task length was reduced from that employed with adults and older children. Results indicated that the new CPT is a reasonable measure of sustained and selective attention in this age group, as differential performance was demonstrated between the control and clinical samples, and improvement was seen with increasing age. This may be a valuable tool for attentional assessments of preschool children.
Correspondence: *Kimberly Kerns, Department of Psychology, University of Victoria, Victoria, BC V8W 3P5, Canada.*

S. HOOPER, C. FINE, & M. OZGEN. Neuropsychological Functioning in Child Psychopathology: A Comparison of Internalizers *Versus* Externalizers.
This study examined the neuropsychological functioning of 30 children and adolescents showing social–behavioral difficulties. Using a dimensional classification system, subjects were classified as either internalizers ($N = 15$) or externalizers ($N = 15$). The groups did not differ in terms of chronological age, race, or socioeconomic status. Neuropsychological testing revealed both groups to have some dysfunction, with the externalizers showing more impaired story memory and verbal learning capabilities. The groups showed similar performances across tasks tapping the domains of IQ, fine-motor, attention, language, visual processing, and executive functioning. These data continue to support the finding of generalized neuropsychological impairment in children and adolescents with social–behavioral disturbance.
Correspondence: *Stephen R. Hooper, Center for Development and Learning, CB# 7255, University of North Carolina School of Medicine, Chapel Hill, NC 27599-7255, USA.*

P.K. ISQUITH, G.A. GIOIA, S.C. GUY, P. RETZLAFF, & L. KENWORTHY. Assessment of Executive Functions in Children: Development of the Behavior Rating Inventory of Executive Functions (BRIEF).
Measuring children's executive–regulatory functions is complicated by a dearth of measures and by constraints of the testing setting. We report on the development of a parent and teacher behavioral rating inventory of executive function in children—the BRIEF—designed as an adjunctive external validation of clinical assessment and as an easily administered, psychometrically sound means of screening for executive difficulties. The measure includes 9 domains of executive function, each with 7 to 10 behaviorally anchored items. Rater agreement for item–domain membership, item–scale correlations, and internal consistency for each scale are high. Interrater agreement between parent and teacher reporters is moderate. Continued study and development of the BRIEF is warranted to explore validity and reliability and to establish age-referenced normative values.
Correspondence: *Peter Isquith, Division of Pediatric Neuropsychology, Mt. Washington Pediatric Hospital, 1708 West Rogers Avenue, Baltimore, MD 21209-4596, USA.*

R. HUNTZINGER & K. HOLLER. Neuropsychological Assessment of Unincarcerated, Court-Referred Adolescents.
While there is evidence that many incarcerated delinquents suffer from learning disabilities and other neuropsychological deficits, less is known about juveniles who are adjudicated but nonincarcerated. This study explored the differences in neuropsychological and emotional functioning of 52 adjudicated, unincarcerated adolescents who were divided into two groups based on historical involvement in special education (SPED; NO-SPED). Results indicated that mean IQ and achievement scores for the entire sample were in the low average range. As predicted, *t* tests revealed that the SPED group earned lower IQ and achievement scores, had diminished receptive and expressive vocabulary, and were slower at completing a complex sequencing task than the NO-SPED group. Unexpectedly, adolescents in the SPED group also experienced more depressed and paranoid symptoms than adolescents in the NO-SPED group.
Correspondence: *Rose Huntzinger, Director of Child Neuropsychology, Bradley Hospital, 1011 Veterans Memorial Parkway, East Providence, RI 02915, USA.*

N. J. FISHER, J.W. DeLUCA, & S. MURJI. Developmental Factor Structure of the Wisconsin Card Sorting Test.
We examined WCST performances of 249 child–adolescent outpatients from 3 age groups (6–9, 10–13, 14–17 years), suspecting that the underlying factors for this population might vary with distinct developmental demands. Principal components analyses for each age group yielded three factors in each instance. For 6–9-year-olds, we interpreted these components as (1) Categorization, (2) Cognitive Flexibility–Novelty Adaptability, and (3) Set Reliance–Maintenance. The factor structure for the two older groups revealed the following components: (1) Cognitive Flexibility–Conceptualization, (2) Novelty Adaptability, and (3) Set Reliance–Maintenance. With increasing age, loadings from *Perseverative Responses*, *Conceptual Level Responses*, and *Categories Completed* on factor I increase, yet decrease on factor II. These findings suggest that as development proceeds, executive functions reorganize, with Cognitive Flexibility linking with Conceptualization as opposed to Novelty Adaptability.
Correspondence: *John W. DeLuca, Wayne State University School of Medicine, Department of Psychiatry, University Psychiatric Center, 2751 E. Jefferson Avenue, Detroit, MI 48207, USA.*

DEMENTIA-2: ASSESSMENT AND DIAGNOSIS

K. BAYLES, C. TOMOEDA, R. CRUZ, & J. WOOD. Correspondence Between Hamilton Rating Scale Scores of Alzheimer's and Parkinson's Patients and Caregiver Reports.
The Hamilton Rating Scale for Depression frequently is used to identify dementia patients with depression. Because it is a self-report measure,

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

the memory impairment that defines dementia may limit its validity. To evaluate its validity for dementia patients, it was administered to 33 Alzheimer's patients and 63 Parkinson's patients, for whom cognitive status was specified, and their caregivers. Calculation was made of the correspondence between patient reports and caregiver reports about the patients. Good agreement existed between patient and caregiver reports for mild Alzheimer's patients, nondemented Parkinson's patients, Parkinson's patients with questionable mental status, and mildly and moderately demented Parkinson's patients. However, a significant disparity existed between patient and caregiver ratings for moderately demented AD patients with caregivers reporting more signs of depression.
Correspondence: *Kathryn A. Bayles, National Center for Neurogenic Communication Disorders, University of Arizona, Tucson, AZ 85721-0071, USA.*

B. FOWLER, C. CIMINO, & A. RAJ. Psychiatric Symptoms and Dementia Severity in Alzheimer's Patients.
A consecutive series of patients diagnosed with probable Alzheimer's disease were evaluated with respect to psychiatric symptomatology and dementia severity. The current study found no relationship between the severity of dementia and the degree of psychosis, behavioral disturbance, depression, or anxiety. These findings contradict the majority of previous research which reports psychotic symptoms and behavioral disturbances are associated with increasing levels of cognitive impairment. Previous research findings on the association between dementia severity and depressive symptomatology are equivocal. The current study found no relationship between global cognitive impairment and affective symptoms of depression and anxiety. These results suggest that psychiatric manifestations in Alzheimer's disease are not well accounted for by the severity of dementia.
Correspondence: *Cynthia Cimino, Department of Psychology BEH-339, University of South Florida, Tampa, FL 33620, USA.*

J. FINK, M. McCREA, & C. RANDOLPH. Neuropsychological Differentiation of Vascular Dementia and Alzheimer's Disease: A Neurocognitive Profile Approach Using a Short Battery.
In cases of relatively mild dementia, the clinical differential diagnosis of Alzheimer's disease (AD) and ischemic vascular dementia (VaD) can be difficult to make. This retrospective study used a new, brief neuropsychological measure (Repeatable Battery for the Assessment of Neuropsychological Status; RBANS) to compare a group of 60 patients diagnosed with AD according to NINCDS–ADRDA criteria with a group of 32 patients diagnosed with ischemic VaD according to State of California criteria. There were no group differences in age, education, gender proportion, or total scores on the RBANS. However, the neurocognitive profiles associated with each clinical group differed significantly. A MANOVA comparing the groups on the five index scores of the RBANS was highly significant, and univariate ANOVAs on each of the index scores were also all significant. The AD group performed significantly better than the VaD group on the Visuospatial–Constructional and Attention Index scores, and significantly worse than the VaD group on the Immediate Memory, Delayed Recall, and Language Index scores. Findings support the utility of a neurocognitive profile analysis approach in distinguishing AD and VaD using a new brief, repeatable neuropsychological instrument.
Correspondence: *Christopher Randolph, 111 N. Wabash Avenue, Suite 1021, Chicago, IL 60602, USA.*

C. LARRAIN & C. CIMINO. Factor Analysis of CERAD Battery in Alzheimer's Disease.
The Consortium to Establish a Registry for Alzheimer's disease (CERAD) battery consists of five subtests assumed to tap global functioning (Mini Mental Status Exam, MMSE), memory (Word List Learning), language (Boston Naming Test, Verbal Fluency) and Constructional Praxis. The purpose of this study was to examine the factor structure on the CERAD and its convergent validity with other cognitive measures in 202 patients meeting NINCDS–ADRDA criteria for Alzheimer's disease (AD). All patients were administered the CERAD, Trails A & B, Stroop, Symbol Digit, Shopping List, COWA, and WMS–R Logical Memory I & II. Exploratory principal-axis factor analysis with varimax rotation was used. Factor analysis of only the CERAD items resulted in a two-factor solution (i.e., memory and nonmemory), accounting for 51% of the variance. This is consistent with findings of Unverzagt et al. (1996), but not consistent with an original report of three factors by Morris et al. (1989). Factor analysis of the CERAD with other cognitive tests resulted in a four-factor solution (i.e., Memory, Language, Visual–motor, and Executive–self-regulatory), accounting for 66% of the variance, with some CERAD items loading on all four factors. The MMSE only loaded on memory and executive/self-regulatory factors. These findings suggest fair convergent validity for most CERAD items, although MMSE may not adequately measure global cognitive functioning, lacking in language and visual–motor items.
Correspondence: *Claudia Larrain, Psychology Service (116B), James A. Haley Veterans' Hospital, 13000 Bruce B. Downs Boulevard, Tampa, FL 33612-4798, USA.*

C. LARRAIN & C. CIMINO. Boston Naming Test 15-item *Versus* 60-Item in Alzheimer's Disease.
A 15-item version of the Boston Naming Test (BNT) is used as a measure of language ability in the Consortium to Establish a Registry for Alzheimer's disease (CERAD) battery. The purpose of this study was to examine the rate of agreement between the 15-item BNT and the full 60-item BNT in the classification of language impairment in 35 patients meeting NINCDS–ADRDA criteria for probable Alzheimer's disease (AD). All patients were administered both versions of the BNT and were classified as normal, borderline, or impaired. The null hypothesis of independence of classification was examined using a chi-square analysis and Pearson's correlations. The rate of agreement between the 15-item and 60-item BNT was only 65.7%. A significant chi-square, ($\chi^2 = 18.4$, df (1,4), $p < .01$) suggests rejecting the null hypothesis, indicating poor agreement in classification. The two versions of the BNT were significantly correlated at $p < .00001$, although the correlation was only .67. These findings suggest poor criterion validity of the 15-item version of the BNT used on the CERAD battery compared to the full 60-item BNT in correctly classifying language abilities in patients with AD.
Correspondence: *Claudia Larrain, Psychology Service (116B), James A. Haley Veterans' Hospital, 13000 Bruce B. Downs Boulevard, Tampa, FL 33612-4798, USA.*

N. J. FISHER, B.P. ROURKE, L.A. BIELIAUSKAS, & N.L. FOSTER. External Validation of Distinct Neuropsychological Subgroups of Alzheimer's Disease Patients: Preliminary Findings from the CERAD Data.
Neuropsychological CERAD data from 960 probable Alzheimer's disease (AD) patients were subjected to Q-factor analysis in an attempt to externally validate previously identified subgroups. Consistent with previous research, three subgroups of AD patients were identified, accounting for 92.8% of the variance. Subgroup 1 (LAD) was characterized by severe naming impairment yet borderline normal figure copying skills. Those in Subgroup 2 (RAD) displayed average naming ability with moderately impaired copying performance. Members of Subgroup 3 (GAD) evinced profound anomia and constructional dyspraxia. Profile analysis and MANOVA confirmed the significant distinction between the 3 subgroups. When data from 465 CERAD normal elderly controls were subjected to an identical Q-factor analysis, the above subgroupings did not emerge, suggesting that the three-subgroup classification is unique to AD patients.
Correspondence: *Nancy J. Fisher, Department of Psychology, University of Windsor, 401 Sunset Avenue, Windsor, ON N9B 3P4, Canada.*

L. GECK, D. MUNGAS, R. WALLACE, & B. REED. Effects of Depression on Cognition and Independent Functioning in Alzheimer's Disease.
This study examined the contribution of depression to cognitive and functional changes in 193 patients with probable Alzheimer's disease (AD) using a multiple regression approach. Presence of a syndrome of depression was associated with impairment of independent functioning but not with impairment of global or specific cognitive functioning. Specific symp-

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

toms of depression showed differential association with global cognitive and independent functioning and with specific cognitive tests. The magnitude of depression effects was small, accounting for less than 5% of variance for most variables. Functional impairment was better predicted by depression than cognitive impairment. Insomnia showed an unexpected, but consistent, positive relationship with cognitive functioning.
Correspondence: *Laurie Conniff Geck, The Counseling Center of Nashua, One Main Street, Nashua, NH 03060, USA.*

M.A. NORMAN, D.C. DELIS, D. SALMON, & E.D. BIGLER. Differential Rates of Cognitive Decline in Subgroups of Alzheimer's Patients.
The present study examined cognitive decline in 90 subjects with Alzheimer's disease (AD) and 75 normal controls (NC). High verbal (HV–AD) and high spatial (HS–AD) patients and normal controls were administered the Dementia Rating Scale, Boston Naming Test, and Block Design Subtest three times at 1-year intervals. The HV–AD and HS–AD subjects did not differ significantly from each other in their DRS scores in any of the 3 years; however, a trend was evident suggesting a greater rate of decline in the HS–AD subjects. The HV–AD patients exhibited a significantly greater rate of decline on the BNT than the HS–AD patients and NC subjects between Years 1 and 3. In contrast, the HS–AD subjects demonstrated a significantly greater rate of decline than the NC subjects on the BD subjects between Years 1 and 3. These findings suggest that AD patients with asymmetrical cognitive profiles exhibit differential rates of decline in particular cognitive domains, with the patients' relative cognitive strength being especially vulnerable to rapid deterioration.
Correspondence: *Marc A. Norman, Veteran's Administration Medical Center, San Diego, 3350 La Jolla Village Drive, San Diego, CA 92161, USA.*

J. ANDRIKOPOULOS, J. McMILLAN, & D. DOLLISON. Judgment of Line Orientation Short Form in Alzheimer's Disease.
Recently, Woodard et al. (1996) examined the utility of two parallel Judgment of Line Orientation Test (JLO) short forms in a mixed clinical sample. The present study examined the use of short forms of JLO in 76 patients diagnosed with probable and/or possible Alzheimer's disease (AD). Two short forms, consisting of the 15 even and odd items, were developed in the manner described by Woodard et al. Results indicated the mean scores of the two short forms and the full version did not differ significantly. The short forms also correlated significantly with each other. Short form estimates were not significantly different from the original JLO score.
Correspondence: *Jim Andrikopoulos, Neuropsychology Clinic, 1750 48th Street, Suite 2, Des Moines, IA 50310, USA.*

J.M. LaFOSSE, S.L. SCARBOROUGH, & B.R. REED. Utility of a New Verbal Recognition Memory Task for the Assessment of Dementia.
We developed a verbal recognition task for use with the Memory Assessment Scales (MAS) to evaluate dementia. Our present goal is to describe the clinical utility of the recognition task. One hundred forty-seven patients meeting NINCDS criteria for AD received the MAS list learning test along with our recognition task. Unlike the recall-based indices, a recognition-based discriminability index is less susceptible to floor effects and therefore is a more useful tool for evaluations of dementia patients at broader ranges of dementia severity. Moreover, the recognition task provides a means for assessing changes in error types as dementia severity increases. Our recognition task is meant to be used with a well-standardized test that should be less overwhelming for demented patients than similar tests with more target words.
Correspondence: *Jose Lafosse, Department of Psychology, University of Colorado at Denver, Campus Box 173, Denver, CO 80217-3364, USA.*

D.B. HOWIESON, A. DAME, R. CAMICIOLI, G. SEXTON, & J. KAYE. The Natural History of Questionable Dementia: Early Dementia *Versus* Age-Associated Cognitive Impairment.
The outcome of elderly individuals who developed questionable dementia (QD) during the course of a longitudinal study of normal aging was studied. Subjects who did not progress to a full dementia syndrome during follow-up of up to 4 years were classified as *stable* ($N = 15$) while those who eventually progressed from QD to at least mild dementia were classified as *decliners* ($N = 9$). The stable individuals appeared stable in their verbal memory performance (WMS–R Logical Memory II) compared with decliners (Group × Time Interaction, $p = .0035$). Stable individuals may have an age-associated cognitive decline rather than early dementia or they may have a slowly progressing dementing illness that is qualitatively different from the decliners, who show the more rapid progression of dementia.
Correspondence: *Diane Howieson, Department of Neurology (L226), Oregon Health Sciences University, Portland, OR 97201, USA.*

J. SAXTON, M. BUTTERS, & C. SHELTON. Diagnosing Dementia in Elderly Alcoholics.
The concept of alcohol dementia has not been well defined, and estimates of the prevalence of the disorder vary widely. The disorder is recognized in DSM–IV and the diagnosis includes the clinical features of dementia (i.e., a deficit in memory plus another cognitive domain and impaired evade functioning). In this study 23 elderly abstinent alcoholics completed a standard clinical evaluation for dementia. Of this group 17% ($n = 4$) met DSM–IV criteria for alcohol dementia. The remaining 19 subjects exhibited deficits in multiple cognitive domains compared to normal elderly; however, these deficits did not include memory and, therefore, did not meet DSM–IV criteria. This paper discusses the diagnosis of alcohol dementia in the light of the cognitive deficits experienced by elderly alcoholics.
Correspondence: *Judith Saxton, University of Pittsburgh Medical Center, Western Psychiatric Institute and Clinic, 3811 O'Hara Street, Pittsburgh, PA 15213, USA.*

C. BACK, S. McPHERSON, J.L. CUMMINGS, & L. FAIRBANKS. Functional Ability in Frontal Variant AD and Conventional AD.
A frontal variant of Alzheimer's disease (FAD) has been described in the literature in which frontal lobe changes are superimposed on bitemporal–parietal dysfunction. However, little is known about functional abilities and neuropsychiatric symptoms in this AD subtype, compared to conventional Alzheimer's disease patients (CAD). In the present study, 6 FAD patients and 6 CAD patients were compared on neuropsychological, neuropsychiatric, and functional measures. Results revealed that, with the exception of degree of impairment in executive–frontal lobe skills, FAD and CAD are neuropsychologically similar, with declines in temporal and parietal abilities. However, the FAD group evidenced significantly greater neuropsychiatric symptoms, more impaired instrumental activities of daily living, and increased caregiver burden, relative to the CAD group.
Correspondence: *Carla Back, UCLA Alzheimer's Disease Center, 710 Westwood Plaza, Los Angeles, CA 90096, USA.*

D. J. CONNOR, C.S. KIM, & D.P. SALMON. Performance on the California Verbal Learning Test–Forced Choice (CVLT–FC) Addendum in a Population with Dementia of the Alzheimer Type (DAT).
A forced choice addendum to the California Verbal Learning Test (CVLT–FC) has been devised as a screening test for malingering. The CVLT–FC demonstrated good sensitivity (80%) and excellent specificity (97%) in a head-injury population (Neurology, 1997). However, the limits of this instrument's performance in a population with multiple cognitive systems dysfunction has not been explored. Our results indicate that a significant number of patients with moderate to severe DAT were misclassified as malingerers by the CVLT–FC. Studies of severely impaired groups (e.g., combined episodic memory loss, semantic network breakdown, and frontal disinhibition) can be useful in testing the limits of dissimulation measures, especially if clinically derived cutoff scores, instead of performance significantly below chance, are used for diagnosis.
Correspondence: *Donald J. Connor, ADRC/UCSD, Suite 1200; 8950 Villa La Jolla Drive, La Jolla, CA 92037, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

K. WILD. The Relationship Between the Severe Impairment Battery and Standard Neuropsychological Tests in Alzheimer's Disease Patients.
In recent years several instruments have been developed to assess cognitive functioning in severely impaired dementia patients. Although a stated aim of these tests has been to extend downwards the range of cognitive domains assessed by commonly used neuropsychological batteries, their construct validity has not been adequately established. The present study compares performance on standard neuropsychological tests with subsequent performance on the Severe Impairment Battery (SIB). Thirty-five patients with possible or probable Alzheimer's disease were examined on two separate occasions with a mean interval of 11.4 months. MMSE scores declined from a mean of 18.2 to 13.3 in that time. The relationship between performance on standard tests of language, memory, and visual spatial function and parallel subscales of the SIB will be presented and implications for longitudinal assessment will be discussed.
Correspondence: *Katherine V. Wild, Department of Neurology, L226, Oregon Health Sciences University, 3181 S.W. Sam Jackson Park Road, Portland, OR 97201, USA.*

M.-E. MEADOWS, R. SPERLING, K. DAFFNER, K. JOHNSON, M. FROSCH, & J. SHEFNER. Amyotrophic Lateral Sclerosis (ALS) and Comorbid Dementia: A Neuropsychological, Neuroimaging and Neuropathological Case Study.
Comorbid dementia in patients with amyotrophic lateral sclerosis (ALS) is relatively rare. G.H. was a 67-year-old man whose neurological exam was consistent with dementia and ALS. Neuropsychological testing revealed deficits in attention, executive functioning, and lexical access,with relative sparing of memory. An MRI showed diffuse atrophy with superimposed right temporal atrophy and select foci in the white matter. A SPECT scan revealed multiple cerebral perfusion bilaterally in the frontal, temporal, and parietal lobes. At autopsy, amyloid plaques and tangles were prominent in the frontal and temporal cortex, consistent with Alzheimer's disease pathology.
Correspondence: *Mary-Ellen Meadows, Brigham and Women's Hospital, 221 Longwood Avenue, Boston, MA 02115, USA.*

M. RIZZO, D. McGEHEE, J. DAWSON, & T. CUMMING. Simulated Intersection Collisions in Drivers with Alzheimer's Disease.
State records indicate that car crashes in cognitively impaired older drivers are often due to failure to notice other drivers at intersections. To test this risk in licensed older drivers with mild to moderate Alzheimer's Disease (AD), we applied the Iowa Driving Simulator, where innovations in computational dynamics, parallel computing, and image generation create a realistic driving environment, providing feedback to the driver. In this experiment an illegal intersection incursion by another vehicle caused a potential crash. Six of 18 drivers with AD (33%) crashed, *versus* 0 of 12 nondemented drivers of similar age ($p = .03$). Predictors of crashes ($p < .05$) included visuospatial impairment and reduced processing of visual motion cues, as in another recent study. High-fidelity driving simulation can provide unique evidence to standardize assessment of fitness to drive following cognitive impairment.
Correspondence: *Matthew Rizzo, Department of Neurology, 2144 RCP, University of Iowa, Iowa City, IA 52242, USA.*

J.S. WEFEL, B.D. HOYT, & P. J. MASSMAN. Cognitive Functioning in Depressed *Versus* Nondepressed Alzheimer's Patients.
Differences in cognitive functioning between Alzheimer's disease (AD) subjects reporting depressive symptoms (AD–dep; $N = 37$) and nondepressed AD subjects (AD–con; $N = 98$) were investigated based on hypothesized impairments of attention–concentration, speed of processing, psychomotor speed, and visuospatial functions. Groups did not differ in age, education, overall severity of dementia, or comprehension. Consistent with hypotheses, AD–dep subjects were more impaired on Block Design, Object Assembly, Digit Symbol, letter fluency, and motor programming. Interestingly, AD–dep subjects performed better on Logical Memory–II and exhibited an unexpected pattern of greater right hand advantage of the Finger Tapping Test (FTT). Relative impairment of AD-dep subjects on letter fluency *versus* category fluency and their unexpected FTT performance are consistent with the hypothesized involvement of frontal areas in depression.
Correspondence: *Paul J. Massman, Department of Psychology, University of Houston, 4800 Calhoun Road, Houston, TX 77204-5431, USA.*

C. CIMINO, K. GOSCHE, C. LARRAIN, A PLACZEK, A. RAJ, R. VELTHUIZEN, & L. CLARKE. White Matter Hyperintensities and Affective Disturbance in Alzheimer's Disease.
The purpose of this study was to investigate the relationship between deep white matter hyperintensities (WMH) and affective disturbance in a sample of patients who met NINCDS–ADRDA criteria for Alzheimer's disease. Findings revealed that a quantitative estimate of WMH was a significant predictor of severity of anxious but not depressive symptoms in this sample of AD patients irrespective of the severity of dementia. The relatively restricted range of depressive symptoms in this sample may possibly account for the weak relationship observed between this variable and WMH. WMH, however, did serve as a significant predictor of severity of anxious symptoms. These findings extend prior research demonstrating that WMH in AD significantly predict the pattern of cognitive performance on tasks of attention and speed of processing.
Correspondence: *Cynthia R. Cimino, Department of Psychology BEH-339, University of South Florida, Tampa, FL 33620, USA.*

K.C. SAINE, J.M. MAYFIELD, K. MARTIN, C.M. CULLUM, & M.F. WEINER. Effects of Aricept (Donepezil) on Cognitive and Functional Living Skills in Alzheimer's Disease.
The purpose of this study was to examine the effect of Aricept on cognitive and functional living skills of patients with Alzheimer's disease (AD). Twenty-one subjects, age 58 to 85 years (MMSE $M = 14.29$, $SD = 6.58$) underwent baseline examination, with 1-month and 3-month follow-up data obtained on a subset of subjects. At each visit, subjects were administered the MMSE and the Functional Living Scale (FLS), a brief performance-based measure of the ability to conduct instrumental activities of daily living, and caregivers completed the Blessed Dementia Rating Scale (BDRS). Results revealed significant improvement at 1 month on the FLS [$t(19) = 3.22$, $p = .005$], although no change was seen on the BDRS [$t(18) = .11$, $p = .911$]. There was a slight increase in MMSE scores, although this was not significant [$t(16) = 1.95$, $p = .069$]. Three-month follow-up data suggested further improvement in FLS scores, with stability on the other measures. Preliminary results suggest that drug efficacy studies that rely on brief cognitive measures or caregiver reports may fail to capture subtle changes in functional status that may be detected with performance-based measures.
Correspondence: *C. Munro Cullum, University of Texas Southwestern Medical Center, 5323 Harry Hines Boulevard, Dallas, TX 75235-8898, USA.*

M.C. CARLSON, J. BRANDT, K. CARSON, F.W. BYLSMA, & Y. STERN. Validation of an Algorithm Predicting Time to Death in Individuals with Alzheimer's Disease.
This study tested the broader applicability of the Predictors Study algorithm, recently developed to predict the length of time from initial clinic evaluation until death in patients with probable Alzheimer's disease (AD). We applied the algorithm to a sample of 209 patients diagnosed with possible and probable AD who entered the Johns Hopkins Alzheimer's Disease Research Center (ADRC). Patients were divided into a poorer prognosis group (predictor indexes of 0.5–1.5) and a better prognosis group (predictor indexes of 1.5–2.5). A comparison of Kaplan-Meier survival curves for these two groups revealed that predictor index scores successfully differentiated patients with shorter *versus* longer actual survival durations. However, the algorithm generally underestimated survival time in the Johns Hopkins ADRC cohort. This underestimate is considered in the context of methodological and sampling differences between studies.
Correspondence: *Michelle C. Carlson, Department of Psychiatry and Behavioral Sciences, The Johns Hopkins Hospital, Baltimore, MD 21287-7218, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

HIV 1

J. BERGHUIS, K. ULDALL, B. LALONDE, S. TONGE, & S. LOHN. A Comparison of the HIV Dementia Scale and the Executive Interview in Identifying HIV–AIDS Patients with Dementia.
Objective: To compare the validity of the HIV Dementia Scale (HDS) and Executive Interview (EXIT) in detecting HIV–AIDS dementia and in predicting patients' living situations. *Method*: Sample was hospitalized or skilled nursing facility (SNF) HIV–AIDS patients ($N = 73$). Participants completed the HDS, EXIT, and a psychiatric assessment using the Structured Clinical Interview for DSM–IV (SCID). *Results*: Preliminary analyses show a predominantly male sample (94%) with a mean age of 39 years ($SD = 8$). Ten patients were diagnosed with dementia. The HDS and EXIT were significantly correlated with dementia ($r = -.56$ and $r = .50$; $p = .000$, respectively and each other ($r = -.69$; $p = .000$). Comparisons of the HDS and EXIT are presented. Separate logistic regression analyses demonstrated the contribution of education, HDS scores, and EXIT scores to dementia and living setting (home *vs* SNF). *Conclusion*: Findings are discussed.
Correspondence: *James P. Berghuis, University of Washington, Center for Health Education & Research, 1001 Broadway, Suite 217, Seattle, WA 98122, USA.*

T.D. MARCOTTE, R.K. HEATON, R. J. ELLIS, J.A. McCUTCHAN, J.H. ATKINSON, I. GRANT, & THE HNRC GROUP. Neuropsychological Decline and Neurocognitive Diagnostic Stability in HIV-infected Individuals.
Although the prevalence of HIV-related neuropsychological (NP) impairment has been well documented, data regarding NP change over time has been limited. Nine hundred seventy-two subjects underwent a baseline NP evaluation and were assigned a neurocognitive diagnosis by a multidisciplinary team. The diagnostic classifications consisted of NP normal, subsyndromic NP impairment (NP impairment but no deficits in everyday functioning), Minor cognitive motor disorder, and dementia. At each successive year of follow-up during a 3-year period, AIDS subjects had the highest rate of NP worsening, followed by HIV-positive non-AIDS subjects and HIV-negative subjects, respectively. Most subjects received a similar diagnosis after 2 years of follow-up; however, there was significant movement between diagnostic classifications. The disease thus appears to be characterized by a pattern of general decline with periods of remission in cognitive symptomatology.
Correspondence: *Thomas D. Marcotte, Department of Psychiatry, University of California at San Diego, HIV Neurobehavioral Research Center, 2760 Fifth Avenue, Suite 200, San Diego, CA 92103, USA.*

M.C. DIEHR, T.D. MARCOTTE, O.M. ALHASSOON, R.K. HEATON, J. NELSON, I. GRANT, & THE HNRC GROUP. Comparison of CANTAB with a Traditional Neuropsychological Test Battery in HIV Disease.
Developing efficient neuropsychological batteries to detect HIV-related neurocognitive dysfunction is important for clinical and research purposes. We compared the performances of $N = 118$ HIV-1 positive subjects on the Cambridge Neuropsychological Test Automated Battery (CANTAB) with clinician ratings based on a standard neuropsychological (NP) test battery. Correlations indicated that CANTAB tests loaded in a general way on diverse NP ability areas, but discriminant function analysis suggested that "frontostriatal" CANTAB tests (spatial working memory and attentional set shifting) may be most sensitive to clinician-rated impairment.
Correspondence: *Michael Diehr, HNRC, 2760 Fifth Avenue, Suite 200, San Diego, CA 92103, USA.*

C.H. HINKIN, S.A. CASTELLON, & K.T. YAREMA. Executive Dysfunction and Dual Task Performance in HIV-1 Infection.
Thirteen HIV-1 infected patients with evidence of executive dysfunction, 29 HIV-1 infected patients without executive dysfunction, and 19 HIV-negative controls participated in a study designed to investigate the relationship between dual task performance, working memory, and executive dysfunction in HIV-1 infection. Results of ANOVA revealed that the dysexecutive group demonstrated a significantly greater proportional decrement in reaction time (RT) under dual task conditions relative to single task RT. The dysexecutive and nondysexecutive HIV-positive groups did not differ on either single task simple RT nor on single task choice RT. These data suggest that the central executive component of working memory, as indexed by a decrement in dual task performance, is differentially impaired in a subset of HIV-positive individuals with evidence of executive dysfunction.
Correspondence: *Charles H. Hinkin, Department of Psychiatry and Biobehavioral Sciences, UCLA School of Medicine, 760 Westwood Plaza, Room C8-747, Los Angeles, CA 90024, USA.*

B.K. CHRISTENSEN, R.R. HENRY, M.L. KLASWICK, & K.R. CAVE. Visual–Spatial Attention in HIV-1 Infection.
Although HIV-1 infected persons perform poorly on neuropsychological (NP) tests of attention, these measures require multiple cognitive processes for completion. This study explored the impact of HIV-1 infection on visual–spatial attention using the Spatial Probe Task (SPT), a componentially specific test of attention. In addition, the relationship between NP measures and the SPT were examined. Nineteen seronegative (HIV–N), 25 seropositive but asymptomatic (HIV–A), and 29 seropositive but symptomatic (HIV–S) individuals participated. The HIV–S group performed worse than the HIV–N or HIV–A groups on several NP measures. The groups were equivalent in their ability to identify a visual target among distractors, but the HIV–S group was less able to allocate attention to a spatial location. Also, the HIV–S group was significantly slower to respond. SPT indices were unrelated to many NP measures, and at best accounted for only 20% of NP test performance. These data suggest that visual search abilities are equivalent across stage of infection, but that motor speed and spatial attention are more impaired in late stages. Additionally, performance on the NP tests could not be wholly attributed to deficits of attention *per se*, and such formulations should be treated cautiously.
Correspondence: *Bruce Christensen, Clarke Institute of Psychiatry, 250 College Street, Toronto, ON M5T 1R8, Canada.*

Symposium 4/3:30–5:10 p.m.

THE HISTORY OF INS

Organizer and Chair: Byron P. Rourke

B.P. ROURKE. The Origins of INS.
The first Annual Meeting of INS was held in New Orleans in February, 1973. But the discernible origins of INS antedate this meeting by approximately 10 years. The early formative years of the Society were marked by a series of thrusts, parries, and feints. Eventually, a consensus was reached that there should be an INS. This consensus brought together a number of quite distinct neuropsychological constituencies that survive and prosper until this day. The main purpose of this symposium is to allow a forum for some of those who know these origins and subsequent developments to speak about them. The participants have been encouraged to frame their remarks in a very personal manner, and to reflect, albeit briefly, on the significance of the persons who were involved in this process. As one dimension of the development of neuropsychology as a discipline, a final presentation reviews INS program content from then until now.
Correspondence: *Byron P. Rourke, University of Windsor & Yale University.*

L. COSTA. From Early Daze to Bored Boards.
By the mid-1960s, some neuropsychologists began to feel the need for a society to make possible the presentation of papers and the consideration of professional issues. The years preceding the first independent INS meeting in New Orleans were filled with organizational and political problems.

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

The important work done by Arthur Benton, Ray Dennerll, Richard Louttit, Manfred Meier, Paul Satz, and Aaron Smith in the gestation and birth of INS will be remembered. In the 1970s, the issues of professionalization and internationalization became central to the agenda of INS. These will be considered briefly.
Correspondence: *Correspondence: Louis Costa, University of Victoria.*

G. GOLDSTEIN. The Early Days and Pioneers.
Some of the events leading up to the 1973 New Orleans meeting and the first European meeting will be reviewed. The contributions of several early INS pioneers are highlighted.
Correspondence: *Gerald Goldstein, Pittsburgh VAMC.*

P. SATZ. Some Reflections on the Early Origins of INS.
My presentation will attempt to piece together spotty remembrances and reflections on the early origins of INS. This period covers a number of informal events that still remain unrecorded. They involve a small group of neuropsychologists and behavoral neurologists from North America and other regions. Some of the neuropsychologists are participants in this symposium: they shared the early hopes and frustrations about someday having a formal organization for neuropsychology.
Correspondence: *Paul Satz, University of California, Los Angeles.*

H. VAN DER VLUGT. The New Orleans Meeting and the European Connection.
It was September, 1971 when I first encountered the so-called INS. At that time, I was a post-doctoral student at the University of Florida working with Paul Satz. At the request of Arthur Benton, Paul Satz was supposed to arrange a meeting in February, 1973. Satz appointed me as the program chair. There were about 100 participants, including three Europeans. From then on, the INS started the tradition of the February meetings. A few years later, we started the European mid-year meetings. Initially, we met in Europe every other year. As a European member of the early days and later also as a Board member of INS, I was involved with all European Meetings. I will present a summary of these activities.
Correspondence: *Harry van der Vlugt, University of Tilburg.*

B.P. ROURKE & S. MURJI. From Then Till Now.
Some reflections on the content of the first and early meetings will be offered. Trends in the nature of the topics presented at INS meetings from then until now will be presented.
Correspondence: *Byron P. Rourke, University of Windsor & Yale University.*

Paper Session 6/3:30–5:30 p.m.

MEDICAL ILLNESS-2

E.A. GUADINO, J. DELUCA, B. J. DIAMOND, C. CHRISTODOULOU, & R. ENGEL. The Nature of Visual Memory Impairment in Multiple Sclerosis: Acquisition, Storage or Retrieval Deficit?
Recent work has shown that the verbal memory deficit in multiple sclerosis (MS) may be due to deficient *acquisition* as opposed to retrieval deficits. The present investigation examined whether visual memory impairment follows the same pattern. Thirty-eight MS and 20 healthy control subjects were administered the 7/24 visual memory test. Subjects were equated for the amount of information acquired by training them to a criterion of two consecutive errorless trials. Recall and recognition were assessed at 30-min and 90-min delays. The MS group required significantly more trials to reach criterion. Although equated for amount of information acquired, recall and recognition were significantly worse in the MS group. Results suggest that visual memory impairment in MS may be due to deficits in both acquisition and storage of visual information.
Correspondence: *John DeLuca, Department of Research, Kessler Institute for Rehabilitation, 1199 Pleasant Valley Way, West Orange, NJ 07052, USA.*

P. ARNETT, C. HIGGINSON, W. VOSS, W. BENDER, & J. TIPPIN. Depression in Multiple Sclerosis: Relationship to Working Memory Capacity.
Recent research has shown that depression in Multiple Sclerosis (MS) is associated with deficits in working memory. One explanation for this relationship is that depression in MS may reduce cognitive capacity, resulting in fewer attentional resources available for performing capacity-demanding cognitive tasks. Our study was designed to test this hypothesis. We compared depressed and nondepressed MS patients on a task of working memory capacity (Reading Span) and a matched task not taxing working memory (Word Span). In support of the capacity-reduction model, compared to nondepressed MS patients, depressed MS patients performed significantly worse on Reading Span ($p < .001$), but not on Word Span. Future research will be necessary to determine whether capacity reduction or narrowed attentional focus on depressive cognitions best characterizes the cognitive functioning of depressed MS patients.
Correspondence: *Peter Arnett, Department of Psychology, Washington State University, Pullman, WA 99164-4820, USA.*

P. ARNETT, C. HIGGINSON, W. VOSS, W. BENDER, & J. TIPPIN. Depression in Multiple Sclerosis: Relationship to Planning Ability.
Recent research has demonstrated deficits on demanding cognitive tasks involving planning in multiple sclerosis (MS) patients. Given the high prevalence of depression in MS and the commonly reported link between depression and performance on cognitively demanding tasks, planning impairments in MS may be associated with depression. We compared performance of depressed and nondepressed MS patients on a planning task (Tower of London) to evaluate this hypothesis. Compared to nondepressed MS, depressed MS patients made significantly more moves and took more time per trial. The left-frontal hypoactivation in depression reported by some investigators may be associated with impaired performance on this task, which prior research has shown involves activation of left-frontal brain systems. Future research examining brain metabolic activity during task performance could evaluate this hypothesis.
Correspondence: *Peter Arnett, Department of Psychology, Washington State University, Pullman, WA 99164-4820, USA.*

D. FORDYCE, R.A. HALL, M. LEE, & B. EISENBERG. Pre- and Intraoperative Cerebral SPECT Scan Predictors of Early Cognitive Decline After Coronary Artery Bypass Grafting (CABG).
An analysis of the ability of SPECT studies of cerebral perfusion to explain neuropsychological impairment after CABG was undertaken. Twenty-one subjects undergoing elective CABG were administered a brief battery of neuropsychological tests just before and on average five days after surgery. Cerebral perfusion was studied through 99m-Tc Bicisate SPECT scans just before and during nonpulsatile hypothermic CABG. Decline in cognitive functioning was found to be correlated with the number of significantly hypoperfused cortical regions identified presurgically. Intraoperative SPECT data, time on pump, demographic data, and levels of depression were not related to altered neuropsychological status.
Correspondence: *David J. Fordyce, Virginia Mason Medical Center, 1100 9th Avenue, Seattle, WA 98111, USA.*

I. ROULEAU, A. DÉCARY, A. J. CHICOINE, F. MORRISSON, & J. MONTPLAISIR. Procedural Memory Functions in Obstructive Sleep Apnea Syndrome.
In order to better characterize the cognitive deficits observed in obstructive sleep apnea syndrome (OSAS), 17 apneics and 9 normal controls (NC) completed a comprehensive neuropsychological test battery including episodic (verbal and visuospatial) and procedural (mirror tracing and pursuit rotor) memory tests as well as tests sensitive to frontal lobe dysfunction. Although the OSAS and NC group performances were not significantly different on the various tests administered, there was, in the OSAS group, a subgroup of subjects ($N = 7$) who showed marked difficulties in the initial acquisition of the mirror tracing task (MTR). Even if their MTR performance showed some improvement across trials, it nevertheless

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

remained deficient. In contrast, rotor pursuit learning was normally performed. Comparison of OSAS patients with and without difficulties on the MTR revealed significant differences on many tests sensitive to frontal lobe dysfunction (e.g., WCST, Maze, Trail B) but no differences on episodic memory tests. Sleep and respiratory variables did not distinguish the two groups. However, a significant effect of age was observed suggesting either an effect of illness duration or a combined effect of age and hypoxemia in the emergence of cognitive deficits in OSAS.
Correspondence: *I. Rouleau, Service de neurologie, Hopital-Notre-Dame, 1560 Sherbrooke est, Montreal, QC H2L 4M1, Canada.*

J. BOBHOLZ, S. RAO, M. SEIDENBERG, L. SWEET, K. PATTERSON, L. BERNARDIN, J.R. BINDER, & L. LOBECK. Cognitive Decline in MS: An 8-Year Longitudinal Study.
This 8-year longitudinal study examined the natural course of cognitive functioning in multiple sclerosis (MS). Samples consisted of 59 MS patients and 67 normal healthy subjects. Groups were matched for age, education, and sex and no significant attrition biases were evident. Both subject groups were administered a comprehensive neuropsychological battery of measures during three evaluations administered at baseline, 3 years and 8 years. MS patients also received neurologic and MRI examinations at each visit. Results revealed significant declines in neuropsychological performance on measures of verbal intelligence, verbal and spatial memory, and visuospatial functions. MRI evaluations revealed significant increases in pathology. Furthermore, individuals who declined significantly on cognitive measures also showed significantly increased pathology over time.
Correspondence: *Julie Bobholz, Section of Neuropsychology, Medical College of Wisconsin Clinic at Froedtert, 9200 West Wisconsin Avenue, Milwaukee, WI 53226, USA.*

Paper Session 7/3:30–5:30 p.m.

GENETICS-1

G.W. JASON, O. SUCHOWERSKY, E.M. PAJURKOVA, L. GRAHAM, M.L. KLIMEK, A.T. GARBER, & D. POIRIER-HEINE. Neuropsychological Manifestations of Huntington's Disease Before and After Clinical Onset in Relation to Genetic Structure.
Neuropsychological evaluation was conducted on 50 people with Huntington's disease (HD) and 127 at-risk (AR) subjects. Molecular genetic analysis was conducted on 31 HD and 86 AR subjects. In clinical HD, cognitive impairment correlated with number of years affected. Linear regression showed a negative intercept suggesting impaired cognitive function by the time of onset. In AR gene carriers, higher trinucleotide repeats correlated with lower cognitive performance. In clinical HD, trinucleotide repeats interacted with disease chronicity such that more repeats were associated with worse performance over time. Results suggest that cognitive decline starts before clinical onset and is correlated with the number of trinucleotide repeats. Subsequent cognitive performance primarily depends on number of years affected, with evidence that more trinucleotide repeats are associated with faster deterioration.
Correspondence: *Gregor W. Jason, Department of Psychology, Foothills Hospital, 1403 29th Street N.W., Calgary, AB T2N 2T9, Canada.*

M. J. FINTON, J.A. LUCAS, G.E. SMITH, R. J. IVNIK, D.L. BOHAC, S.C. WARING, E.G. TANGALOS, R.C. PETERSEN, & N.R. GRAFF-RADFORD. Differences in Cognitive Phenotypes Associated with Apolipoprotein-E Genotypes in Probable Alzheimer's Disease.
Apolipoprotein E (apoE) is known to be a significant risk factor for dementia of the Alzheimer's type (DAT) and may be associated with specific cognitive phenotypes. The current study examined differences in verbal and spatial cognitive performance among 98 White individuals diagnosed with probable DAT. Patients were divided into three groups based on the presence and number of $\epsilon 4$ alleles. Results indicated a significant group difference on measures of verbal and spatial functions. The homozygous patients demonstrated relatively worse spatial than verbal cognitive abilities, whereas the opposite pattern was present in patients without an $\epsilon 4$ allele. A similar but nonsignificant trend was also found between homozygous and heterozygous $\epsilon 4$ patients. The $\epsilon 4$ genotype may therefore be associated with a distinct cognitive phenotype characterized by greater visuospatial dysfunction.
Correspondence: *John A. Lucas, Department of Psychology, Mayo Clinic Jacksonville, 4500 San Pablo Road, Jacksonville, FL 32224, USA.*

G. SWAN, T. MARKEE, T. REED, C. DECARLI, B. MILLER, P. WOLF, & D. CARMELLI. A Genetic Analysis of the California Verbal Learning Test.
As part of the 4th Exam follow-up of the National Heart, Lung, and Blood Institute's Twin Study, 90 monozygotic (MZ) pairs and 81 dizygotic (DZ) pairs were given the California Verbal Learning Test (CVLT). Subjects were all male, mean age = 71.7 years and mean educational level = 13.5 years. Genetic analyses of CVLT subscales revealed that intraclass correlations were significant regardless of zygosity and significantly greater within MZ than DZ pairs. The additive genetic model with residual nonshared familial environmental influences provided the best account of the observed data. Heritability estimates for the CVLT subscales ranged from a low of 26% (recognition hits) to a high of 64% (List A total). This is the first study to evaluate the genetic contribution to this very important aspect of memory in old age.
Correspondence: *Gary E. Swan, Center for Health Sciences, SRI International (formerly Stanford Research Institute), 333 Ravenswood Ave., Menlo Park, CA 94025, USA.*

C.L. MCNAMARA, R.A. YEO, & S.W. GANGESTAD. Developmental Instability and Alzheimer's Disease.
Genetic influences in the etiology of Alzheimer's disease (AD) are widely acknowledged yet poorly understood. This study investigated the possibility that developmental instability (DI), the imprecise expression of the genetic plan for development due to "noise" in developmental processes, whose genetic underpinnings (polygenic homozygosity, mutations, disadvantaged HLA alleles) have been well characterized, contributes to the etiology of AD. Classic markers of DI assessed were minor physical anomalies and fluctuating anatomic asymmetry (producing a composite score), as well as atypical handedness. As compared to age- and sex-matched controls, AD patients demonstrated greater DI and more atypical handedness (both left-handedness and extreme right-hand skill). DI was also associated with older age of onset. These results provide substantial support for the role of DI in the etiology of AD.
Correspondence: *R.A. Yeo, Department of Psychology, University of New Mexico, Albuquerque, NM 87131, USA.*

R.S. KERN, M. J. ROBERTSON, R.G. MANGANO, & M.F. GREEN. Neurocognitive Impairments in the Familial Subtype of Schizophrenia.
Despite the substantial evidence for a genetic component in schizophrenia, little evidence has emerged from the neuropsychological literature to document a familial subtype for the disorder. The present study compared DSM–III–R treatment-resistant schizophrenia patients with (FH+; N = 12) and without (FH−; N = 44) first-degree relatives with schizophrenia on a battery of neurocognitive measures. The results revealed that FH+ patients were more impaired on a measure of procedural learning, and trends in the expected direction were noted on measures of verbal learning, visual vigilance, and executive functioning. The unidirectionality of these findings across multiple neurocognitive domains suggests that patients with FH+ may have a form of the disorder that is associated with relatively severe diffuse disturbances in neurocognitive functioning.
Correspondence: *Robert S. Kern, VA Medical Center West Los Angeles (B116AR), 11301 Wilshire Boulevard, Los Angeles, CA 90073, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

J.T. TSCHANZ, K.A. WELSH-BOHMER, M.C. NORTON, R. NICKLES, B.W. WYSE, A. HART, A.M. SAUNDERS, & J.C.S. BREITNER. Identification of Nondemented Individuals Homozygous for the ϵ4 Allele of Apolipoprotein E Using a Psychometric Standardization of ADRDA Criteria.
Few reports exist in the literature of non-demented individuals who are homozygous for Apo ϵ4. Previously in our laboratory, we showed that while ϵ4/ϵ4 was a strong risk factor for Alzheimer's disease (AD), nearly all of this risk was apparent by age 80, and half of the subjects with ϵ4/ϵ4 never developed AD. Because dementia classification was based upon clinical diagnostic methods, and can be criticized as being somewhat subjective, we performed an analysis of continuous neuropsychological measures as a basis to reclassify individuals into groups of those with and without dementia. Dementia was defined as memory and two other cognitive tests falling 1.5 *SD* below the mean. We also conducted analyses to determine if there was a difference in the relative distribution of test scores by genotype. Of the 984 subjects who underwent neuropsychological testing as part of an examination for dementia, 87 were ϵ4/4. We identified 66 ϵ4/ϵ4 individuals without dementia, ranging in age between 65 and 92. For all subjects, the lowest neuropsychological test scores were obtained by ϵ4/ϵ4 subjects followed by those with one ϵ4 allele. These results confirm our previous results that ϵ4/ϵ4 individuals may reach old age without developing dementia. We also show that lower neuropsychological performance is related to the ϵ4 genotype.
Correspondence: *JoAnn T. Tschanz, UMC4440, Utah State University, Logan, UT 84322-2900, USA.*

Birch Memorial Lecture/6:30–7:30 p.m.

MEMORY SYSTEMS IN THE MAMMALIAN BRAIN

Larry Squire

FRIDAY MORNING, FEBRUARY 6, 1998

Paper Session 8/9:00–10:40 a.m.

DEMENTIA 3: INTERVENTION & ETHICS

Y. TANAKA, M.L. ALBERT, K. MINEMATSU, H. HARA, & K. HAYASHIDA. Cognitive Improvement After Treatment with CDP-Choline in Patients with Vascular Dementia: A SPECT Study.
Objective: This pilot study is designed to determine if CDP-choline produces improvement in cognitive function in patients with vascular dementia that lasts beyond the time of treatment. *Subjects:* Two patients with well-documented MID: a 57 y/o female and a 58 y/o male. *Methods:* (1) Evaluation of cognitive function with the Cross Cultural Cognitive Examination (CCCE) before and one week after daily treatment with CDP-choline. (2) 99m-Tc-ECD-SPECT analysis performed before and 24 h after cessation of a 7-day treatment regime with CDP-choline. *Results:* (1) Statistically significant improvement in cognition on CCCE (from 5 to 13 out of 22 pass-tasks in Case 1, and 10 to 14 out of 22 in Case 2). (2) Statistically significant increase in CBF on SPECT. *Conclusion:* CDP-choline improves cognition and CBF in MID for at least 24 h after cessation of treatment.
Correspondence: *Yutaka Tanaka, Momose Clinic, Heguri Ikoma-gun, Nara, Japan, 636.*

R. ZEC, K. VOST, & S. MARKWELL. Early AD Patients Lack Insight Regarding the Degree of Their Executive Functioning Impairment.
The rating scores of an early Alzheimer disease (AD) group (*M* MMSE = 24.2, Alzheimer Disease Assessment Scale < 15) and a normal elderly control group were compared on the Dysexecutive Self-Rating (DEXs) and the Dysexecutive Independent Rating (DEXi) from the Behavioural Assessment of the Dysexecutive Syndrome. Eighteen early AD patients and 28 elderly normal elderly control subjects were studied. The ratings on these two rating scales clearly demonstrated lack of insight into executive functioning impairments in the early AD group. The AD patient group rated themselves as *less* impaired than the control group rated themselves. The independent ratings by a family member or friend indicated significantly greater impairment in everyday executive functioning in the AD group compared to the control group. The difference between the self ratings and the independent ratings was significantly different between the two groups. Our data clearly demonstrate lack of insight into executive function impairments in early AD patients. Lack of insight can be interpreted as a breakdown in metacognitive processes or executive functions in which patients have increasing difficulty self-monitoring and predicting their own performance. Because early AD patients lack insight into their own impaired executive functioning, they cannot be expected to spontaneously develop and use strategies to help compensate for these deficits.
Correspondence: *Ronald Zec, P.O. Box 2832, Springfield, IL 62708, USA.*

J.M. GOLD, P. APPLEBAUM, J. BARTKO, W. CARPENTER, R. CONLEY, A. LAHTI, & C. QUEERN. Ethics of Research Participation: Competence to Consent and Cognitive Impairment.
This study examined the relationship between cognitive performance and performance on the MacArthur Competence Assessment Tool–for Clinical Research (MCAT–CR) in 30 schizophrenia patients. The MCAT-CR is an interview-based measure of competence to consent to research that evaluates a patient's ability to understand protocol information, appreciate the effects of research participation, reason about participation, and evidence a choice, four commonly applied legal standards for decisional competence. Approximately 50% of patients demonstrated questionable competence on the MCAT–CR, with high correlations between cognitive measures and MCAT–CR competence assessment. Additional training involving group and individual meetings, and computerized visual aids significantly enhanced MCAT–CR performance, suggesting that obtaining genuine informed consent in cognitively impaired populations requires tailoring of consent procedures in light of patient deficits.
Correspondence: *James Gold, Maryland Psychiatric Research Center, P.O. Box 21247, Baltimore, MD 21228, USA.*

K. VOST, R. ZEC, & S. MARKWELL. Impairment in Four Major Components of Executive Functioning (Goal Generation, Planning, Execution and Feedback Control) in Early AD.
The executive functioning of an early Alzheimer disease (AD) group (*M* MMSE = 24.2, Alzheimer Disease Assessment Scale < 15) and a normal elderly control group were compared on a series of executive functioning tests measuring four major component processes (i.e., goal generation, planning, execution, and feedback control). Eighteen early AD patients and 28 elderly normal control subjects were studied. We found that early AD patients, including the earliest clinical cases, display clearly impaired executive functioning. Our data also supports the hypothesis that each of the major components of executive functioning are impaired. These findings have several important implications: (1) measures of executive functioning may help in the detection of very early AD; (2) appropriate measures of executive functioning may be useful as outcome measures in drug

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

efficacy studies; (3) impairments in this cognitive domain should be adequately assessed and managed in early clinical AD cases; and (4) because all major components of goal directed behavior are impaired, cognitive–behavioral–environmental intervention strategies will need to be developed to address impairment in each component; AD patients cannot be expected to spontaneously develop and use strategies to help compensate for these deficits.
Correspondence: *Ronald Zec, P.O. Box 2832, Springfield, IL 62708, USA.*

D. MARSON, S. SAWRIE, T. STALVEY, B. McINTURFF, & L. HARRELL. Neuropsychological Correlates of Declining Financial Capacity in Patients with Alzheimer's Disease.
Loss of functional capacities like financial skills are inevitable consequences of Alzheimer's disease (AD). However, little is known about loss of financial capacity in AD, and about neurocognitive changes mediating this loss. We investigated neurocognitive correlates of declining financial abilities in AD using a newly developed clinical assessment instrument and neuropsychological test measures. The study sample consisted of 23 normal older controls and 35 patients with AD. Subjects were administered neuropsychological measures and the Financial Capacity Instrument (FCI), a clinical instrument that directly assesses six domains of financial activity: (1) basic monetary skills; (2) financial conceptual knowledge; (3) cash transactions; (4) checkbook management; (5) bank statement management; and (6) financial judgment. Control and AD performance on the FCI domains was compared using *t* tests. Within the AD group, cognitive predictors of FCI domain performance were obtained using univariate and multivariate techniques. Measures of simple executive function, semantic memory, verbal abstraction, attention, and receptive language emerged as key predictors of AD patient performance on the FCI domains. The results suggest that multiple cognitive functions are associated with loss of financial abilities in AD, consistent with the view that financial capacity is a complex, multidimensional construct.
Correspondence: *Daniel Marson, JT1216, Department of Neurology, University of Alabama at Birmingham, Birmingham, AL 35294, USA.*

Symposium 5/9:00–10:40 a.m.

NEUROBEHAVIORAL CONSIDERATIONS IN THE NEUROSURGICAL TREATMENT OF PARKINSON'S DISEASE

Organizer and Chair: A.I. Tröster

A.I. TRÖSTER. Neurobehavioral Considerations in the Neurosurgical Treatment of Parkinson's Disease.
Realization of the limits of pharmacotherapy, and advances in radiology, stereotaxis, and neurophysiology led to the recent renaissance of pallidotomy and the development of new neurosurgical treatments for Parkinson's disease (PD). Although about 50 North American centers now perform surgery for PD, neurobehavioral issues pertinent to patient selection and surgical outcome have received scant attention. This symposium addresses these issues. Tröster outlines the historical development of PD surgery. Two presentations address cognitive outcomes, one in pallidotomy (Cahn et al.), the other in alternative surgical treatments such as thalamic, pallidal, and subthalamic stimulation, and fetal mesencephalic tissue grafting (Fields and Tröster). Straits-Tröster et al. present quality of life outcome data for pallidotomy and alternative surgical treatments. In his discussion, Miyawaki summarizes key points from the various presentations, and highlights how the symbiosis of laboratory and clinical research advances our understanding of the "motor" basal ganglia's role in affect and cognition.
Correspondence: *Alexander I. Tröster, Department of Neurology, University of Kansas Medical Center, 3901 Rainbow Boulevard, Kansas City, KS 66160-7314, USA.*

A.I. TRÖSTER. An Historical Synopsis of the Development of Neurosurgical Treatments for Parkinson's Disease.
Attempts to treat movement disorders by neurosurgical means date to the late 19th Century. This paper outlines the evolution of neurosurgical procedures for Parkinson's disease (PD) from the first open, pyramidal system procedures to the stereotactic, extrapyramidal system operations popular in the 1950s and 1960s. Neurobehavioral morbidity is reviewed briefly. The paper then identifies factors underlying the renaissance of surgical treatments in the late 1980s, after surgical procedures for PD declined with the introduction of levodopa in 1968. Differences between current and earlier procedures, and in patient selection criteria, are identified. Finally, the paper reviews laboratory and clinical research driving the development of alternative, experimental treatments, such as tissue grafting (transplantation) and chronic electrical stimulation, along with the currently accepted indications for each procedure.
Correspondence: *Alexander I. Tröster, Department of Neurology, University of Kansas Medical Center, 3901 Rainbow Boulevard, Kansas City, KS 66160-7314, USA.*

D.A. CAHN, E.V. SULLIVAN, P.K. SHEAR, G. HEIT, & G. SILVERBERG. Posteroventral Pallidotomy for the Treatment of Parkinson's Disease.
For patients who progress to medically intractable, end-stage Parkinson's disease, a lesion placed in the posterior third of the internal globus pallidus can, in some cases, reduce their debilitating parkinsonian symptoms. Postsurgical symptom reduction is hypothesized to result from a decrease in inhibitory pallidal efferent activity, which serves to increase thalamocortical interactions and consequent activity in motor cortical areas. While a number of studies now report significant improvement in parkinsonian motor symptoms following pallidotomy, findings on cognitive functioning following this procedure have been less straightforward. This paper reviews the findings from our prospective study of pallidotomy that has focused on motor and cognitive change at both short- and long-term follow-up and explores reasons for discrepancies among published studies.
Correspondence: *Edith V. Sullivan, Department of Psychiatry & Behavioral Sciences, Stanford University School of Medicine, Stanford, CA 94305, USA.*

J.A. FIELDS & A.I. TRÖSTER. Neurobehavioral Outcome Following Nonablative Neurosurgical Treatments for Parkinson's Disease.
The last decade has witnessed a dramatic revival of surgical treatments for refractory Parkinson's disease (PD). While pallidotomy and thalamotomy have been procedures of choice, concerns about potential morbidity have driven the recent development of alternative, nonablative, surgical therapies. Such alternative therapies include chronic intracerebral electrical stimulation and fetal tissue transplantation. While the efficacy of surgical treatments in alleviating the physical symptoms of PD is well documented, little is known about neurobehavioral outcome following nonablative operations. This paper presents the rationale for performing nonablative surgeries. We review the results and limitations of studies examining the cognitive effects of pallidal-, thalamic-, and subthalamic stimulation, and of tissue grafting (transplantation). Alternative surgical treatments for PD appear relatively safe, but in a small minority of patients subtle declines occur in certain areas of cognition. Possible risk factors for such declines are delineated. We discuss potential needs and directions for future research.
Correspondence: *Julie A. Fields, Department of Neurology, University of Kansas Medical Center, 3901 Rainbow Boulevard, Kansas City, KS 66160-7314, USA.*

K. STRAITS-TRÖSTER, J.A. FIELDS, J. KIELTYKA, K.E. LYONS, W.C. KOLLER, & A.I. TRÖSTER. Quality of Life Outcome Following Neurosurgical Intervention for Parkinson's Disease.
All treatment for Parkinson's Disease (PD) is designed to decrease disability and increase function and health-related quality of life (HRQOL). This paper presents HRQOL and mood outcome data for three neurosurgical procedures: pallidotomy ($N = 23$), pallidal stimulation ($N = 9$), and

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

thalamic stimulation ($N = 7$). Four months after surgery, pallidotomy patients reported significant improvements in physical, psychosocial, and overall functioning (SIP), and less anxiety and more vigor (POMS). Pallidotomy patients also completed a disease-specific QOL measure (PDQ) and reported improved overall functioning, mobility, ability to perform activities of daily living, and less stigma at follow-up. UPDRS scores improved after surgery for thalamic and pallidal stimulation groups. Pallidal stimulation patients reported significantly improved physical and overall functioning, and decreased postsurgery anxiety. Change in QOL and mood did not reach statistical significance in the thalamic stimulation sample, but means were in the expected direction of improvement. Results suggest that neurosurgical interventions for PD improve patient quality of life and decrease affective distress.
Correspondence: *Kristy Straits-Tröster, Department of Veterans Affairs Medical Center, Psychology Service 116-B, 4801 E. Linwood Boulevard, Kansas City, MO 64128-2226, USA.*

E. MIYAWAKI. The "Affective and Cognitive" Basal Ganglia.
In a summary discussion, major points from the symposium are discussed. Historically, pallidal and alternative-site surgery had attendant neurobehavioral risks, although sequelae are less likely in the modern era. Cases demonstrating clear decrement or even improvement in cognitive, learning, or "psychosocial" variables invite a review of the role of the basal ganglia, and particularly the globus pallidus, in affective or cognitive domains apart from, but intimately related to, motor function. Although the basal ganglia have been traditionally associated with motor control, recent investigations implicate them in various aspects of higher cortical function. The concept that discrete pathways subserve different neurobehavioral aspects is placed in the context of a growing literature suggesting that pallidal output directed at cortex encompasses more complex networks or connectivities.
Correspondence: *Edison Miyawaki, Department of Neurology, University of Kansas Medical Center, 3901 Rainbow Boulevard, Kansas City, KS 66160-7314, USA.*

Symposium 6/9:00 a.m.–10:40 a.m.

MEMORY, AGING, AND PREFRONTAL FUNCTION

Organizer and Chair: Elizabeth L. Glisky

E.V. SULLIVAN & A. PFEFFERBAUM. Age-Related Vulnerability of the Frontal Lobes: Implications for Decline in Memory Functions.
Quantitative structural and functional neuroimaging studies reveal that the frontal lobes lead most other brain regions in normal age-related declines. Prefrontal cortical gray matter exhibits greater decreases in volume and glucose metabolism with advancing age than do more posterior cortical regions. Despite the downward slope in prefrontal cortical gray matter volume and glucose metabolism observable in normal healthy aging individuals, the volume and metabolism of the hippocampus declines relatively little with age. These patterns of age-related brain volume reduction imply that declines in mnemonic functioning associated with normal aging are more likely to be attributable to compromise of frontal lobe systems, which subserve strategic and working memory, than of medical temporal lobe systems, which subserve nonstrategic, explicit memory processes.
Correspondence: *Edith V. Sullivan, Department of Psychiatry and Behavioral Sciences, Stanford University School of Medicine, Stanford, CA 94305-5548 and Neuropsychiatry Program, SRI International, Menlo Park, CA 94025, USA.*

L. RYAN Strategic Search and Familiarity Processes in Implicit Memory Performance in the Elderly.
A growing number of studies have demonstrated that priming in the elderly is more likely to be impaired on word stem completion (WSC) than other priming tasks. What makes WSC sensitive to changes in performance in the elderly? Two hypotheses are examined that implicate frontal lobe dysfunction. Declines in WSC priming may be due to (1) inefficient search processes or (2) increased reliance on familiarity associated with a loss of inhibitory control. A series of studies are presented that suggest that the elderly have an increased sensitivity to familiarity, as assessed by word frequency, while they utilize phonologic search in similar ways to younger adults. The implications for these findings to theories of frontal lobe functioning in the elderly are discussed.
Correspondence: *Lee Ryan, Department of Psychology, University of Arizona, Tucson, AZ 85721-0068, USA.*

C.L. GRADY. Age-Related Changes in Brain Activity Patterns During Working Memory.
A positron emission tomography study was carried out on young and old subjects to examine age-related changes during working memory (WM) for faces. Both groups showed increased activity in right prefrontal and bilateral extrastriate cortices during the tasks. Young subjects had greater activity in right ventrolateral prefrontal cortex across all WM tasks and in the left medial temporal area at short delay intervals compared to old subjects. Older participants showed greater activity in left dorsolateral and occipitoparietal cortices. These results suggest that brain mechanisms underlying WM involving the short-term maintenance of visual representations are relatively preserved in old subjects. However, some differences were seen between groups suggestive of a functional reorganization of brain activation in old subjects that may reflect compensatory changes.
Correspondence: *Cheryl L. Grady, Rotman Research Institute, Baycrest Centre for Geriatric Care, 3560 Bathurst Street, North York, ON M6A 2E1, Canada.*

E.L. GLISKY. Memory, Aging, & Prefrontal Function.
Recent evidence suggests that prefrontal brain regions may play a role in memory that is different from that served by medial temporal lobe structures. This symposium examines how the frontal lobes may be involved in different kinds of memory and how age-related changes in prefrontal cortex may account for specific kinds of memory decline. We first present data from structural and functional neuroimaging studies showing preferential decline in prefrontal cortex. We then report three empirical investigations of different kinds of memory in older adults in which the frontal lobes appear to be involved: working memory, implicit memory and source memory. The implications of these findings for theories of memory and aging will then be discussed.
Correspondence: *Elizabeth L. Glisky, Department of Psychology, P.O. Box 210068, University of Arizona, Tucson, AZ 85721, USA.*

E.L. GLISKY & S.R. RUBIN. Source Memory in Older Adults.
Declining frontal lobe function has been hypothesized to underlie the deficits in source memory experienced by older adults, but the nature of the frontal involvement is unclear. We report results of two source memory experiments that begin to elucidate the role of the frontal lobes in source memory. Participants were adults over the age of 65 who had been classified as high or low on medial temporal lobe function and high or low on frontal lobe function. In one experiment, they listened to several voices speaking one of two sentences. In the other experiment, they studied pictures of chairs in one of two rooms. Results suggested that the frontal lobes may play a role in discriminating between highly similar or overlapping memory traces at retrieval.
Correspondence: *Elizabeth L. Glisky, Department of Psychology, P.O. Box 210068, University of Arizona, Tucson, AZ 85721, USA.*

Poster Session 4/9:00 a.m.–12:00 p.m.

LANGUAGE

N. SILVERBERG & T.H. GOLLAN. Partial Knowledge of TOT Targets in Hebrew Is Implicit.
Tip-of-the-tongue (TOT) states in bilinguals allow the evaluation of recency as a factor in producing retrieval failures. Thirty-five native Hebrew

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

speakers attempted to name 73 pictures in Hebrew. There was a significant positive correlation between number of years spent living outside Israel and average number of TOTs, thus demonstrating the importance of recency in predicting retrieval failures even in the native language. Interestingly, there was no difference between TOT and *don't-know* (DK) states in the ability to guess partial information (i.e., gender and initial phoneme) about the targets. Curiously, responses overall were significantly more accurate than chance (50% in a two-alternative forced choice paradigm) suggesting that guesses in both TOTs and DK states reflect implicit rather than explicit knowledge of the targets.

Correspondence: *Nina Silverberg, Department of Psychology, University of Arizona, Tucson, AZ 85721, USA.*

S.A. JOHNSON, D.N. BUB, & M. ARGUIN. An Investigation of Pure Alexia: Evidence Against Letter-by-Letter Reading.

The relationship between initial lexical activation and the compensatory reading strategy observed in pure alexia was investigated. Lexical decision and naming were examined in three patients with pure alexia (D.M., I.H., and J.L.). Orthographic and lexical variables were selected from two models of normal reading (*interactive–activation* and *cohort*). Patients were affected by the same variables as the normal readers and their patterns of performance, although slower, were also similar. All subjects demonstrated a facilitatory effect of high word frequency and large neighborhood size. Results also indicated that the compensatory strategy is not letter-by-letter or left-to-right. Patients with pure alexia appear to achieve normal lexical activation and then engage in a compensatory reading strategy that is guided by this initial activation.

Correspondence: *Shannon A. Johnson, Department of Psychology, P.O. Box 3050, University of Victoria, Victoria, BC V8W 3P5, Canada.*

L.O.L. FERNANDES, B.D. HICKS, J. KELLER, J. ALPER, W. HELLER, & G.A. MILLER. Preserved Semantic Categorization in Wernicke's Aphasia: Evidence from Event-Related Brain Potentials.

Traditional measures of preserved language comprehension may be limited by their reliance on overt behavioral responses, because they cannot readily reveal or distinguish intact intermediate processes. However, psychophysiological assessment can provide a means for examining language subprocesses in real time. With event-related brain potentials, the present study explored whether semantic categorization processes could be implicitly preserved in a Wernicke's aphasic who demonstrated semantic comprehension deficits. P300 data from a three-category semantic oddball task provided evidence for the categorization of semantically rare and frequent words in a Wernicke's aphasic, despite the subject's impairment in overt behavioral performance.

Correspondence: *Gregory A. Miller, Department of Psychology, University of Illinois, 603 East Daniel Street, Champaign, IL 61820, USA.*

J.M. ANDERSON, R. GILMORE, B. CROSSON, R.M. BAUER, S.E. NADEAU, D.Q. BEVERSDORF, J. CIBULA, M. ROGISH, S. KORTENCAMP, J. HUGHES, L.G. ROTHI, S.N. ROPER, & K.M. HEILMAN. Induction of a Conduction Aphasia by Cortical Stimulation.

Conduction aphasia is associated with temporal parietal lesions that destroy cortex and subcortical white matter including the arcuate fasciculus. Conduction aphasia has been attributed to a white matter disconnection and a defect in the verbal output lexicon. We present a patient who during cortical stimulation of their posterior superior temporal gyrus, demonstrated conduction aphasia with frequent phonemic paraphasias, impaired picture naming and repetition of words, yet with preserved semantic knowledge. Because cortical stimulation interrupts cortical processing, rather than affecting white matter processing, our observations support the postulate that conduction aphasia is caused by dysfunction of the verbal output lexicon. Additionally this patient utilized a letter-by-letter oral spelling strategy during speech production that may be an alternative method to engage the orthographic output lexicon.

Correspondence: *Jeffrey Anderson, Research Department 151, VA Medical Center, Gainesville, FL 32608, USA.*

B.L. MACAULEY & M. J. McCLELLAND. Types of Conversational Gestures Produced by Nonfluent Aphasic Patients With and Without Ideomotor Apraxia.

Types of gesture produced during spontaneous conversation were compared between nonfluent aphasic subjects with and without ideomotor apraxia and neurologically normal control subjects. It was found that the overall pattern of gestures produced did not differ between the controls and the aphasic only patients but did differ significantly between the controls and the aphasic patients with ideomotor apraxia as well as between the two aphasic groups. Results indicated that both aphasic groups produced more filler type gestures than the controls. However, the nonfluent aphasic patients with ideomotor apraxia produced fewer total gestures, fewer emphasis and content type gestures, and demonstrated gesture production errors not observed in either other group. Therefore, it appears that presence of ideomotor apraxia may influence gesture production during communicative interaction.

Correspondence: *Beth L. Macauley, Department of Speech & Hearing Sciences, Washington State University, 601 W. 1st Avenue, Spokane, WA 99201-3899, USA.*

L. BURTON & N. RELKIN. Apractic Agraphia After a Right Hemisphere Lesion.

Apractic agraphia is a rare inability to produce recognizable written words despite normal manual sensorimotor function and intact oral spelling ability. Most cases involve lesions of the superior left parietal lobe. The current report is of a rare case of a right-handed patient with a CT scan showing a right hemisphere hypodensity in the inferior aspect, from the posterior parahippocampal gyrus through the medial parietal lobe to the precalcarine portion of the occipital lobe. The primary cognitive deficits involved several visual spatial deficits, and a left hand finger localization deficit suggesting a right parietal functional localization. The most severe deficit was seen for perception of line orientation, suggesting that processing orientation features is impaired at the level of input (perception) as well as output (writing).

Correspondence: *L. Burton, Psychology Department, Fordham University, 441 E. Fordham Road, Bronx, NY 10458, USA.*

P.W. SCHÖNLE, W. WITZKE, B. STEMMER, L. SCHÖNLE-LOREK, & S. LACHER. Differential N400 Effects for Auditorily *Versus* Visually Presented Language Material in an Ambidextrous Dyslexic Patient.

A 50-year-old female ambidextrous dyslexic patient was investigated $5\frac{1}{2}$ years after a left hemispheric CVA leaving her with normal auditory comprehension and slightly reduced reading comprehension especially for complex material. An event related potential study (N400 paradigm) using auditory and visual sentence stimuli showed a dissociation of normal "auditory" N400 potentials over both hemispheres, an abnormal (latency and configuration) N400 over the left hemisphere, and no N400 over the right hemisphere. In a word/legal non-word paradigm a N400 was only observed over the right hemisphere. These observations point to distinct processing of auditorily *versus* visually initiated sentence material despite normal perception, and to distinct interhemispheric specialization (sentence processing in the left and word processing in the right hemispheres).

Correspondence: *P.W. Schönle, A.R. Lurija Institute for Rehabilitation Sciences at the University of Konstanz, Kliniken Schmieder, D-78473 Allensbach, Germany.*

A. KIRK, R. J.D. MACAULAY, & M. VRBANCIC. Progressive Aphasia in Alzheimer's and Pick's Diseases.

Progressive aphasia has been reported in association with several pathologies. Nonfluent aphasia is often a component of Pick's disease. Fluent aphasia often occurs in Alzheimer's disease. We describe a patient with isolated fluent (anomic) aphasia due to autopsy-proven Pick's disease and a patient with relatively isolated nonfluent (Broca's and then global) aphasia with autopsy-proven Alzheimer's disease. The patient with Pick's disease had more pathology in the left temporal lobe than in the frontal lobe which may explain why fluent aphasia was seen. The patient with Alzheimer's disease had severe neocortical involvement with relatively less

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

involvement of the hippocampus, perhaps explaining why the language disturbance predominated.
Correspondence: *Andrew Kirk, Division of Neurology, University of Saskatchewan, Royal University Hospital, 103 Hospital Drive, Saskatoon, SK S7N 0W8, Canada.*

M.C. PAI. Phonologic Facilitation in Written Word Retrieval in Chinese Agraphics.
Chinese is quite different from Indo-European languages, especially for its ideographic morphology. From rare case studies, some investigators consider that the grapheme–phoneme conversion is not applicable for Chinese writing and reading. However, phonologic paragraphias appear in the writing errors for normal individual and the agraphics. It implies that there might be a phonologic route for Chinese word retrieval. A battery was given to Chinese agraphics, including tests for writing to the presentation of real objects, oral naming, writing to dictation, drawing, copying, pointing objects by showing printed names, pointing objects by oral names, and pointing printed names by showing real objects. Eight out of the 11 showed phonologic facilitation; that is, a significant improvement in the performance of dictation as compared with that of spontaneous writing. The three without improvement were all with parietal lesion. This indicates that Chinese written word retrieval can be facilitated by phonologic cues, and possibly via the occipito–parietal pathway, a phonologic route.
Correspondence: *Ming-Chyi Pai, Department of Neurology, National Cheng Kung University Medical Center, 138 Shen Li Road, Tainan 704, Taiwan.*

M.-S. HUA, S.-T. CHEN, & Y.-C. CHU. Writing Function in Patients with Subcortical Stroke.
Literature concerning writing function in patients with subcortical strokes is relatively scarce in comparison with literature on other aspects of language. This study was designed to explore the writing function of patients with subcortical strokes. Two cohorts of patient subjects with either the left or the right subcortical strokes, and one group of normal controls participated in the study. All participants received a writing test battery including the three aspects of writing function, that is, *spontaneous writing*, *writing to dictation*, and *writing from copy*, and a battery of nonwriting linguistic tests. Data analysis showed that writing function change only occurred in patients with the left subcortical stroke while no remarkable change of writing function, with the exception of writing from copy, was found in patients with the right subcortical stroke. On the basis of the results, we suggest that the subcortical structures might play a role in writing function, and that there exists a functional asymmetry between the left and the right subcortical regions: the pattern of functional asymmetry seems parallel in the left and the right cerebral cortices.
Correspondence: *Mau-Sun Hua, Department of Psychology, National Taiwan University, Taipei 106 Taiwan.*

M. MIMURA, M. KATO, M. KATO, Y. SANO, T. KOJIMA, E. MOROOKA, & H. KASHIMA. Prospective and Retrospective Studies of Recovery from Aphasia: Changes in Cerebral Blood Flow (CBF) and Language Functions.
In Experiment 1, a prospective study, 20 aphasic patients caused by acute CVA received a standard language test battery and SPECT twice: at a mean of 3.2 months and 9.2 months after onset. In Experiment 2, a retrospective study, 16 patients with residual aphasia received a standard language test battery and SPECT at a mean of 82.8 months after onset. The patients had received initial language evaluation at a mean of 6.5 months after onset. The complementary results of Experiments 1 and 2 suggest that the initial language recovery within the first year primarily links to functional recovery of the left hemisphere. Subsequent and long-term aphasia prognosis appears to be related with slow and gradual compensatory functions by the right hemisphere.
Correspondence: *Masaru Mimura, Department of Neuropsychiatry, Tokyo Dental College Ichikawa General Hospital, 5-11-13 Sugano, Ichikawa, Chiba 272, Japan.*

VISUAL PROCESSING

S.Z. RAPCSAK, E.L. GLISKY, S.L. REMINGER, & A.W. KASZNIAK. A Psychophysiological Investigation of False Facial Recognition in Normal Elderly Subjects.
Skin conductance responses (SCRs) were recorded in elderly subjects engaged in a face familiarity decision task. Participants generated significantly greater SCRs to famous faces than to unfamiliar faces. However, SCRs to falsely recognized unfamiliar faces were not significantly different from SCRs to unfamiliar faces that subjects correctly rejected. The failure to find an autonomic correlate for the false recognition errors suggests that these incorrect responses were not based on the spurious activation of *specific* face memory representations. Instead, they may have been driven by the sense of familiarity created by novel faces that had a *general* similarity to faces encountered previously. We propose that the elderly may base recognition decisions more on general familiarity and less on the recollection of specific contexts. This bias may reflect an age-related decline of frontally-mediated strategic retrieval and monitoring functions.
Correspondence: *Steven Z. Rapcsak, Neurology Service (127), VA Medical Center, Tucson, AZ 85723, USA.*

S. CHRISTMAN. Effects of Line Orientation and Spatial Position on Line Bisection.
Bisection of horizontal *versus* vertical lines as a function of the quadrants of a page (upper left, upper right, lower left, and lower right) was examined in 50 right-handed subjects. Deviations from true center were larger for horizontal than for vertical lines. Position on the page affected bisection of horizontal, but not vertical, lines. Horizontal lines yielded leftward errors when located on the left half of the page and rightward errors when located on the right half; in turn, the leftward bias was strongest in the upper right quadrant, while the leftward bias was strongest in the lower left. Vertical lines yielded small downward biases that did not vary as a function of position on the page. Results are discussed in terms of the independence of mechanisms underlying the orienting of attention along the horizontal *versus* vertical meridians of the visual field, and the role of attentional *versus* premotor biases in line bisection performance.
Correspondence: *Stephen Christman, Department of Psychology, University of Toledo, Toledo, OH 43606, USA.*

V.W. MARK. Location and Orientation Effects on Line Bisection after Hemispheric Injury.
In focal brain injury, bisection error is often maximal on lines located opposite the error direction. Furthermore, some subjects show maximal error on nonhorizontal lines. In this study, 7 focal brain-injured subjects bisected isolated lines in the transverse plane that were in any of four orientations and five locations across the page. For all but 1 subject, the interaction of location and orientation accounted for the greatest variance in bisection error. At page center, all subjects showed maximal error on nonhorizontal lines. On quadrant-centered lines, subjects with smaller errors generally showed a page-centered bisection bias, while subjects with larger errors showed primarily graded diagonal neglect. The results indicate that in focal brain injury, bisection error depends on the line's orientation and its location on the page.
Correspondence: *Victor W. Mark, Department of Neuroscience, UND Medical Education Center, 1919 Elm Street North, Fargo, ND 58102, USA.*

M. MENNEMEIER, R. DOWLER, S. TIPTON, & G. FISK. A Three-Phase Response to Caloric Stimulation in Spatial Neglect.
Caloric vestibular stimulation (CVS) temporarily ameliorates left spatial neglect. It is unclear if the beneficial effects of CVS are due to changes in eye movements, orientation, general arousal, or some combination. We tested 7 patients with unilateral brain lesions of either the left or right cerebral hemispheres before and after CVS. We assessed nystagmus, changes in postural orientation, and performance on line bisection and cancellation. Effects due to general arousal were inferred by comparing CVS with

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

a cold pressor that increased arousal without stimulating the vestibular system. Results were consistent with a three-phase response to CVS including a short lived nystagmus that does not influence performance, a pronounced temporary change in orientation induced by vestibular stimulation, and a longer lasting change in general arousal that was not dependent on vestibular stimulation.
Correspondence: *Mark Mennemeier, Department of Physical Medicine and Rehabilitation, University of Alabama, 530 SRC, 1717 6th Avenue S., Birmingham, AL 35233-7330, USA.*

M. MENNEMEIER, C. PIERCE, E. VEZEY, & S.Z. RAPESAK. Hemispace Influences Crossover on Line Bisection.
Nineteen patients with right hemisphere lesions bisected lines(24 to 30 cms) in left and right hemispace. In left hemispace, they errored right of true center but in right hemispace they "reversed" that error and bisected lines left of center. Patients with spatial neglect demonstrate a crossover on line bisection, they bisect short lines (<2 cms) left of true center and long lines (>10 cms) right of true center. We hypothesized that the patient's "reversed" error in right hemispace was actually a delayed crossover effect. To test this hypothesis, we administered lines that varied in length from 5 to 10 cms in three spatial locations—left of midline, midline, and right of midline. Patients with unilateral right (n = 19) and left hemisphere lesions (n = 9) and normal control subjects (n = 11) were treated. Crossover occurred in all subject groups. As predicted for RHL patients, crossover occurred on longer lines in right than left hemispace.
Correspondence: *Mark Mennemeier, Department of Physical Medicine and Rehabilitation, University of Alabama, 530 SRC, 1717 6th Ave. S., Birmingham, AL 35233-7330, USA.*

K.S. REINKE. Perceptual Learning and Reorganization of the Sensory Cortex.
With practice, humans can improve their ability to discriminate similar stimuli, such as lines of slightly differing orientation. Some animal research has shown a reorganization of the primary sensory cortex that corresponds to such perceptual learning. It has also demonstrated that as the cortical area devoted to practiced stimuli increases, performance increases. However, this comes at a cost to performance on nonpracticed stimuli. Many people believe that the animal studies do not typify what occurs with humans. The research here demonstrates that humans show the same learning, as well as costs. This increases the likelihood that the same neurophysiological changes are occurring in humans.
Correspondence: *Karen Reinke, Psychology Department, Psychology Building Room 312, University of Arizona, Tucson, AZ 85721, USA.*

E. PEZARIS, M.B. CASEY, M. SCHIRO, & R. NUTTALL. The Relationship Between Math Self-Confidence in Females and Skill at Mental Rotation.
There is evidence for sex differences in math achievement, with lower scores among females at the high school level and beyond. Many researchers have attributed this difference to lower math self-confidence in females. Instead, it is proposed here that within females, variations in math self-confidence as well as math abilities may arise from differences in underlying cognitive skills. The purpose of this paper was to examine the relationship between math self-confidence in females and one type of cognitive skill, skill at mental rotation. A sample of 118 female education majors was administered the Vandenberg Test of Mental Rotation along with questionnaires assessing self-confidence in English and math. The results indicate a significant correlation of .32 ($p = .01$) between mental rotation ability and math self-confidence. To control for the possibility that this relationship was due to general academic self-confidence, a partial correlation between mental rotation and self-confidence was performed, controlling for English self-confidence. The correlation remained significant. These findings on the college sample confirm our previous findings on high school female students that mental rotation ability predicts for math self-confidence. The present study shows that this relationship cannot be attributed to the momentary effects of taking high school geometry, but is a more enduring long-term association.
Correspondence: *M. Beth Casey, 201 Campion, Boston College, Chestnut Hill, MA 02167, USA.*

L. RAPPORT, S. MILLIS, & P. JOHNSON. Validation of the Warrington Theory of Visual Processing and the Visual Object and Space Perception Battery.
Competing hypotheses regarding the nature of visual processing were examined using the performance of 111 healthy older persons on the Warrington and James (1990) Visual Object and Space Perception Battery (VOSP). Confirmatory factor analysis indicated that a two-factor model corresponding to the Warrington theory of object and space perception as discrete domains fit the data well [$\chi^2(18) = 26.06$, RMSEA = .06]. Moreover, the Warrington model demonstrated a superior fit to the data compared to a unidimensional model of visual processing and a null model. The combination of these findings with previous studies demonstrating that the VOSP reliably identifies right-hemisphere insult support the construct validity of both the Warrington theory of visual processing and the VOSP.
Correspondence: *L. Rapport, Department of Psychology, 71 West Warren, Wayne State University, Detroit, MI 48202, USA.*

R.E. GRAVES & J.A. COOK. Visual Localization of Briefly Flashed Stimuli by Normal and Dyslexic Adults: Evidence for the Magnocellular Pathway Role in Reading.
Seventeen observers localized small (0.36 degree diameter), briefly flashed (33 ms), low contrast (±10%, 20%) stimuli presented at ±9.9 degrees horizontal eccentricity. Dyslexic university students ($N = 5$) had less accurate localization than did the normal reading adults ($p = .06$). Seventy-five percent of the dyslexics fell below the accuracy level exceeded by 75% of the normals. Since localization of briefly flashed low contrast stimuli should require use of the magnocellular visual pathway, these results are consistent with other reports of a magnocellular deficit among about 75% of dyslexics. Variations of this PC CRT based task may have potential as a screening method to detect children at risk for dyslexia.
Correspondence: *R.E. Graves, Department of Psychology, P.O. Box 3050, University of Victoria, Victoria, BC V8W 3P5, Canada.*

M.T. BANICH & D.H. WEISSMAN. Perceptual Asymmetries for Faces Are Modulated by Encoding Mechanisms.
We investigated whether encoding and contextual mechanisms modulate perceptual asymmetries for faces. On each trial, a face was presented in a visual scene. Twelve participants rated the size of the nose relative to the other facial features and 12 rated how honest the face looked. After a short interval, participants were asked to indicate whether a second face presented in the same or a different scene in the left or the right visual field was the same as the face they had just rated. A right hemisphere (RH) advantage was observed only for participants who rated perceived honesty consistent with the hypothesis that the RH advantage for face processing derives from an advantage in processing facial emotion and/or configural aspects of faces.
Correspondence: *Marie Banich, Department of Psychology and the Beckman Institute, University of Illinois at Urbana-Champaign, Champaign, IL 61820, USA.*

A.M. BARRETT, D.Q. BEVERSDORF, G.P. CRUCIAN, & K.M. HEILMAN. Narrowing of the Attentional Window in Neglect after Right-Hemisphere Stroke.
Visual tasks requiring focused attention have been said to use an "attentional spotlight." Tasks requiring spatially distributed attention may require a "floodlight." We used a line decision task and varied the area over which subjects needed to spread their attention. Two patients with neglect after right hemisphere stroke performed more poorly than normal and left-hemisphere-damaged controls when there was an increased demand for

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

distributed attention. These results support a defective "floodlight" in neglect induced by right hemisphere lesions.
Correspondence: *Anna M. Barrett, Department of Neurology, P.O.B. 100236, University of Florida College of Medicine, Gainesville, FL 32610, USA.*

R.E. GRAVES & S.C. BEZEAU. Reading Speed as a Function of Color and Luminance Contrast: Evidence for the Parvocellular Pathway Role in Reading.
Sixteen normal university students were timed while reading difficult text of varying luminance and color contrast. At ±35% luminance contrast, reading speed was the same whether or not the text differed in color from the green background, and was as fast as for 100% contrast black text. At ±20% contrast, however, speed was significantly ($p < .001$) slower when color contrast was removed. Such ability to capitalize on color contrast suggests that, for normal skilled readers, reading speed is likely determined by the color sensitive parvocellular pathway.
Correspondence: *R.E. Graves, Department of Psychology, P.O. Box 3050, University of Victoria, Victoria, BC V8W 3P5, Canada.*

PEDIATRICS-4

R. BUTLER, G. JONES, & J. FINLAY. The Differential Neuropsychological Effects of Infratentorial, Supratentorial and Diencephalic Childhood Brain Tumors.
Patients ($n = 55$) treated for childhood brain tumors were divided into three groups based on tumor site. All patients received a comprehensive neuropsychological test battery. Supra- and infratentorial tumors were associated with neuropsychological impairment in many areas, although memory was relatively intact in the infra group while language functions were relatively impaired in the supra group. The diencephalic tumor patients were remarkably intact in most areas except for delayed memory retention. The effects of irradiation to the brain appeared to be most pronounced in nondominant hemisphere functions, attention/concentration and, at high doses, in all areas of academic achievement. The groups were not significantly different on indices of psychological adjustment. These results are most relevant to the 1st year off treatment.
Correspondence: *Robert W. Butler, Department of Pediatrics, Child Development & Rehabilitation Center, Oregon Health Sciences University, P.O. Box 574, Portland, OR 97207, USA.*

C.L. SWARTZ, R.E. LAUER, L.L. CONANT, & B. GIORDANI. Unique Challenges of Neuropsychological Assessment of Children in a Cochlear Implant Program.
Children with a profound hearing impairment undergoing cochlear implantation represent a unique challenge. Acquisition of language structure has been associated with increased behavioral control and cognitive organization. The children undergoing cochlear implantation seen in the Neuropsychology Division often have had profound prelingual hearing loss, very limited exposure to sign language, and other developmental insults. A common referral question has been to differentiate possible comorbid learning, attentional, and behavioral disorders from expected difficulties attributable to hearing and language deficits. These issues, as well as Vygotsky's theory of the interrelationship of cognition and language, are discussed within the context of several case studies.
Correspondence: *Christine L. Swartz, Division of Neuropsychology, University of Michigan Medical Center, C-480 Med Inn Bldg., 1500 E. Medical Center Drive, Ann Arbor, MI 48109-0840, USA.*

J.R. WOZNIAK, L.E. MELAMED, & S. GRCEVICH. Dorsolateral and Orbitofrontal Functioning in Attention Deficit Hyperactivity Disorder (ADHD): An Investigation of Neuropsychologically Based Subtypes of ADHD.
The authors provide preliminary results supporting the validity of a neuropsychologically informed system of sub-typing ADHD. The study explored the differential contributions of dorsolateral–executive deficits and orbitofrontal–inhibitory deficits to ADHD symptomology in children. Neuropsychological measures, chosen to reflect dorsolateral–executive and orbitofrontal–inhibitory functioning as independently as possible, were administered to 39 children, ages 8–13, who were diagnosed with ADHD. Principal components analysis revealed two factors that corresponded well to the predicted model. Factor scores were differentially related to early developmental variables and to the child's response to Ritalin. No significant relationship between factor scores and behavior personality was observed.
Correspondence: *Jeffrey Robert Wozniak, Pediatric Neuropsychology, University of Minnesota, Box 486, 420 Delaware Street S.E., Minneapolis, MN 55455, USA.*

D. DEWEY, B. J. KAPLAN, & S.G. CRAWFORD. Does the Wide Range Assessment of Memory and Learning (WRAML) Validly Discriminate between Children with Attention Deficit Hyperactivity Disorder and Reading Disabilities?
The discriminant validity of the WRAML subtests to distinguish among children with primarily ADHD, primarily RD, and comorbid ADHD+RD was examined. Sixty-three children with ADHD, 69 with reading disability (RD), 68 with both ADHD+RD and 112 controls were administered the WRAML, the WISC–III and the Woodcock-Johnson Psychoeducational Battery–Revised (WJ–R). Discriminant function analysis indicated that the WRAML subtests were not able to reliably distinguish diagnostic groups. However, when academic and intellectual measures were included in the discriminant function analysis, the correct classification of children improved. These results suggest that performance of children with ADHD, RD, and ADHD+RD on the WRAML subtests is not diagnostic in and of itself, and should not be used outside the context of a full clinical assessment.
Correspondence: *Deborah Dewey, Behavioural Research Unit, Alberta Children's Hospital, 1820 Richmond Road S.W., Calgary, AB T2T 5C7, Canada.*

J. HALL, G.W. HYND, & D. LANG. Callosal Morphology and Performance on Intelligence Tests in Children.
Investigations have recently focused on the effect of variations in callosal morphology and intellectual functioning. Strauss, Wada, and Hunter, in a study with adults, found that the splenium of the callosum correlated significantly with FSIQ. They concluded that this variation in callosal morphology allows greater processing of information. Few of these studies, however, have investigated children. In the current study, 52 right-handed children were compared on MRI obtained seven ROI demarcated corpus callosum segments and a Wechsler measure of intelligence. Results denote no statistically significant correlation for measures of VIQ, PIQ, FSIQ, VC, or PO and callosal morphology. Contrary to previous findings, evidence denotes that no significant relationship between intellectual measures and callosal morphology in children.
Correspondence: *Josh Hall, Department of Educational Psychology, Ball State University, Muncie, IN 47306, USA.*

A.M. WEBER, J.M. McKELLOP, K. GYATO, T. SULLIVAN, & D.N. FRANZ. Metachromatic Leukodystrophy and Nonverbal Learning Disability: Neuropsychological and Neuroradiological Findings in Heterozygosity and Pseudodeficiency.
This study examined the nonverbal learning disability pattern in metachromatic leukodystrophy (MLD), a progressive neurodegenerative disorder involving deficiency of the enzyme arylsulfatase A that leads to diffuse demyelination. Neuropsychological data, genetic and enzyme studies, and MRI are presented for a child with MLD and 8 family members who are heterozygotes and/or have pseudodeficiency (both parents, 2 siblings, a paternal uncle and maternal aunt who are married to each other, and 2 cousins who are children of this aunt and uncle). The child with MLD and her younger sister demonstrated aspects of the nonverbal learning disability pattern. Although the remaining 7 family members all showed low levels of arylsulfatase A, their neuropsychological functioning was within normal limits or better across all of the assessed areas.
Correspondence: *Anna M. Weber, Division of Neurology–OSB 5, Children's Hospital Medical Center, 3333 Burnet Avenue, Cincinnati, OH 45229, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

K. ESO & K. KERNS. Efficacy of a New Attention Training Program in Children Diagnosed with ADHD.
The efficacy of a new set of child oriented attention training materials, *Pay Attention*, was investigated in 14 children, age 7–11 years diagnosed with attention deficit hyperactivity disorder (ADHD). Treatment and control groups were matched for age and sex. Both groups completed pre- and post-training assessment batteries which included psychometric measures of attention, a measure of academic efficiency, and behavioral rating scales completed by parents and teachers. Results indicate that children who received attention training did significantly better on nontrained measures of attention, and academic efficiency. Behavioral ratings of inattention, impulsivity and overactivity were also compared to control children. These results suggest that the *Pay Attention* Program may be a valuable treatment option for children with ADHD.
Correspondence: *Karen L. Eso, Department of Psychology, P.O. Box 3050, University of Victoria, Victoria, BC V8W 3P5, Canada.*

Z. EVIATAR, A. BARNEA, & D. SEGAL. Dot Enumeration in Dyscalculic Children: A Pilot Study.
Quantity estimation ability is crucial component in numerical competence and arithmetic operations. Small amounts (1–4) are recognized automatically by subitizing. Larger amounts are usually quantified by estimation or by decomposition to subitizable units and addition. We investigated whether there are hemispheric differences in these abilities and whether dyscalculics differ systematically from normals in hemispheric functions. Eight diagnosed dyscalculics and 14 normal right handed 4th-graders participated. Dot clusters ranging in size from 1–10 were presented tachistiscopically in the LVF, RVF, center, and bilaterally (simultaneously in each VF). Half were distributed randomly and half in decomposable patterns. Median RTs, % errors, and distance of errors (absolute size) were measured. The results suggest that overall the hemispheres perform the tasks using the same strategy, with indications that decomposable clusters of large amounts are more helpful to the LH than to the RH. The dyscalculics reveal a speed–accuracy trade-off in the LVF for large amounts, together with a deficit in subitizing small amounts. This suggests lower RH abilities in these children. Dyscalculics also differed from normals in the center condition, suggesting a deficit in hemispheric integration.
Correspondence: *Zohar Eviatar, Psychology Department, University of Haifa, Haifa 31905, Israel.*

E. HEIERVANG, K. HUGDAHL, H. STEINMETZ, J. STEVENSON, A.I. SMIEVOLL, & A. LUND. Reduced Planum Parietale Asymmetry in Dyslexic Children.
The planum parietale is an area showing rightward asymmetry on *in vivo* magnetic resonance imaging. This area corresponds to the posterior wall of the ascending part of the Sylvian fissure. In front of it lies the planum temporale, an area showing leftward asymmetry, reflecting left hemisphere language dominance. In dyslexics, more symmetric planum temporale areas have been found, but no structural or functional deviations have been attributed to the planum parietale. In dyslexic children, we found a reduced rightward asymmetry of the planum parietale, using magnetic resonance morphometry. Overall, significant positive correlations were observed between the rightward asymmetry of the PP and performance on the Posner's cue–target test, the Mental Rotation test, and the Dichotic Listening test.
Correspondence: *Einar Heiervang, Department of Psychiatry, Haukeland University Hospital, N-5021 Bergen, Norway.*

J.R. HIEMENZ, A.H. CODY, K.H. NIELSEN, & G.W. HYND. Sex and Handedness Differences in Left Sylvian Fissure Morphology and Prediction of Reading Ability.
Witelson and Kigar (1992) found that asymmetries of the Sylvian fissure seem to be correlated with handedness only in men, suggesting that differences in lateralization of function exist between sex and handedness groups. This study examined sex and handedness differences in left Sylvian fissure anatomy, and how these differences predict reading ability in a sample of children aged 8–12 years. In right-handed males only, left Sylvian fissure morphology predicted differential performance on reading measures, but not on language measures.
Correspondence: *Jennifer R. Hiemenz, Center for Clinical and Developmental Neuropsychology, 570 Aderhold Hall, University of Georgia, Athens, GA 30602, USA.*

V. PETTI & S. VOELKER. Inference of Emotion from Facial Expression and Gesture by Children with Nonverbal Learning Disabilities.
Socioemotional functioning in nonverbal learning disabilities may be compromised by deficient processing of visual–spatial information crucial to social interactions. The present study examines interpretation of nonverbal emotion cues. Thirty-three children (*M* age 12 years) participated: 11 with nonverbal learning disabilities, 11 with verbal learning disabilities, and 11 controls. Participants identified emotions expressed by adults and children in posed photographs and on audiotape. As anticipated, children with nonverbal learning disabilities made more errors in identifying emotions depicted nonverbally ($p < .05$) than did comparison children. Implications for treatment are discussed.
Correspondence: *Sylvia Voelker, Department of Psychology, University of Windsor, 401 Sunset Avenue, Windsor, ON N9B 3P4, Canada.*

C.L. SWARTZ, J.D. GFELLER, H.M. HUGHES, & H.R. SEARIGHT. Specificity of WISC–III Scores and Cooperation Ratings for Diagnostic Classification of Attention Deficit Hyperactivity Disorder (ADHD).
Records from 210 children seen in a pediatric hospital were reviewed. In this sample, 33.8% were diagnosed with an emotional disorder (ED), 25.5% were diagnosed with a behavioral disorder (BD), 23.8% were diagnosed with ADHD, and 16.7% were diagnosed with a learning disorder (LD). Children with an ED were significantly older than children in the BD, ADHD, and LD groups. A series of discriminant function analyses were conducted using WISC–III scores, clinicians' ratings of children's level of cooperation, and demographic information. Comprehension subtest scores and cooperation rating significantly discriminated children with ADHD from children in the BD and LD groups. However, WISC–III were not able to discriminate children in the ADHD group from children in the ED group. Children diagnosed with ADHD were rated as demonstrating significantly lower levels of cooperation than the children in the LD or ED groups. Implications of these findings are discussed.
Correspondence: *Christine L. Swartz, Division of Neuropsychology, University of Michigan Medical Center; C-480 Med Inn Building, Box 0840, 1500 E. Medical Center Drive, Ann Arbor, MI 48109, USA.*

S.G. CRAWFORD, B.J. KAPLAN, & D. DEWEY. Different Subgroups of Learning Difficulties and Immunologic Dysfunction: Is There a Link?
There is controversy in the literature regarding whether or not there is a link between developmental learning difficulties, such as Attention Deficit Hyperactivity Disorder (ADHD), and immunologic dysfunction. We investigated the association between immunologic dysfunction and learning difficulties, in 63 children with ADHD, 69 with reading disability (RD), 68 children with both RD+ADHD, and 112 controls. Results revealed an association between immunologic dysfunction and learning difficulties, particularly for children with primarily ADHD and their families, and somewhat so for children with primarily RD and their families. The presence of comorbid RD+ADHD in the child was not, however, associated with more immunologic dysfunction in the child or in the family. These findings suggest that immunologic activity may not play a causal role in developmental learning difficulties.
Correspondence: *Susan Crawford, Behavioural Research Unit, Alberta Children's Hospital, 1820 Richmond Road S.W., Calgary, AB T2T 5C7, Canada.*

C.J. POPPE, C.E. NEUMANN, & J.B. HOEPPNER. Academic and Behavioral Differences in Attention Deficit Disorders Subtypes.
Children aged 7–14 with ADHD subtypes (predominantly inattentive type (PI), $N = 22$; combined type (CT), $N = 22$) were compared on measures

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

of academic functioning and behavior (Achenbach Child Behavior Checklist (CBC), Conners Questionnaire (CQ), Home Situations Questionnaire (HSQ)). The CT group evidenced higher WISC–III Verbal and Full Scale IQ scores ($p < .04$, $p < .03$). The PI group performed more poorly on the KeyMath Applications Cluster ($p < .003$) and the Total Test score ($p < .02$), and on the CELF Listening to Paragraphs subtest ($p < .035$). There were no differences on Spelling, Written Language, or Digit Spans. PI children received significantly higher internalizing *t* scores on the CBC by mother's report only ($p < .03$). Externalizing *t* scores were significantly elevated by father in the CT group ($p < .01$) and a similar trend by mother CBC ($p < .09$). The CT group displayed severe problems at home only according to the mothers' HSQ ($p < .0001$) and for both parents on the Hyperactivity Index of the CQ. The results provide further evidence for academic and behavioral disparities between the PI and CT subtypes of ADHD.

Correspondence: *Christopher J. Poppe, Finch University of Health Sciences/ The Chicago Medical School, 3333 Green Bay Road, North Chicago, IL 60064, USA.*

K.R. KRULL, K. GREENE, M.M. SCHMITT, & J. FEIGIN. Information Processing in ADHD and Long-Term Survivors of Acute Lymphocytic Leukemia.

Thirty-one children treated with intrathecal methotrexate for leukemia (ALL) were compared to 31 children with ADHD on a computerized continuous performance task. Children were equated for age, IQ, and parental education. All children in the ALL group had been off treatment for at least 2 years and had not received radiation therapy. All children were off medication at the time of testing. Errors of omission and commission as well as response times were analyzed. Compared to the ADHD group, children with ALL displayed a slower reaction time, though did not differ in regards to impulsive errors. Both the ALL and the ADHD groups displayed more errors of commission compared to normative standards and their own errors of omission. Furthermore, these commissive errors were due primarily to an impulsive response style, not random or late responses.

Correspondence: *Kevin R. Krull, Department of Psychology, University of Houston, 4800 Calhoun, Houston, TX 77204-5341, USA.*

E. REICHER, L. BURTON, & J. WAGNER. The Relationship of Spelling to Visual Memory.

Results from 19 pre-first-grade subjects indicated a significant relationship between visual memory and the nature of spelling errors such that higher visual memory scores were associated with a higher proportion of dysphonetic spelling errors. These results may suggest that individuals with better visual memory rely less on phonetic analysis. The relationship of the dual-process theory of reading to spelling is also discussed.

Correspondence: *L. Burton, Psychology Department, Fordham University, 441 E. Fordham Road, Bronx, NY 10458, USA.*

MEMORY

A. SCHNIDER, C. VON DÄNIKEN, & K. GUTBROD. Mechanisms of Human Amnesia: Information Storage and Temporal Context Memory.

We have previously demonstrated that spontaneous confabulations and disorientation in amnesia are based on increased temporal context confusion (TCC) of information in memory rather than an inability to store new information (item recognition, IR). In the present study, we examined the impact of TCC and IR on the occurrence of amnesia. Fifty-three brain-damaged subjects with memory capacities ranging from normal to severely amnestic were examined. We found that learning, the delayed recall and recognition in two memory tests correlated weakly but significantly with the amount of information stored in a continuous recognition task but failed to correlate with TCC as measured with the comparison of two runs of the continuous recognition task. We conclude that, although increased TCC is strongly predictive of spontaneous confabulations and disorientation, TCC is not a significant predictor of the amnesia itself; amnesia is more often associated with a failure to store normal amounts of information.

Correspondence: *Armin Schnider, Neurologische Universitätsklinik, Inselspital, CH-3010 Bern, Switzerland.*

S. J. DUFF & E. HAMPSON. Keeping Track of Multiple Locations: A Sex Difference in Favor of Females.

Working memory is known to depend on prefrontal cortex. In nonhuman primates, behavioral and neuroanatomical evidence suggests this region is sexually differentiated, but little is known of any corresponding differences in the human brain. In the present experiments, healthy males and females were administered a multitrial spatial working memory task employing either colors (Expt. 1) or geometric forms (Expt. 2). A verbal working memory task was given for comparison. In both experiments, we found that females committed significantly fewer working memory errors on the spatial working memory task and took significantly less time to reach criterion than males. This was not attributable to a female advantage in perceptual speed, incidental memory, or speeded verbal labeling. The results raise the possibility that prefrontal functions may be sexually differentiated in humans.

Correspondence: *Elizabeth Hampson, Department of Psychology, University of Western Ontario, London, ON N6A 5C2, Canada.*

R. LAJINESS-O'NEILL, B. GIORDANI, S. BERENT, S. MINOSHIMA, N.L. FOSTER, R. KOEPPE, & D. KUHL. Paradoxical Increase in Frontal Cerebral Glucose Utilization in Isolated Memory Impairment at a 2-Year Follow-up: Relationship to Neuropsychological Functioning.

Isolated memory impairment (IMI; Berent et al., 1995) has been hypothesized to represent the early stage of probable Alzheimer's disease (AD). We examined neuropsychological functioning in 13 IMI subjects, 11 of whom also received [^{18}F] FDG PET scans, initially and at a 2-year follow-up evaluation. Matched sample *t* tests which examined mean differences in metabolic and neuropsychological performance from baseline to follow-up revealed no statistically significant differences in regional glucose metabolism in temporal, parietal, and occipital regions normalized to the thalamus. A significant increase in frontal metabolism was observed ($p < .01$), along with a concomitant and significant increase in controlled oral word association (COWA; $p < .05$). Significant declines in orientation, visual memory, recognition memory, and nonverbal reasoning were also evident. Previous investigations have revealed an up-regulation of muscarinic M1 receptors in the premotor cortex (Zilles et al., 1995), and up-regulation in immunoreactivity in AD (Su et al., 1996). The increase in frontal metabolic functioning coupled with an increase in verbal fluency at 2 years may represent a compensatory neurochemical up-regulation prior to declines in frontal metabolism concomitant with progressions in neurological impairment.

Correspondence: *Renee Lajiness-O'Neill, Neuropsychology Division, C-480 Med Inn Bldg., Box 0840, University of Michigan Medical Center, 1500 E. Medical Center Drive, Ann Arbor, MI 48109-0840, USA.*

M. PARSONS & D. TUCKER. Repetition Priming and Recognition Memory in Dyslexic and Nondyslexic College Students: Evidence for a Specific Deficit in Explicit Memory for Phonological Information.

The study compared priming and recognition memory performance on word reading and picture identification tasks for college students with ($N = 17$) and without ($N = 20$) dyslexia. On a repetition priming task requiring reading of phonologically regular, exception and nonwords, dyslexic readers were slower than controls overall, but both groups showed significant priming of reading speed that did not differ in magnitude across groups or word type. Both groups also showed significant positive learning effects resulting from multiple subsequent presentations. Despite these priming and learning effects, dyslexics demonstrated a specific deficit for recognition of nonwords presented on multiple trials, relative to controls. Dyslexics per-

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

formed normally on priming and recognition tasks using pictures as stimuli. Implications for models of reading and memory are discussed.
Correspondence: *Michael Parsons, Section of Neuropsychology, Medical College of Wisconsin, 9200 West Wisconsin Avenue, Milwaukee, WI 53226, USA.*

J. McGLONE, S.E. BLACK, J. EVANS, A. GRANTMYRE, M. MOSCOVITCH, A. PARKIN, M. SADLER, A. SITA, E. SQUIRES, D. STUSS, & B.A. WILSON. Evidence-Based Decision-Making: Construct Validity of a Sodium Amobarbital Recognition Memory Protocol.
This investigation examined the construct validity of a yes–no recognition memory protocol that normally is used during intracarotid injection of sodium amobarbital. Chance performance served as the criterion to identify who might risk severe amnesia if given a temporal lobectomy. Two global amnesic patients with virtually no recall after a short interval, nine pure (but not global) amnesic patients, and 5 patients with amnesia plus other cognitive deficits were administered the protocol without any drug injection. The globally amnesic patients scored at or below chance and were considered to have failed. By contrast, the other 14 amnesics all passed. Combined, the findings indicate that this four-item memory protocol has limited construct validity. It identified global amnesic conditions, but was insensitive to more common, severe amnesic disorders.
Correspondence: *Jeannette McGlone, Department of Psychology, QEII HSC, Rm. 4707, New Halifax Infirmary, 1796 Summer Street, Halifax, NS B3H 3A7, Canada.*

D. EVANS, G. GEFFEN, M. WRIGHT, & L.B. GEFFEN. Electrophysiological Correlates of Encoding and Rehearsal in Visuospatial Working Memory.
Encoding and rehearsal in visuospatial working memory were investigated by recording event-related potentials during performance of a delayed response task. Participants ($N = 18$) recalled the location of a target (memory trials) or made a visually guided movement to a target (sensory trials) after a 1- or 8-s delay. Distractor stimuli were presented on 28.6% of trials. N180 amplitude was greater for memory than sensory trials for left visual field targets indicating right hemisphere superiority for encoding of spatial location. Slow wave amplitude was greater for memory than sensory trials at anterior electrodes suggesting activation of the frontal lobes during rehearsal of location. Distractor presentation increased slow wave amplitude during memory trials but had little effect on pointing accuracy, suggesting increased central executive activity to maintain performance in the face of distraction.
Correspondence: *Gina Geffen, Department of Psychology, University of Queensland, St. Lucia, Queensland 4067, Australia.*

D.K. PELO, V.W. HENDERSON, C.A. McCLEARY, G.A. MURDOCK, & J.G. BUCKWALTER. The Association Between Naming Ability and Memory for Visual Reproduction.
The present study examined whether memory for visual stimuli on the Visual Reproduction (VR) subtest of the Wechsler Memory Scaled–Revised is associated with naming ability. Subjects were 63 nondemented elderly patients who participate in a longitudinal study on Alzheimer's disease and normal aging. All subjects completed the VR subtest and a variety of measures assessing language, visuospatial, and constructional skills. Measures of confrontational naming as well as immediate and delayed verbal memory were significantly related to scores on VR while controlling for constructional and visuospatial skills, and demographic factors. Results are interpreted as supportive of verbal mediation of visual information.
Correspondence: *J.G. Buckwalter, Alzheimer's Disease Research Center, Andrus Gerontology Center, University of Southern California, 3715 McClintock Avenue, MC 0191, Los Angeles, CA 90089-0191, USA.*

S. ERTLE, S. SCHUMM, F. LAGHRISSI-THODE, F. CALVI-GRIESS, & J.P. MACHER. Estrogenic Effects on Cognition and Quality of Life in Healthy Women.
This study investigates the estrogenic effects on mood and cognitive performances in healthy women in age of child bearing contraceptive drug free. Evaluation of quality of life and a neuropsychological battery assessing memory efficiency, attention capacities, visual–motor coordination, fine motor skills, verbal articulation, and visuospatial skills were conducted at two time points: at the beginning and at the end of the follicular phase of the menstrual cycle. Women were stratified in two groups: Group 1, 18 to 39 years; and Group 2, 40 to 50 years. The main hypothesis is that cognitive performances, quality of life, and mood are objectively improved by estrogen as reflected by the differences between the two time points in cognitive functions and Women Health Questionnaire scores.
Correspondence: *Stéphane Ertle, Forenap, Secteur 8, Centre Hospitalier, Rouffach 68250, France.*

A.D. WATTS RUNGE, M. HOFFMANN, & S.G. TOLLMAN. Transient Global Amnesia: Neuropsychological and SPECT Scan Findings.
This study investigated the neuropsychological status of 5 subjects during a transient global amnesia (TGA) attack. All subjects characteristically displayed both anterograde and retrograde amnesia, although there were individual differences in the severity and nature with which these symptoms manifested. Four subjects also displayed executive skills dysfunction. All MRI scans performed during TGA were normal, while SPECT scans revealed frontal and thalamic hypoperfusion. In addition, 4 subjects had temporal, 2 parieto–occipital and one biparietal hypoperfusion. The implications of these findings for elucidating the aetiology of TGA as well as the nature of amnesia–memory functioning and the associated brain structures on which it is dependent will be discussed.
Correspondence: *Ann D. Watts Runge, Neuropsychology Unit, Entabeni Hospital, Medical Centre West, 148 South Ridge Road, Durban 4001, South Africa.*

S.F. LUMEMPOUW, J. MISBACH, B.S. WIBOWO, L. SIDIARTO, F.L. MOELIONO, & L. SOERTIDEWI. Abnormal Auditory P300 Latency Correlates with Posttraumatic Amnesia.
Closed craniocerebral trauma (CCT) frequently causes posttraumatic amnesia (PTA). The latency of P300 that reflects the cortical processing of auditory stimuli is suggested to have a physiological correlation with PTA. The subject consisted of two groups; 60 normal subjects and 60 patients with CCT who were admitted to Cipto Mangunkusumo Nasional General Hospital Jakarta, Indonesia, with Glasgow Coma Scale (GCS) scores of 9–15; age range of 20–40 years, with elementary school education. On the day the GCS score was 15, the Galveston Orientation and Amnesia Test (GOAT) was applied and the P300 auditory evoked potentials were recorded. The P300 mean latencies of normal people showed positive linear regression with increasing age. The moderate CCT group were significantly having abnormal latencies and the abnormal latencies of P300 in the CCT patients had significant correlation with the presence of PTA, as measured by GOAT.
Correspondence: *Silvia Francina Lumempouw, Department of Neurology, Faculty of Medicine, University of Indonesia, Salemba Raya no. 6, Jakarta Pusat, Indonesia.*

N. YAMANIE, S. MARKAN, S. KUSUMOPUTRO, & J. MISBACH. Auditory Memory in Amateur Boxers.
The safety of amateur boxing as a sport is still a problem to be debated among physicians all over the world. Repeated brain injury caused by this kind of sport gave rise to auditory memory disorder. We evaluated the auditory memory of 57 amateur boxers and 56 nonboxer athletes by the Selective Auditory Memory Test of Buschke and Fuld. The boxer group was divided into two smaller subgroups, the first was with less than 4 years experiences and the second was more than 4 years. Our results showed that there were significant differences between the first group and the second group. There were also significant differences between the second group and the control group. We concluded that boxing sports could cause disturbance of brain function, especially more than 4 years of boxing activity.
Correspondence: *N. Yamanie, Department of Neurology, Faculty of Medicine University of Indonesia, Salemba 6, Jakarta Pusat, Indonesia.*

EMOTION

M. TABERT, J.C. BOROD, J.M. SCHMIDT, L.K. OBLER, J. WELKOWITZ, & I.S. SONG. Word-Type Analysis of Emotional Verbal Fluency Data in Unilateral Brain-Damaged Stroke Patients and Normal Adults.

A posed emotional expression task (i.e., verbal fluency) for the lexical communication channel was utilized to evaluate neuropsychological hypotheses about interhemispheric and intrahemispheric aspects of emotion. Subjects were 27 right-brain-damaged (RBD), 22 left-brain-damaged (LBD), and 25 normal demographically-matched right-handed adults. Patient groups were matched for lesion site along cortical–subcortical and anterior–posterior dimensions. Subjects generate words to eight emotional and eight analogous nonemotional categories. A word-type analysis determined the amount of good words and errors (i.e., perseverations, phrases, and proper names). Overall, cortical structures were more involved in emotional than nonemotional performance. Anterior LBDs showed greatest output deficits, across both conditions; anterior RBDs were more impaired for emotional than nonemotional conditions. Finally, RBDs produced the most perseverations, and patient groups produced more phrase errors than normal.

Correspondence: *Matthias Tabert, Dept. of Psychology, CUNY, 65-30 Kissena Blvd., Flushing, NY 11367, USA.*

A.Y. STRINGER & M. NADOLNE. Clinical *Versus* Statistical Subtyping of Disorders of Emotional Perception and Expression Following Brain Damage.

The current study contrasted clinical and statistical (cluster analytic) approaches to subtyping disorders of emotional perception. A sample of 56 neurological patients (predominantly stroke and brain injury) yielded nine clusters of vocal affect disorder, representing 39% of the sample. Clusters included mild and severe variants of motor aprosodia, a disorder typified by deficits in affect production and imitation and four subtypes of global aprosodia in which production, imitation, and perception of vocal affect are impaired in differing degrees. Agreement between two novice and two experienced clinicians was low when attempting to diagnose the traditional clinical subtypes of vocal affect disorder, but improved when the statistical subtypes were utilized. Implications for neuropsychological assessment, treatment, and epidemiologic research are discussed.

Correspondence: *Anthony Y. Stringer, Emory University, 1441 Clifton Road N.E., Atlanta, GA 30322, USA.*

S. BROWN-KUHL & H. EHRLICHMAN. Startle Reflex Modulation by Pleasant and Unpleasant Odors: Effects of Laterality and Gender.

Blink magnitude (in microvolts) in response to acoustic startle probes during inhalation or exhalation of unilateral presentation of odor stimuli [pleasant (coconut) or unpleasant (Limburger cheese), and neutral (no-odor)] were studied in 80 adults. Laterality and sex effects were examined and a significant interaction of Laterality (left nostril, right nostril) × Odor Condition (pleasant, unpleasant) × Breath (inhalation, exhalation) was found. In the pleasant odor condition smaller startle blink responses were found for the left nostril than the right nostril during inhalations. In the pleasant odor condition smaller blink magnitude during left nostril presentation was demonstrated during inhalations than during exhalations and conversely, in the unpleasant odor condition greater blink magnitude during right nostril presentation was found during exhalations than during inhalations. Findings were discussed in relation to the valence hypothesis and Zajonc's vascular efference theory. Sex effects primarily revealed that females were more physiologically reactive than males to the odors and/or the acoustic startle probes.

Correspondence: *Sandra Brown-Kuhl, Department of Psychology, New York Hospital-Cornell Medical Center, 21 Bloomingdale Road, White Plains, NY 10605, USA.*

R. KRIKORIAN, R. ROJDEV, P. NEWMAN, & D. FELDMAN. Executive Function Ability and Emotional Distress.

This exploratory study was designed to examine relationships among executive planning ability, mood, and personality factors in a nonclinical sample. The findings indicated that, even among normal individuals with expectable performances on ability measures, variations in executive planning ability were associated with mood and personality factors. Those with poorer (albeit normal range) performance on the Tower of London task reported more emotional distress and demonstrated a comparatively increased characterological tendency toward neurotic maladjustment. These data would indicate that further investigation of the contribution of cognitive neuropsychological factors to emotional and personality functioning in nonclinical and psychopathological samples is warranted. The study of the effect of developmental cognitive disorders on adjustment in adulthood would seem to be of particular interest.

Correspondence: *Robert Krikorian, Department of Psychiatry, University of Cincinnati College of Medicine, 231 Bethesda Avenue, Cincinnati, OH 45267-0559, USA.*

B. CICERO, J.C. BOROD, L. OBLER, J. WELKOWITZ, H. ERHAN, J. WHALEN, I. GRUNWALD, & R. AGOSTI. Emotional *Versus* Nonemotional Lexical Perception in Brain Damage.

This study examined hemispheric specialization for lexical–verbal emotional perception in 11 right brain-damaged (RBD), 10 left brain-damaged (LBD), and 15 normal control adults. The groups did not differ for sex, age, education, or occupation; the patient groups were similar with regard to lesion location. Parallel emotional experimental and nonemotional control tasks included word identification, sentence identification, and word discrimination. Emotional stimuli included eight emotions; nonemotional stimuli included eight "characteristics of people" (e.g., vision). A significant interaction of Group × Condition revealed that RBDs were significantly impaired relative to LBDs and normals within the emotional condition, particularly for identification. There were no significant group differences for the nonemotional condition. These findings suggest that the right hemisphere has a unique contribution to the perception of lexical emotional stimuli.

Correspondence: *Barbara Cicero, 85-35 54th Avenue, Elmhurst, NY 11373, USA.*

L. BURTON & D. LABAR. Emotional Status after Right *Versus* Left Temporal Lobectomy.

Nineteen temporal lobectomy patients with epilepsy were evaluated (11 right and 8 left) with a brief questionnaire that addressed (1) general happiness, (2) depression, (3) anxiety, (4) impulse control, and (5) socialization. The patients with left temporal lobectomy reported increases in depression and decreases in socialization compared to the right temporal lobectomy patients after surgery. Further, although the right temporal lobectomy patients reported increases in general happiness, no changes in general happiness were reported by the left temporal lobectomy patients. The present study supported the idea that increased negative affect is associated with left compared to right temporal lobectomy. This is consistent with a model of negative emotional valence when the right hemisphere dominates awareness.

Correspondence: *L. Burton, Psychology Department, Fordham University, 441 E. Fordham Road, Bronx, NY 10458, USA.*

N.K. MADIGAN, J.C. BOROD, H. EHRLICHMAN, J. TWEEDY, & J. LoBOSCO. Hedonic Facial Expressions in Patients with Unilateral Lesions: Comparison of Expressions Produced With and Without Odorants.

Emotional facial expressions were elicited by two different methods (odorants and verbal command) in subjects with right hemisphere damage (RHD), and left hemisphere damage (LHD), and in normal controls (NC). Ratings of spontaneous and voluntary facial expressions to pleasant and unpleasant odors revealed no differences between LHDs, RHDs, and NCs. However, ratings of facial expressions posed to six different emotions revealed that RHDs' expressions were significantly less accurate and less intense than NCs' expressions. As odorants are predominantly processed by subcortical–limbic structures, the findings from this study suggest differential involvement of the cortical *versus* subcortical route by which emotional information can be acquired. The results also suggest the importance

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

of right neocortical regions in the symbolic, more complex aspects of emotional processing.
Correspondence: *Nancy Madigan, % Joan Borod, Dept. of Psychology, NSB-E 318, Queens College, CUNY, 65-30 Kissena Blvd., Flushing, NY 11367, USA.*

P. MARSHALL & P. STEINBERG. Effects of Allergic Rhinitis on Mood and Cognitive Function.
This study evaluated the effect of having allergic reactions (i.e., being in allergy season without taking medications) on fatigue level, mood, speed of cognitive processing, ability to divide and sustain attention, short term and recent verbal memory, and working memory. Subjects (29 atopics, 20 controls) were given a battery of tests and mood ratings in and out of allergy season. Repeated measures ANOVA indicates that atopic patients experience more mental fatigue and reduced motivation, levels of activity, and pleasurable engagement in allergy season. They also have more difficulty with verbal short term memory. Allergic symptoms do not appear to adversely effect speed of cognitive processing or ability to divide and sustain attention.
Correspondence: *Paul Marshall, Department of Psychiatry, Hennepin County Medical Center, 701 Park Avenue, Minneapolis, MN 55401, USA.*

P. FEDIO, M. MANN, A. SCHAFFER, & A. AUGUST. Emotional Reactions and Self-Ratings Following Intracarotid Amytal Injection.
Low dosage amytal (75 mg) facilitated emotional reactions of dysphoria–crying with the left, and euphoria with the right, injection. 'Laughter' after left injections was viewed as a negative reaction of anxiety–frustration relating to dysphasia. Right temporal patients had a low stress level and self-rated negatively after transfemoral preparation preceding injection. These patients were emotionally neutral and indifferent in rating their euphoria after the right injection. Left temporal patients were mood congruent and rated their emotional states as positive after the right, and negative after the left, injection. These data suggest that the left brain may deal with the cognitive components of emotions, the right, with basic expression and perception.
Correspondence: *Paul Fedio, Neuropsychology, 10/5D-49, NINDS, National Institutes of Health, Bethesda, MD 20892, USA.*

Paper Session 9/11:00 a.m.–12:30 p.m.

PEDIATRICS-5: DISORDERS

D. ANDERSON, R. MARTINEZ, & J. REILLY. Affective Vocalizations in Prelinguistic Infants with Early Unilateral Brain Damage.
Adult studies have implicated the right hemisphere in emotional processing. This study investigates the nature of prelinguistic vocalizations of infants (age 9–16 months) with unilateral focal brain damage. Previously, we found that these children have access to a range of emotions but use facial expressions less frequently than NC. Moreover, children with posterior right hemisphere damage (RHD) displayed an affective profile different from children with left hemisphere damage (LHD) or NC. In this study, the vocalizations from 46 infants (12 children with RHD, 11 with LHD, and 23 age- and sex-matched controls) were coded as positive, negative, neutral, or ambiguous. Our results mirror those for facial expression and support the role of both the anterior and posterior right hemisphere regions in emotional organization.
Correspondence: *Judy Reilly, San Diego State University, 6363 Alvarado Court, #221, San Diego, CA 92120, USA.*

S. PARLOW & S. KUEHN. The Impact of Traumatic Brain Injury on Cerebral Interhemispheric Interaction in a Pediatric Population.
In order to clarify the role of the corpus callosum in pediatric traumatic brain injury (TBI), several behavioral indices of interhemispheric interaction were examined within 6 weeks of injury. To date, 24 children (M = 9.1 years, SD = 3.6) have been tested, including 10 children with mild TBI, 4 with moderate or severe TBI, and 10 orthopedic controls. Subjects with even mild TBI performed more poorly on the crossed conditions (interhemispheric) of a tactile sensory task (the Finger Localization Test, Quinn & Geffen, 1985) than age-matched controls. The groups did not differ on the uncrossed conditions (intrahemispheric). Nor did they differ on a motor interhemispheric test (Bimanual Tapping Test). These data suggest that functioning of the posterior corpus callosum is compromised in acute TBI.
Correspondence: *Shelley Parlow, Department of Psychology, Carleton University, Ottawa, ON K5S 1B6, Canada.*

L. EWING-COBBS, L. KRAMER, M. PRASAD, D.N. CANALES, P.T. LOUIS, S.H. LANDRY, J.M. FLETCHER, & A. NISBIT. Neuroimaging, Physical, and Neuropsychological Findings in Young Children with Inflicted and Noninflicted Traumatic Brain Injury.
Neuroimaging, physical, and neuropsychological findings were compared in children 0 to 6 years of age with inflicted (N = 20) or noninflicted (N = 20) traumatic brain injury (TBI). The two TBI groups were comparable on indices of injury severity and neonatal history. Acute CT–MRI scans revealed preexisting brain injury in 45% of children with inflicted TBI and in none of the children with noninflicted injuries. Although extraaxial bleeds occurred more often in children with inflicted TBI, intraparenchymal bleeds, infarct–edema, skull fractures, cranial soft tissue swelling, cranial nerve injury and hemiparesis were similar in both groups. Deficient cognitive scores were more common in children with inflicted TBI (45%) than noninflicted TBI (5%) at 1 month after the injury. Motor scores were comparable in both groups. The high frequency of deficient cognitive scores in children with inflicted TBI secondary to physical child abuse reflects the combination of repetitive neurological injury and adverse environmental conditions (NINDS R01-29462; MD-RR-02558).
Correspondence: *Linda Ewing-Cobbs, Department of Pediatrics, University of Texas Houston Health Science Center, Houston, TX 77030, USA.*

N. SINGER HARRIS, E. COURCHESNE, R. CARPER, H. CHISUM, & B. EGAAS. Neuroanatomic Contributions to Slowed Orienting of Attention in Children with Autism.
Previous research has demonstrated that autistic patients and patients with focal cerebellar lesions are abnormally slow to orient attention to visual cues in the Posner paradigm. Similar effects were recently described in younger autistic children, and were significantly correlated with cerebellar vermis, but not other neuroanatomic regions. More thorough analysis of these data, using multiple regression to determine degree to which slowed attentional orienting in autistic children is accounted for by different neuroanatomic regions, indicates that only cerebellar vermis area accounts for a significant proportion of variance in orienting. Total variance accounted for is reduced when frontal lobe volume, total brain volume, and corpus callosum area are included in the model. This research is the first to establish a specific brain–behavior link in autistic children.
Correspondence: *Eric Courchesne, Laboratory for Research on the Neuroscience of Autism, 8110 La Jolla Shores Drive, Suite 201, La Jolla, CA 92037, USA.*

R.F. WHITE, P. GRANDJEAN, A. NIELSON, E. DOS SANTOS, & K. MCNULTY. Neuropsychological Correlates of Methylmercury Exposure in Brazilian Children.
Performance on neurocognitive and motor tests was examined in relation to methylmercury exposure among 346 children age 7–12 residing in three communities on the Brazilian Tapajos River, where fish is contaminated by mercury from gold-mining operations, and a control community. Mercury levels were determined in samples of hair from the children and their mothers. Decreased performance was related to increased mercury levels in the children or their mothers on a number of test measures, even at levels below the current WHO-recommended exposure limit.
Correspondence: *Roberta F. White, Boston Environmental Hazards Center, Boston DVAMC–116B-4, 150 S. Huntington Avenue, Boston, MA 02130-4893, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

M.R. HARRIS-COLLAZO, W. KWOK, S.N. MATTSON, T.L. JERNIGAN, & E.P. RILEY. Quantitative Magnetic Resonance Imaging Analysis of Fetal Alcohol Syndrome.
Fetal alcohol syndrome (FAS) is characterized by a pattern of facial malformations, growth retardation, and CNS abnormalities caused by heavy prenatal alcohol exposure. Studies utilizing magnetic resonance imaging (MRI) have demonstrated significant reductions of the cranium, diencephalon, and basal ganglia when compared to control subjects. The present study utilized improved volumetric techniques to study FAS. The quantitative analyses revealed that the cerebral and cerebellar vault volumes were significantly reduced in the FAS subjects, and the volume of their cerebellar vault was disproportionately smaller than their cerebral vault. In addition, the proportional volume of the caudate nucleus was reduced, while no difference was found in the lenticular nuclei. These brain changes may underlie some of the behavioral deficits associated with FAS. The current findings are consistent with studies on animals with perinatal alcohol exposure that have demonstrated reductions in the volumes of the caudate and cerebellum.
Correspondence: *Michelle R. Harris-Collazo, Brain Image Analysis Lab, UCSD, 9500 Gilman Drive, La Jolla, CA 92093-0949, USA.*

Symposium 7/11:00 a.m.–12:30 p.m.

NEW PERSPECTIVES ON THE CORPUS CALLOSUM: ANATOMY, PHYSIOLOGY, AND BEHAVIOR

Organizer and Chair: Maryse Lassonde

E. ZAIDEL. The Redundant Target Effect in Simple Reaction Time: Paradoxical Implicit Interhemispheric Transfer in the Split Brain.
Can an unattended stimulus in one visual hemifield (VF) of a split brain patient affect the decision about a target in the other VF? To demonstrate such implicit transfer or priming it is necessary to show failure of explicit priming, compare priming between the two VFs to priming within each VF, and compare priming in a split brain patient to priming in normal subjects. We present a demonstration that satisfies these requirements for the first time. Thirty-two normal subjects and a patient with complete cerebral commissurotomy from the Los Angeles series, NG, performed a simple reaction time task with unimanual responses. Target location was predesignated and targets occurred alone or together with a redundant copy in the same or opposite VF. Normal subjects showed a slightly larger speeding up of reaction time (gain) in the between-field redundant target condition (4.1 ms) than in the within-field redundant target condition (3.2 ms). Split brain patient NG showed a redundancy gain in the right hemisphere and a redundancy loss in the left hemisphere. However, she showed a very large gain in the between-field conditions (39 ms). This demonstrates an implicit priming effect in the split brain and illustrates that independent parallel processes in the two disconnected hemispheres can affect each other.
Correspondence: *Eran Zaidel, UCLA Department of Psychology, 1282A Franz Hall, Box 951563, Los Angeles, CA 90095-1563, USA.*

C.D. SARON. The Electrophysiology of Interhemispheric Visuomotor Interaction: Relations with Behavior and Effects of Callosal Agenesis.
Ipsimanual and contramanual reaction times to unilateral visual stimuli are typically conceptualized in terms of a fastest or critical route between visual system activation and motor command generation. Indices of brain function using this interpretive scheme often fail to consider the anatomical complexity of the pathways involved. These may be reflected interindividually as preferred response modes and intra-individually as trial-to-trial differences in pathway contribution. The work described here characterized the spatiotemporal dynamics and electrocortical source geometry of interhemispheric visuomotor interaction using high electrode density event-related potentials. Relations between behavioral and physiological responses, and the contributions of callosal *versus* non-callosal interhemispheric pathways were investigated. The results demonstrate the complex neural dynamics and heterogeneity of response types underlying even the simplest behavioral tasks.
Correspondence: *Clifford Saron, Department of Neuroscience, Albert Einstein College of Medicine, Bronx, NY 10461, USA.*

M. LASSONDE. New Perspectives on the Corpus Callosum: Anatomy, Physiology, and Behavior.
Since the seminal work of Sperry in the 1950s and early 1960s, studies conducted on epileptic patients who underwent a therapeutic callosal transection, as well as animal studies, have essentially confirmed the callosal involvement in interhemispheric transfer of lateralized information. This symposium will be devoted to new findings regarding the anatomofunctional organization of the corpus callosum. Francisco Aboitiz will present his recent work on the anatomy of the human corpus callosum with a special emphasis on its behavioral correlates. Studying cognitive event related potentials, Cliff Saron will investigate the relations between behavioral and physiological responses and the contributions of callosal *versus* non-callosal pathways. Franco Lepore will present electrophysiological data related to the little-explored role of the corpus callosum in midline fusion and will also address the behavioral data obtained in patients with callosal pathology. Eran Zaidel will address new findings regarding the presence of implicit visual interhemispheric transfer in a split-brain patient who failed to transfer the information explicitly. Finally, Maryse Lassonde will present a series of experiments indicating that the plasticity observed in callosal agenesis subjects is limited to transfer tasks involving sensory stimulation but that interhemispheric disconnection signs are present in acallosal subjects when cross-integration involves a motor component.
Correspondence: *Maryse Lassonde, Departement de Psychologie, Universite de Montreal, C.P. 6128, Succursale Centre-Ville, Montreal, QC. H3C 3J7, Canada.*

M. LASSONDE. Absence of Callosal Plasticity in Tasks Requiring Motor Integration.
It is commonly believed that individuals with callosal agenesis do not manifest the typical disconnection symptoms that are present in adult split-brain patients. One exception concerns bimanual coordination which is impaired in both split-brain and acallosal patients. We report a series of experiments that demonstrate that callosal plasticity is indeed limited when interhemispheric transfer of motor performances is required. The first two experiments examined whether acallosal and callosotomized subjects could learn a visuomotor skill that involved a motor control from either one or both hemispheres. All subjects learned the visuomotor skill in the unimanual conditions but none of the "callosally deprived" subjects could transfer the learning from one hand, and hence one hemisphere, to the other. In the third experiment, we compared the ability of acallosal subjects and callosotomized patients to point toward a visual stimulus that appeared either in the left or right visual field. Both groups of patients were less accurate than their controls, especially in the crossed visual-field–hand conditions. We argue that the absence of plasticity in motor cross-integration may be related to the fact that, unlike the regions that mediate sensory functions, maturity of the frontal lobes, subserving the motor functions, may be reached after the termination of the critical period of callosal plasticity.
Correspondence: *Maryse Lassonde, Departement de Psychologie, Universite de Montreal, C.P. 6128, Succursale Centre-Ville, Montreal, QC H3C 3J7, Canada.*

FRANCO LEPORE. Midline Fusion Is Assured by the Corpus Callosum: Behavioral Demonstration Across Different Sensory Modalities.
Higher order sensory information is transmitted to the cortex *via* lateralized pathways. Unified experience is rendered possible by the corpus callosum. Callosal neurons as well as their terminal fields are mainly concerned with the sensory midline, possibly to preclude sensory discontinuities across the hemifields. This midline fusion rule appears to hold at the anatomical and physiological level for visual, somatosensory and, in part, auditory systems. The behavioral consequences are that human subjects with callosal pathology have greater deficits at midline than laterally, at least for the highly lateralized visual and tactile modalities. Such does not appear to

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

be the case for auditory and thermal perception, systems which are less lateralized. The rule seems thus to hold mainly for the former systems and not the latter.
Correspondence: *Franco Lepore, Departement de Psychologie, Universite de Montreal, C.P. 6128, Succursale Centre-Ville, Montreal, QC H3C 3J7, Canada.*

F. ABOITIZ. Anatomofunctional Connections of the Corpus Callosum.
In primates, the corpus callosum has a topographic representation of the different cortical areas that project to it. This topography is matched by regional differences in fiber composition, in which a high proportion of fibers connecting sensorimotor areas are highly myelinated and have a large caliber, while fibers representing association areas tend to be thinner and lowly myelinated, although much more abundant. We have investigated the gross morphological and microscopical (fiber composition) variability of the corpus callosum both across human subjects and across species, and have established that (1) in humans there is an inverse relation between numbers of fibers in specific callosal segments and anatomical asymmetry in the Sylvian fissure; (2) across species, the mean fiber diameter increases with increasing brain size, but it does so less than expected for the increase in interhemispheric distance. Furthermore, frontally looking species tend to have thicker fibers in the posterior callosum (many of them subserving visual functions) than expected for their size. This indicates that, although callosal fiber conduction velocity compensates to some extent for the increase in interhemispheric distance in larger brains, this may not be enough to render interhemispheric transmission independent of brain size.
Correspondence: *Francisco Aboitiz, Program of Morphology, Institute for Biomedical Science, Faculty of Medecine, University of Chile, POB 70079, Santiago 07, Chile.*

Symposium 8/11:00 a.m.–12:30 p.m.

FUNCTIONAL NEUROIMAGING IN CLINICAL POPULATIONS

Organizer and Chair: T. Hammeke

T.A. HAMMEKE, S. J. SWANSON, J.R. BINDER, J.A. SPRINGER, S.M. RAO, M. FISCHER, J.A. FROST, P.S.F. BELLGOWAN, G.L. MORRIS, & W.M. MUELLER. Clinical Applications of Functional Magnetic Resonance Imaging (fMRI) in Intractable Epilepsy.
fMRI is a promising technique for mapping brain activity. A series of investigations at the Medical College of Wisconsin have evaluated fMRI in determining (1) the cerebral distribution of language functions in neurologically normal individuals and patients with intractable epilepsy, (2) the correspondence of indices of language and memory lateralization from the Intracarotid Amobarbital Test (IAT) and fMRI, and (3) the relationships between epilepsy history variables, handedness, and neuropsychological variables and cerebral distribution of language and memory in complex partial epilepsy. Using information from these studies it will be argued that, while fMRI holds considerable promise for understanding cerebral organization of language and memory, it is premature to rely on the methodology for making clinical decisions in epilepsy surgery.
Correspondence: *Thomas A. Hammeke, Section of Neuropsychology, Medical College of Wisconsin, 9200 West Wisconsin Avenue, Milwaukee, WI 53226, USA.*

M.W. HAUT. Functional Neuroimaging in Clinical Populations.
Functional neuroimaging using strategic activation of cognitive systems has supplemented knowledge gained from decades of lesion studies examining neuroanatomical correlates of behavior. In addition to investigations of 'normal' human cognition, techniques such a functional magnetic resonance imaging (fMRI) and [^{15}O]-water positron emission tomography (PET) are now being applied to clinical populations. These techniques have the potential to increase the pathophysiological understanding of cognitive dysfunction in neurological disease. This symposium will present data from both fMRI and PET studies of temporal lobe epilepsy, Alzheimer's disease, and solvent exposure. The strengths, weaknesses, and clinical applications of these specific studies and of functional imaging techniques in general will be discussed.
Correspondence: *Marc W. Haut, Department of Behavioral Medicine & Psychiatry, P.O. Box 9137, West Virginia University School of Medicine, Morgantown, WV 26506, USA.*

J.T. BECKER. Probing Dementia Syndromes with Functional Neuroimaging.
Functional neuroimaging techniques such as positron emission tomography (PET) have permitted great strides to be taken in the *in vivo* study of the organization of information processing systems in the human brain. Recently, these techniques have been used to investigate the changes in formation processing that can occur in the context of neurological disease. The present report describes the results of experiments investigating episodic and semantic memory in patients with Alzheimer's disease. Correlational analyses reveal that AD patients have a normal functional organization of the brain regions responsible for auditory–verbal memory processing. Thus, analysis of brain function using imaging techniques can be usefully applied in the study of dementia syndromes.
Correspondence: *James T. Becker, Neuropsychology Research Program, University of Pittsburgh School of Medicine, Suite 502, Iroquois Building 3600 Forbes Avenue, Pittsburgh, PA 15213, USA.*

A. J. SAYKIN, L.A. FLASHMAN, S. FRUTIGER, S.C. JOHNSON, A. MAMOURIAN, C. MORITZ, J. O'JILE, H. J. RIORDAN, R. SANTULLI, C.A. SMITH, & J.B. WEAVER. Semantic Processing and Memory in Alzheimer Disease: fMRI Activation Patterns.
Objective: Impaired semantic processing occurs in AD and dissociations among types of semantic relations have been reported. We evaluated functional neuroanatomic correlates of semantic processing in AD. *Methods:* Patients and controls underwent whole brain echo planar imaging at 1.5T using a local gradient coil. Tasks included auditory semantic decision (category–exemplar match, category–function match), phonemic control and recognition memory. ROI and voxel-based analyses were performed. *Results:* Patients showed worse performance than controls on the categorical but not function or phoneme tasks and a trend towards poorer memory for semantic but not phonemic items. fMRI activation was observed in frontal, temporal, cingulate, and subcortical regions. *Conclusion:* Semantic processing deficits appear greatest for categorical relations and influence memory. Relation of cognitive performance to brain activation will be discussed.
Correspondence: *Andrew Saykin, Psychiatry/DHMC, Dartmouth Medical School, Lebanon, NH 03756, USA.*

M.W. HAUT, S. WHYTE, T.S. CALLAHAN, A. DUCATMAN, N. GUPTA, & H. KUWABARA. Verbal Working Memory in Solvent Exposure: A PET Activation Study.
While numerous studies have documented neuropsychological deficits in patients with exposure to organic solvents, the pathophysiology of the deficits remains unclear. We used positron emission tomography (PET) activation utilizing [^{18}O] water to investigate verbal working memory in patients with chronic exposure to solvents in the work place. Patients with solvent exposure, as compared to control subjects, demonstrated additional areas of activation in the right anterior frontal lobe, but failed to activate the left anterior frontal lobe to the same degree. The results suggest that solvent exposed patients appear to compensate for working memory deficits typically associated with left anterior frontal lobe areas by utilizing an alternate strategy, the right frontal system.
Correspondence: *Marc W. Haut, Department of Behavioral Medicine & Psychiatry, P.O. Box 9137, West Virginia University School of Medicine, Morgantown, WV 26506, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

FRIDAY AFTERNOON, FEBRUARY 6, 1998

Paper Session 10/1:30–3:10 p.m.

REHABILITATION-1

J.C. ADAIR, S.E. NADEAU, T.W. CONWAY, I. J. GONZALEZ-ROTHI, P. HEILMAN, I.A. GREEN, & K.M. HEILMAN. Change in Functional Neuroanatomy After Successful Treatment of Phonological Alexia.
Regional cerebral blood flow (CBF) was measured in a patient with phonological alexia before and after therapy (auditory discrimination in depth; ADD). The intervention, provided over 2 years after injury, improved reading performance. Prior to ADD, he performed a linguistic task (reading nonwords) after infusion of a CBF tracer which was imaged with SPECT. The SPECT study was repeated twice (during the linguistic task and also a nonlinguistic comparison) after treatment to assess changes associated with remediation of alexia. Before ADD, the right hemisphere was inactive during nonword reading relative to the nonlinguistic task. After treatment, nonword reading increased CBF in right perisylvian cortex, homologous to dominant hemisphere areas involved in language processing. Results indicate that rehabilitating alexia may entail recruitment of nondominant networks.
Correspondence: *John Adair, Neurology Service (127), Albuquerque VA, 2100 Ridgecrest Drive S.E., Albuquerque, NM 87108, USA.*

C. FLAHERTY, P. ESLINGER, & J. CONNOR. Borderline Personality Disorder Complicated by Frontal Lobe Trauma: An Effective Interdisciplinary Treatment Strategy.
Recent cognitive–behavioral approaches have addressed the behavioral manifestations of the borderline personality disorder. This study was designed to test the hypothesis that the poor impulse control associated with borderline personality disorder, exacerbated by frontal lobe trauma, could be mitigated by a combination of cognitive therapeutic approaches and guided imagery. Findings included significant decreases in angry reactions to minor environmental stressors, with gains experienced in ability to self-regulate emotional reactions remaining stable in the posttreatment phase. This incorporation of key strategies from three therapeutic schools promises to improve executive self-regulation in such dual diagnosis patients, widely acknowledged among neurorehabilitation specialists to be the most intractable to traditional approaches.
Correspondence: *Clare Flaherty, Division of Neurology, Pennsylvania State University, Hershey Medical Center, Hershey, PA 17033, USA.*

A.A. RIZZO, J.G. BUCKWALTER, U. NEUMANN, C. KESSELMAN, & M. THEIBAUX. Virtual Reality Technology: Potential Tools for Neuropsychological Assessment and Cognitive Rehabilitation.
The application of virtual reality technology (VR) for the neuropsychological assessment and cognitive rehabilitation of persons with acquired brain injury and neurological disorders could serve to revolutionize the study of brain–behavior relationships as well as produce treatment options unavailable with traditional methods. The development of this field will require the merging of knowledge from a variety of disciplines including neuropsychology, educational theory and technology, human factors, and computer science. This presentation will describe how VR could be used to facilitate cognitive assessment and rehabilitation and will briefly address the theoretical and practical issues (interface concerns, side effects, generalization, etc.) for these applications and describe our ongoing work developing a mental rotation–spatial skills cognitive assessment and training system.
Correspondence: *Albert A. Rizzo, Andrus Gerontology Center, University of Southern California, University Park, MC-0191, CA 90089, USA.*

J. SUHR, S. ANDERSON, & D. TRANEL. Progressive Muscle Relaxation in the Management of Behavioral Disturbance in Alzheimer's Disease.
Behavioral disturbances are common in Alzheimer's disease (AD) and make substantial contribution to its disability. These symptoms often are treated with psychotropic medication, sometimes with undesired side effects. We tested the efficacy of a nonpharmacological behavioral management technique that relies on motor memory skills (progressive muscle relaxation; PMR). We hypothesized that PMR would reduce behavioral difficulties and improve performance on cognitive screening measures. Thirty-four patients and their caregivers were randomly assigned to PMR or a control treatment. The PMR group showed a significant decrease in behavioral disturbance and improved performances on measures of memory and verbal fluency, from baseline to 2-month follow-up. The findings support the notion that PMR is an effective technique for managing behavioral disturbance in AD patients with mild to moderate dementia.
Correspondence: *Julie Suhr, Department of Psychology, Porter Hall, Ohio University, Athens, OH 45701, USA.*

M. GLISKY. The Effects of Aerobic Exercise and Cognitive Training on Cognitive and Psychosocial Functioning in Older Adults.
The current study employed two 16 week interventions with older adults (over 65 years)—either an aerobic exercise class or a cognitive training class, which participants attended two to three times per week. The cognitive classes focused on general cognitive activities, as well as specific memory encoding strategies and verbal fluency strategies. The aerobic group participated in cardiovascular exercise classes. Subjects were tested on a range of cognitive and psychosocial variables, both pre- and postintervention. Both the aerobic and the cognitive groups showed significant improvements on measures of memory (Logical Memory I and II) and Verbal Fluency (letter and category), whereas the control group showed some declines in these areas. The aerobic and cognitive groups did not differ from each other. In addition, the aerobic group demonstrated a decline in negative affect which was not noted in either the cognitive or the control group. Subjects in both intervention groups reported significant perceived changes in their cognitive and psychosocial functioning.
Correspondence: *Martha Glisky, Department of Psychology, University of Arizona, Tucson, AZ 85721, USA.*

N. GEORGIOU, J.L. BRADSHAW, & E. CHIU. Can Patients with Parkinson's Disease, Huntington's Disease, and Tourette's Syndrome Benefit from the Effect of Directed Attention?
Parkinson's disease (PD), Huntington's disease (HD), and Tourette's syndrome (TS) are disorders associated with both movement and attentional impairments. This study sought to ascertain whether overt gaze (i.e., directed attention) would influence patients' ability to hold and shift attention. TS and PD patients were impaired in holding attention towards an expected location, whereas HD patients experienced difficulties in *both* holding and shifting attention. The impairment in HD, however, was found to be modulated by directed attention. In HD, the impairment may stem from an interruption of frontal–basal ganglia pathways, on both cortical and subcortical levels (anterior attention system), as well as of parietal lobe pathways (posterior attention system). In TS and PD, the anterior attention system is perhaps dysfunctional, whereas parietal lobe pathways may be less implicated.
Correspondence: *Nellie Georgiou, Neuropsychology Research Unit, Psychology Department, Monash University, Clayton, Victoria 3168, Australia.*

Paper Session 11/1:30–3:10 p.m.

HIV-2

T.A. FLETCHER, E.M. MARTIN, D.L. PITRAK, R. FARINPOUR, K. J. PURSELL, K.M. MULLANE, & R.M. NOVAK. Cognitive Reserve and Neuropsychological Functioning in HIV-Seropositive Drug Users.
Threshold theory predicts that lower brain reserve capacity increases vulnerability to HIV-related cognitive deficits. We tested this hypothesis by

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

evaluating the pattern of neuropsychological test scores for 109 HIV-seropositive and 104 HIV-seronegative drug users as a function of brain reserve capacity (BRC), which was indexed by AmNART estimates. Results provided partial support for threshold theory. Cognitive test scores were significantly lower for drug users with lower AmNART IQ estimates, regardless of serostatus. Motor test scores were significantly lower for seropositive compared with seronegative subjects and for subjects with lower AmNART IQ scores, but the effect was stronger for serostatus. Methodological difficulties associated with testing the cognitive reserve hypothesis in the HIV-seropositive drug user population will be discussed.
Correspondence: *Eileen M. Martin, Department of Psychiatry (M/C 913), University of Illinois, 912 S. Wood Street, Chicago, IL 60612, USA.*

T.S. SULLIVAN, E.M. MARTIN, T.A. FLETCHER, D.L. PITRAK, K. J. PURSELL, K.M. MULLANE, R.M. NOVAK, & M. HARROW. Auditory Working Memory in HIV-1 Infection.
We have shown previously that verbal, spatial, and visual working memory functioning is impaired in HIV-seropositive drug users. In the present study, we examined auditory working memory in 42 HIV-seropositive and 33 HIV-seronegative drug users. We administered a modified version of a letter-number span task developed by J.M. Gold and colleagues which allowed us to examine working memory storage and processing operations. We found that HIV-seropositive subjects had significantly poorer working memory processing than HIV-seronegative controls ($p < .005$). This finding could not be accounted for by group differences in age, education, estimated verbal IQ, or psychological distress. The current finding indicates that the operations involved in manipulating working memory representations are impaired, and suggests that impaired working memory is a core deficit of HIV-related cognitive dysfunction.
Correspondence: *Eileen M. Martin, Department of Psychiatry (M/C 913), University of Illinois, 912 S. Wood Street, Chicago, IL 60612, USA.*

M.R. BASSO & R.A. BORNSTEIN. Cognitive Reserve Capacity Mediates Neurobehavioral Changes in HIV Across 12 Months.
This study tested whether cognitive reserve capacity moderates worsening neurobehavioral dysfunction in HIV infection. One hundred twenty-six homosexual men (48 controls; 46 HIV-positive asymptomatic, 22 HIV-positive symptomatic; 10 AIDS) with stable disease status were tested on measures of executive function, attention, and new learning at baseline and 12-month follow-up. Cognitive reserve capacity was indexed on the basis of a demographically based estimation of premorbid intelligence and participants were classified as average or above-average intelligence. Regardless of disease status, participants with above-average IQ showed no declines across time. In contrast, among those with average IQ, AIDS, and HIV-positive symptomatic groups showed declines, whereas the asymptomatic groups did not. The findings support the hypothesis that cognitive reserve mediates declines in neuropsychological function in patients with stable HIV status.
Correspondence: *M.R. Basso, Department of Psychology, University of Tulsa, 600 South College Avenue, Tulsa, OK 74104, USA.*

M.R. BASSO & R.A. BORNSTEIN. Effects of Immunosuppression and Disease Severity on Neuropsychological Function in HIV Infection.
Effects of immunosuppression and illness severity upon neuropsychological function were assessed in 144 homosexual men across 12 months. There were 50 seronegative, 52 HIV-positive asymptomatic (HIV+A), 22 HIV-positive symptomatic (HIV+S), 11 with AIDS defining illnesses (AIDS–DI), and 8 diagnosed with AIDS on the basis of CD4 levels falling below 200/mm^3 (AIDS–CD4). Groups were equivalent in age, education, and IQ. None were drug users, and none experienced a change in disease status. Across time, the AIDS–DI group had worse executive function, new learning, and attention performance than the other groups. Additionally, at follow-up, the AIDS–DI group became more impaired. The data suggest that cognitive declines associated with AIDS are unlikely due to independent contributions of immunosuppression and illness, but are more likely attributable to a combination of the two.
Correspondence: *M.R. Basso, Department of Psychology, University of Tulsa, 600 South College Avenue, Tulsa, OK 74104, USA.*

E.M. MARTIN, M. COHEN, R. HERSHOW, B. SWANSON, K. WEBER, V.L. CARSON, & J. RICHARDSON. Neurobehavioral Function in HIV-Seropositive Women: A Preliminary Report from the Women's Interagency HIV Study–Chicago Consortium.
Women comprise the fastest-growing demographic group with HIV-1 infection, but no published studies to date have evaluated their neuropsychological function. We administered a battery of neuropsychological tests to 60 HIV-seropositive and 20 seronegative women enrolled in the Women's Interagency HIV Study (WIHS), a multicenter study of HIV disease progression. Neuropsychological test protocols of 22% of seropositive women but no seronegative women were classified as abnormal. Women with NP abnormalities were less likely to be employed currently and significantly less well educated than seronegative women or seropositive women with normal NP protocols. Neuropsychological performance discriminates HIV-seropositive from seronegative women, despite high and similar rates of substance abuse and psychiatric disorder for these groups.
Correspondence: *Eileen M. Martin, Department of Psychiatry (M/C 913), University of Illinois, 912 S. Wood Street, Chicago, IL 60612, USA.*

S.A. CASTELLON, C.H. HINKIN, E. GRANHOLM, S.S. ISHIKAWA, K.T. YAREMA, G. SIEGLE, & H. MYERS. Apathy and Effortful Attentional Processing in HIV-1 Infection.
Apathy is commonly observed in neurologic disorders which lead to disruption of frontal–subcortical circuits. Although apathy is a frequent manifestation of HIV-1 infection, to date it has received scant empirical scrutiny. The current study compared the neurocognitive performance of apathetic HIV-positive individuals ($N = 23$), nonapathetic HIV+ individuals ($N = 24$), and 21 HIV seronegative controls using computerized RT measures. On tasks which heavily engaged controlled attentional processing, apathetic HIV-positive participants were found to differ from both HIV-negative controls and nonapathetic HIV-positive subjects. These findings cannot be attributed to group differences in level of depression (which was treated as a covariate in all analyses). These results are consistent with the proposal that apathy may be a manifestation of HIV-associated frontal–subcortical disruption.
Correspondence: *Steven A. Castellon, Department of Psychiatry and Biobehavior Sciences, UCLA School of Medicine, 760 Westwood Plaza, Room C8-747, Los Angeles, CA 90024, USA.*

Symposium 9/1:30–3:20 p.m.

PATTERNS OF WAIS–III AND WMS–III PERFORMANCE IN SEVERAL SAMPLES OF INDIVIDUALS WITH NEUROLOGICAL DISORDERS

Organizer: D.S. Tulsky; Co-Chairs: D.S. Tulsky and M. Ledbetter

G. J. CHELUNE & THE BOZEMAN EPILEPSY CONSORTIUM. In Search of the Elusive Double Dissociation Between Auditory and Visual Memory Functions Among Temporal Lobectomy Patients: New Evidence with the Wechsler Memory Scale–III.
While verbal memory deficits following left temporal lobectomy (LTL) are almost universally reported in the literature, reports of visual memory deficits following right temporal lobectomy (RTL) are less consistent. Preliminary examination of differential memory deficits among 15 LTL and 12 RTL patients using the new Wechsler Memory Scale–III clearly demonstrates a double dissociation between side of surgery and both immediate and delayed Auditory and Visual Memory Indexes. Comparisons of

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

individual Auditory–Visual Memory discrepancy scores against population base rates from the WMS–III standardization sample also reveal differences in the incidence of statistically rare Auditory–Visual Memory discrepancies.
Correspondence: *Gordon J. Chelune, Section of Neuropsychology (P-57), Cleveland Clinic Foundation, 9500 Euclid Avenue, Cleveland, OH 44122, USA.*

D.S. TULSKY, J. ZHU, & C. VASQUEZ. Patterns of WAIS–III Subtests, IQ, and Index Scores in Samples of Individuals with a Variety of Neurological Disorders.
Several changes were made in the WAIS–III to enhance the usefulness in assessing lower functioning individuals. To demonstrate the utility of these changes, the WAIS–III was administered to small groups of individuals with Alzheimer's, Huntington's, and Parkinson's disease, Korsakoff's syndrome, and traumatic brain injury. Examinees in each of the clinical groups were matched on key demographic variables (e.g., age, education-level, sex, and ethnicity) with examinees from the WAIS–III–WMS–III standardization and their scores were compared on each of the WAIS–III subtests, Index Scores, and IQs. Both the pattern of scores within each of these groups and the pattern of differences between these groups differed. The Index Scores tend to be more sensitive than IQ scores and this session will highlight the differences between the IQ and Index Scores of the WAIS–III.
Correspondence: *D. Tulsky, The Psychological Corporation, 555 Academic Court, San Antonio, TX 78204, USA.*

J.M. GOLD, V.N. IANNONE, & R.W. BUCHANAN. The WAIS–III and WMS–III in Schizophrenia.
Recent neuropsychological studies of patients with schizophrenia have demonstrated a reliable profile of cognitive impairment including (1) a general decline from premorbid levels; (2) marked deficits in executive, memory, and attentional functions. The use of IQ and Index scores from the WAIS–III and WMS–III in the schizophrenia clinical validity sample ($N = 42$) confirms this profile including (1) a relative strength in the Verbal Comprehension factor; (2) relative weaknesses in processing speed and working memory consistent with prior evidence of attention impairment; (3) an equivalent impairment of both auditory and visual memory which is not amplified on delayed testing; (4) recognition memory 1 *SD* below normal controls. Thus the WMS–III–WAIS–III appears to provide for an impairment profile in schizophrenia consistent with recent studies using far more extensive testing batteries. Convergent validity data using other neuropsychological measures will be presented.
Correspondence: *J. Gold, Maryland Psychiatric Research Center, P.O. Box 21247, Baltimore, MD 21228, USA.*

D. TULSKY. Patterns of WAIS–III AND WMS–III Performance in a Variety of Clinical Groups.
To assess the clinical sensitivity and utility of the WAIS–III and the WMS–III, data were collected on several samples of individuals with a variety of neurological deficits. For these studies, examinees were matched on age, ethnicity, gender, and education level to individuals in the standardization sample. Sessions will describe the changes that were made to the instruments to make them more useful in clinical populations. Subtest and composite scores will be compared both within and across a variety of these clinical groups. Special sessions will be devoted to the functioning of WAIS–III and WMS–III in individuals with multiple sclerosis, schizophrenia, and those who have had a lobectomy to treat seizures for temporal lobe epilepsy. There are significant differences within each group on the various IQ, Index, and Composite scores, as well as different patterns of functioning on these scores between these clinical groups.
Correspondence: *D. Tulsky, The Psychological Corporation, 555 Academic Court, San Antonio, TX 78204, USA.*

R.A. BORNSTEIN. Patterns of Performance by Multiple Sclerosis Patients on the New Wechsler Memory Scale–III.
Multiple sclerosis (MS) is a relatively common neurological disorder of young and middle adulthood. Previous studies using the WMS and WMS–R indicate that many patients exhibit both verbal and nonverbal memory deficits. Preliminary analyses of the WMS–III primary indexes for 25 individuals with MS and 25 demographically matched normal controls clearly indicate both verbal and nonverbal memory deficits in the MS group. From 10 to 30% of the MS participants scored below 70 on most of the WMS–III indexes except the Working Memory Index and the Auditory Recognition Delayed Index. Contrary to some previous studies, individuals in this sample were more likely to perform in the impaired range on visual indexes than on the auditory indexes.
Correspondence: *R. Bornstein, 473 W. 12th Street, Columbus, OH 43200, USA.*

M.F. LEDBETTER. Evidence for the Clinical Utility of Selected WMS–III Supplemental Measures.
In addition to the WMS–III primary index configuration, a number of additional supplemental measures have been added to the scale. These additional measures include IQ–Memory discrepancy scores and four Auditory Process Composite Scores, which include Single-Trial Learning, Learning Slope, Retention and Retrieval. Preliminary analyses evaluating mean differences and base rate differences between several clinical groups and demographically matched normal controls indicate that these supplemental measures are sensitive to neuropsychological impairment. Furthermore, these supplemental measures provide clinically meaningful information beyond that obtained from the WMS–III Primary Indexes. The clinical utility of selected supplemental scores are illustrated both using group data and case studies.
Correspondence: *M. Ledbetter, The Psychological Corporation, 555 Academic Court, San Antonio, TX 78204, USA.*

Poster Session 5/1:30–4:00 p.m.

AGING-1

S.D. GARDNER & M.I. VRBANCIC. Is Retrieval Cuing Necessary to Elicit Age-Related Intrusion Differences?
Some studies have found intrusions to be more prevalent in old age and other studies have not found an increase in intrusions with advancing age. This may partly be a result of the method by which intrusions are produced; the presence of a retrieval cue may be necessary to elicit age-related differences. To test this theory, 65 young adults (*M* age = 23 years; range 18–34) and 65 older adults (*M* age = 72 years; range 61–83) were administered the California Verbal Learning Test. Young and older groups were compared on number of free-recall intrusions, cued-recall intrusions and recognition false positives they produced. Young and older groups did not differ in number of free-recall intrusions, but the older group did produce more cued-recall intrusions and recognition false positives than the young group.
Correspondence: *Sandy Gardner, Department of Psychology, University of Saskatchewan, Saskatoon, SK S7N 5A5, Canada.*

F. OSTROSKY, G. CASTILLO, M. PÉREZ, & M.A. BOBES. ERP Assessment of Semantic Memory in Normal Aging.
To assess the effects of normal aging on semantic analysis we examined the N400 component of event related potentials (ERPs) elicited during a picture semantic matching task in young, middle-aged, and elderly groups of neurologically intact subjects. With aging, the N400 effect was delayed in latency and showed marked changes in scalp distribution, younger subjects showed a wide spread activity with a left frontal maximum amplitude, while in middle-aged subjects frontal activity was more symmetrical; in elderly subjects, activity was restricted to right centroparietal regions. The N400 component was followed by a late positivity, which was also sensitive to incongruency (P600). This component was reduced in amplitude and delay in latency in the elderly group. The diminished activity at frontal leads of the N400 and reduced amplitude of the P600 may both be related to a diminished attentional allocation that may be associated to se-

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

lective neuronal loss. This data are consistent with theories of aging that had postulated a reduced working memory capacity, reduced or poorer control of attentional resources and less efficient inhibitory processes.
Correspondence: *Feggy Ostrosky-Solis, Department of Psychophysiology, National University of Mexico, Rivera de Cupia #110-71, Col. Lomas de Reforma, C.P. 11930, Mexico, D.F.*

T.F. KARL & M. SCHMITTER-EDGECOMBE. Relevancy and Reasoning: Changes Across the Lifespan.
Reasoning on familiar *versus* unfamiliar topics was investigated in older adults. Younger adults (age 18–28), young-old adults (age 58–69), and old-old adults (age 70–79) were asked three casual questions and prompted to provide casual theories, evidence in support of theories, counterarguments, alternative theories, and rebuttals. The three topics were either low (computer use), neutral (school failure), or high (adjusting to retirement) in relevancy for the older compared to the younger adults. Overall, the older adults performed at a lower level than the younger adults. However, topic interacted with performance revealing that the older adults performed relatively better in comparison to the younger adults on the topic of their highest relevancy (retirement). The results indicate a need to insure relevancy of topic when assessing older adults reasoning abilities.
Correspondence: *Tamra F. Karl, Department of Psychology, Washington State University, Pullman, WA 99164-4820, USA.*

A. SIMPSON & M. SCHMITTER-EDGECOMBE. Memory for the Content and Temporal Order of Performed Activities: Age Differences and Automaticity.
Age differences in the encoding of temporal order and content memory for activities was assessed. Seventy-two young adults (age 18–28), 72 young-old adults (age 55–71), and 72 old-old adults (age 71–93) were given tests of recall and temporal order following the completion of 10 cognitive tasks. Participants received one of three instructional sets (incidental, intentional, and intentional plus temporal order) designed to manipulate the extent of rehearsal at the time of encoding. The results revealed that memory for the content of activities is an effortful process that is dependent upon rehearsal and is sensitive to age changes. In contrast, temporal order memory for activities appears to be a rehearsal independent, but age-sensitive, form of episodic memory. Implications of the results for theories of automaticity are discussed.
Correspondence: *Maureen Schmitter-Edgecombe, Department of Psychology, Washington State University, P.O. Box 644820, Pullman, WA 99163, USA.*

T. GORANSON, H. TUOKKO, L. ROSENBLOOD, & R. FRERICHS. Serial Sevens: Age-Cohort Performances and Differences Between Older Persons With and Without Cognitive Impairment.
The serial subtraction of seven from 100 is a task purported to measure attention and concentration, and is interpreted by clinicians as having meaning when screening for cognitive impairment in elderly persons (e.g., Mini-Mental State Examination; CAMCOG). We examined the serial 7 performance of 1011 residents over 65 years of age in Victoria, British Columbia. Those with and without other evidence of cognitive impairment did not differ with respect to the number or types of errors made. Sensitivity and specificity of the measure was poor. Cognitively intact persons did not show more errors as a function of age and error types did not differ significantly by age. The use of this task as an indicator of cognitive impairment in older person does not appear warranted.
Correspondence: *H. Tuokko, Centre on Aging, University of Victoria, P.O. Box 1700, Victoria, BC V8W 2Y2, Canada.*

J.B. RICH & E.M. SVOBODA. Prospective and Retrospective Memory in Normal Aging.
Eight-two healthy, elderly subjects (*M* age = 74; *M* education = 12) completed a neuropsychological battery including four prospective memory (PM) tasks (requesting a red pencil and a hidden belonging, both event-based, laboratory tasks; making phone calls and mailing a letter, both time-based, naturalistic tasks) and two retrospective memory (RM) tests (immediate and delayed paragraph recall and list learning). Analyses revealed no incentive effect on PM performance and no significant correlations between the laboratory and naturalistic PM tasks. Among the laboratory tasks, performance differed as a function of meaningfulness. Demographic variables (i.e., age, education, and mental status) correlated significantly with performance on some PM measures. Performance on only one PM measure (red pencil) correlated with RM performance. The results suggest that PM is not a unitary function. Instead, it varies as a function of materials, task, and subject variables. This variability may account for discrepant findings in previous studies of PM and aging.
Correspondence: *Jill B. Rich, Department of Psychology, York University, 4700 Keele Street, North York, ON M3J 1P3, Canada.*

A.A. RIZZO, V.W. HENDERSON, G.A. MURDOCK, C.A. McCLEARY, & J.G. BUCKWALTER. Sex Differences on Mental Rotation Performance in Elderly Individuals.
Recently, interest in sex differences in cognitive performances of elderly subjects has emerged in the literature partly due to reports that women are more likely to develop Alzheimer's disease (AD) and women with AD are more severely impaired on certain cognitive tasks. For persons under age 65, the most consistent sex differences in cognitive performances are reported on the Mental Rotation Test (MRT) of spatial ability, a difference favoring males. The present study compared 15 male and 15 female nondemented elderly subjects (*M* age = 79.1 years) on the MRT and on a battery of neuropsychological tests where sex differences have been previously reported. Older males continued to display an MRT advantage and the verbal advantage of females on certain tests was not found in this sample.
Correspondence: *Albert A. Rizzo, Andrus Gerontology Center, University of Southern California, University Park, MC-0191,CA 90089, USA.*

I.C. FRIESEN, H. TUOKKO, & C.A. MATEER. Validation of the Prospective Memory Screening Questionnaire with Older Adults.
Prospective memory, or the memory for intended actions, has only recently received the attention of researchers interested in cognitive changes that occur with aging. Few psychometrically sound prospective memory measures are available that also allow variability in scores (i.e., most tasks are scored on an all or none basis resulting in limited variability in a sample thereby biasing statistical analyses). We validated the Prospective Memory Screening Questionnaire (PROMSQ; Sohlberg & Mateer, 1989) in a randomly selected sample of 612 older adults. The PROMSQ is a self-report questionnaire that queries individuals about retrospective and prospective memory functioning. Results indicated that it has two factors and good internal consistency. Discussion focuses on its useful in clinical and research settings with older adults.
Correspondence: *Ingrid Friesen, Department of Psychology, University of Victoria, Victoria, BC V8W 3P5, Canada.*

T. MARKEE, G. SWAN, D. CARMELLI, & A. LaRUE. Normative Data on the California Verbal Learning Test for a Group of Normal Older Adults.
The California Verbal Learning Test was administered to a sample of 1364 normal, independently living older adults. Separate normative data are presented for males and females stratified by age and education for eight commonly used CVLT subscores. The current data may aid in better characterizing and interpreting CVLT performance among healthy older adults.
Correspondence: *Taryn Markee, 1104 Main Street, Suite 500, Vancouver, WA 98660, USA.*

C.M. LEMSKY, G. J. CHELUNE, G.E. SMITH, T. J. FERMAN, & R. J. IVNIK. Detecting Clinically Relevant Memory Changes in Elderly Patients.
Detecting reliable changes in memory over time is pivotal in the diagnosis of dementia among elderly patients. Group norms do not inform the neuropsychologist of expected practice effects. In elders, the effects of normal aging should also be taken into consideration. A sample of 108 subjects from the well established Mayo Older Americans Normative Study was used to examine practice effects in the context of advancing age over three

test sessions 1 or more years apart. Findings suggest that there was a trend toward improvement from Testing 1 to Testing 2, which diminished in magnitude at the time of the third testing, and that there is an interaction between practice effects and the effects of aging for some memory measures.
Correspondence: *Carolyn Lemsky, Department of Psychiatry and Psychology, Cleveland Clinic Foundation, Cleveland, OH 44195, USA.*

J.G. BUCKWALTER, T.E. SEEMAN, K. KRATZ, P. LARSON, & A. VAN ROOYEN. Cognitive Performance and Cortisol Reactivity in Healthy Elderly Individuals.

Cortisol has been shown to be associated with hippocampal impairment in both animal and human studies. It has also been suggested to play a role in memory decline in elderly individuals. Cortisol is dramatically elevated in response to stress. We evaluated if cortisol reactivity during a stressful event was associated with cognitive performance in healthy elderly subjects. Cortisol reactivity was evaluated by obtaining repeated saliva samples during a cognitively challenging task. Neuropsychological performance was evaluated at a separate occasion. There were strong negative linear associations between cortisol reactivity and measures of verbal memory. No consistent associations were observed in other cognitive domains. We conclude that cortisol reactivity provides a useful method for evaluating the effects of cortisol on cognitive performance.
Correspondence: *J. Galen Buckwalter, Andrus Gerontology Center, University of Southern California, University Park, MC-0191, Los Angeles, CA 90089, USA.*

P.S. FASTENAU. Distortions in Regression-Based Norms: Effects of Age and Education Corrections Among Older Adults.

This study empirically tested Fastenau and Adams' concerns about using regression-based norms (RBN) to statistically correct for demographic influences. The widely used RBN system of Heaton, Grant, and Matthews was applied to scores for Trailmaking Test A & B, Boston Naming Test, and Wisconsin Card Sorting Test for 63 healthy older adults. Age influences on all four tests were virtually eliminated by the RBN. Education influences, on the other hand, were created by the RBN such that better educated elders were penalized by the norms on three of the four tests. These findings cast considerable suspicion on norms that are generated by statistical regression when there are not adequate numbers of people supporting each demographic cell.
Correspondence: *Philip S. Fastenau, Department of Psychology, LD 124, 402 N. Blackford Street, Indiana University and Purdue University, Indianapolis, IN 46202-3275, USA.*

K. LINDMAN, K.B. BOONE, I. LESSER, & B. MILLER. Does Estrogen Replacement Therapy Protect Cognitive Ability in Postmenopausal Women?

Neuropsychological evaluation of 60 healthy postmenopausal women suggested that use of estrogen replacement therapy (ERT) positively impacts verbal memory and verbal fluency. Specifically, significant group differences across ERT groups (ERT–no-ERT) and across the ERT duration group (0–36 years) were documented on both a verbal memory task and a verbal fluency task. Hierarchical regression analysis controlling for age and education confirmed that postmenopausal women on ERT perform significantly better than non-ERT postmenopausal women. Likewise, duration of ERT use significantly impacted the verbal memory and verbal fluency scores. Furthermore, when investigating the effect of length of ERT use in estrogen users only, on verbal memory task, a trend was found such that the length of ERT use was associated with better verbal memory scores.
Correspondence: *Kari Lindman, 3100 Riverside Drive, #102, Burbank, CA 91550, USA.*

S. WILKINS, K. WHITE, & J.L. CUMMINGS. Utility of the Neuropsychiatric Inventory in a Geriatric Medical Population.

The Neuropsychiatric Inventory (NPI) was assessed as a tool to evaluate psychiatric symptoms in a geriatric medical population. Patients included had intact cognitive abilities (MMSE $\geq$ 24, and no diagnosis of dementia), and no psychiatric history. The mean age was 76.65 years. Patients and their caregivers each rated the patient's psychiatric symptoms across 12 dimensions (delusions, hallucinations, agitation, dysphoria, anxiety, euphoria, apathy, disinhibition, irritability, aberrant motor behavior, sleep, and appetite). Patients and caregivers agreed in rating appetite disturbance and dysphoria as two of the most frequent and severe problems. However, it is noteworthy that patients were more likely to endorse sleep problems, while caregivers were more concerned about agitation and irritability.
Correspondence: *Stacy Wilkins, Psychology Service (116B), VAMC West Los Angeles, 11301 Wilshire Boulevard, Los Angeles, CA 90073, USA.*

L.T. CONNOR, L.K. OBLER, M.L. ALBERT, & A. SPIRO, III. Neuropsychological Profiles of Language Change in Adulthood.

A battery of neuropsychological tests of language was administered to adults ranging in age from 30 to 80, four times over a period of 13 years. All scores were normed to the 30-year-olds to facilitate comparisons across tests and age groups. Significant decline was obtained in several measures, most notably in short-term verbal memory (CVLT Trial 1 recall) and in lexical retrieval of nouns (Boston Naming Test) and verbs (Action Naming Test). Verb retrieval showed the most decline with age; 80-year-olds performed more than 3.5 standard deviations below the mean of the 30-year-olds. In contrast, measures of discourse production (words per theme and story ordering) did not show evidence of decline with age, nor did letter fluency (FAS) or category fluency (Animal Naming).
Correspondence: *Lisa T. Connor, VA Medical Center (12A), 150 S. Huntington Avenue, Boston, MA 02130, USA.*

S. SAWRIE, D. MARSON, & L. HARRELL. Empirical Methods for Evaluating Clinically Meaningful Neuropsychological Change in Older Adult Populations.

The evaluation of cognitive change over time in older adult populations presents several unique challenges. In any repeated testing paradigm, change scores are susceptible to the confounding effects of test instability, practice effect, and regression to the mean. Change scores for the older adult are confounded further by normal, age-related cognitive changes. The present study used two new methodologies to derive normative data that may be used in the evaluation of cognitive change over time in either (1) the individual older adult patient or (2) normal and neurologic geriatric populations. Twenty-three neurologically intact, community dwelling older adults were administered a comprehensive neuropsychological evaluation followed by retesting 1 year later. Using the *reliable change* (RC) methodology, adjusted RC cutoff values were derived for each of the 11 neurocognitive measures used in this study. Standardized regression-based change norms also were derived. These normative data allow the clinician to evaluate the magnitude of change on one or more variables along a common metric that controls for the reliability and stability of each measure. Case data illustrate how these methods provide an empirically grounded means of evaluating change in the individual older adult patient as well as normal and neurologic geriatric populations.
Correspondence: *Stephen M. Sawrie, University of Alabama at Birmingham, University Hospital, Department of Neurology, Jefferson Tower (1216), Birmingham, AL 35294, USA.*

M.C. NEWMAN, A.W. KASZNIAK, L. ALTHOFF-WEEKS, & R. GONGOLL. Aging and Spatial Memory: Filled *Versus* Unfilled Space.

Newman, Kaszniak, and colleagues studied aging and memory for an array of 36 objects in a 6×6 cell display. Healthy younger and older adults were equivalent on immediate free recall and recognition memory. Delayed item recall, and immediate and delayed spatial recall were impaired in the older group. In the current investigation, memory for filled *versus* unfilled space was also compared across age groups. Similar to previous studies, there were no group differences for immediate item free recall. Older adults were impaired on tasks believed to depend upon the medial temporal lobe memory system: spatial tasks and delayed tasks (both verbal and spatial). The older group demonstrated deficits in spatial memory, even when errors in the location of particular items was ignored.
Correspondence: *Mary C. Newman, National Center for Neurogenic Communication Disorders, Building 71, University of Arizona, Tucson, AZ 85721, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

B. NEWMAN, M.C. NEWMAN, & C.M. NEWMAN. Color, Spatial Memory and Aging.
Newman and colleagues reported that free recall for an array of objects was equivalent between age groups. However, the spatial memory of the older adults was impaired. The current study was designed to examine spatial memory for identical objects of different colors, and to determine whether particular colors, or classes of colors (standard, metallic, fluorescent, dark, light) would affect spatial memory. Results suggested that free recall on this task is preserved with age. Memory for the spatial arrangement of objects was impaired in older adults even when errors in the location of particular items was ignored. No class of colors appeared to differentially affect spatial memory, although group differences in performance with some individual colors were significant.
Correspondence: *Mary C. Newman, National Center for Neurogenic Communication Disorders, Building 71, University of Arizona, Tucson, AZ 85721, USA.*

R. PARKS, S. FRITZ, R. BECKER, J. MATTHEWS, T. SUNDERLAND, I. DALTON, G. PUTNAM, H. WEINGARTNER, G. LATHAM, & J. RADCLIFFE. Effects of Scopolamine on Shipley Institute of Living Scale in the Elderly.
Eight healthy elderly subjects were administered the Shipley Institute of Living Scale (SILS) in a double-blind placebo controlled study with scopolamine and saline solution. Cognitive testing commenced 24 hr after drug administration. Scopolamine produced significantly impaired performance for the SILS mean abstraction scores. However, verbal scores were not impaired. Scopolamine is a centrally-active antimuscarinic agent. Experimental findings with this agent generally produce a reversible, pharmacologically induced deficit in new learning. The overall pattern of our finding with the SILS performance demonstrates that cholinergic manipulation of executive functioning is impaired in normal subjects and perhaps may be useful in neuropharmacological modeling of dementia.
Correspondence: *Randolph W. Parks, Department of Psychiatry, Southern Illinois University School of Medicine, P.O. Box 19230, Springfield, IL 62794-9230, USA.*

DEMENTIA-5: COGNITION

K. BAYLES, T. AZUMA, R. CRUZ, C. TOMOEDA, J. WOOD, & E. MONTGOMERY. Gender Differences in Language of Alzheimer's Disease Patients Revisited.
Results of recent investigations suggest that Alzheimer's disease (AD) has a more deleterious effect on language in women than men. This intriguing finding motivated an analysis of the language performance of probable AD patients, equally divided as to sex, on a variety of language comprehension and production tests. Cross-sectional data were available for 63 probable AD subjects and longitudinal data were available for 26. Independent groups *t* tests were used with the cross-sectional data and repeated measures ANOVA was used with the longitudinal data. No significant differences between the performance scores of male and female subjects were obtained for either the cross-sectional or longitudinal data.
Correspondence: *Kathryn A. Bayles, National Center for Neurogenic Communication Disorders, University of Arizona, Tucson, AZ 85721-0071, USA.*

L.L. CHAPMAN & D.A. WHITE. Long-Term Memory Contributions to Short-Term Memory in Dementia of the Alzheimer Type (DAT).
Prominent deficits in long-term memory are a hallmark of DAT. It is therefore possible that the interplay between long and short term memory is disrupted. This issue was explored in three memory span experiments: (1) high *versus* low frequency words, (2) real words *versus* nonwords, and (3) words from heterogeneous *versus* homogeneous categories. Performance was evaluated in healthy young (YNG), healthy elderly (ELD), and very mild DAT individuals. The YNG spans were larger than the ELD, and the ELD spans were larger than the DAT, across all conditions. Group × Condition interactions in the ELD–DAT comparisons indicated that, even in the earliest stages of DAT, there may be a deficit in long-term semantic memory contributions to short term memory performance. This is consistent with previous research findings suggesting that the semantic knowledge structure may be disrupted in DAT.
Correspondence: *Desiree White, Box 1125, Department of Psychology, Washington University, St. Louis, MO 63130, USA.*

M. DIXON, D.N. BUB, S. LUPIEN, C. PAVATE, J. MALETTE, & N.P.V. NAIR. Selective Attention for Shape in Patients with Alzheimer's Disease.
A visual search task using computer generated shapes was administered to Alzheimer's patients to assess their selective attention capabilities. Subjects attempted to detect the presence or absence of a carrot-shaped target embedded in distractors sharing either one or two visual features with targets. For error rates, Alzheimer's patients performed similarly to controls when targets were present within arrays. When targets were absent Alzheimer's patients mistook distractors sharing two features for targets significantly more often than controls, and more often than distractors sharing only a single feature. The failure to correctly detect the absence of targets in arrays of visually similar distractors may suggest that Alzheimer's disease compromises the ability to retrieve from working memory the specific combinations of visual features which comprise a given object.
Correspondence: *Mike Dixon, Department of Psychology, University of Waterloo, Waterloo, ON N2L 3G1, Canada.*

R. SINHA, W. HEINDEL, & B. OTT. Category Learning and Recognition Memory in Alzheimer's Disease.
Groups of AD patients and controls were administered either (1) a category learning test in which subjects were exposed to forty distortions of a single prototype dot pattern and later asked to discriminate between new distortions from the same prototype and random dot patterns; or (2) a recognition memory test in which subjects were exposed to five different random dot patterns and later asked to distinguish the five old from five new patterns. AD patients displayed intact ability to classify novel prototype distortions from random patterns, but were significantly impaired in discriminating between old and new patterns. Category learning of dot patterns appears not to depend upon temporoparietal structures underlying AD patients' explicit or semantic memory deficits, but may involve changes within intact perceptual systems.
Correspondence: *Rashmi Sinha, Department of Psychology, Brown University, Providence, RI 02912, USA.*

A.B. SERODY, M.W. BONDI, A.S. CHAN, & D.P. SALMON. Inhibitory Processing Impairment in Alzheimer's Disease: Evidence from the Stroop Color-Word Test.
Inhibitory processes were investigated with the Stroop Color-Word Test in 57 elderly normal control (NC) participants, 52 patients diagnosed with probable Alzheimer's disease (AD), 16 patients diagnosed with Parkinson's disease (PD), and 8 patients diagnosed with Huntington's disease (HD). The AD patients were further divided into three subgroups (*mild*, *moderate*, or *severe*) on the basis of their dementia severity. AD patients produced larger Stroop interference effects than NC participants, although level of dementia severity did not appear to influence scores on the incongruent trial. Despite controlling for age and speed differences in color naming, HD patients also produced heightened Stroop interference effects. Overall, results support the notion that AD produces an impairment in inhibitory processing early in the course of the disease. In addition, increases in Stroop interference between AD and HD groups may reflect prefrontal cortical dysfunction that is common to both dementias. Increases in the interference effect may not become apparent in PD unless significant dementia has developed.
Correspondence: *M.W. Bondi, Department of Psychiatry, University of California San Diego School of Medicine, 9500 Gilman Drive, La Jolla, CA 92093-0949, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

P. J. BAYLEY, D.P. SALMON, M.W. BONDI, D.C. DELIS, L.A. HANSEN, & L. J. THAL. Comparison of the Serial Position Effect in Alzheimer's Disease (AD) and Dementia with Lewy Bodies (LB).
Individuals normally show better immediate recall of words from the primacy (beginning) and recency (terminal) regions of a list. We examined this effect in MMSE-matched, autopsy-confirmed AD ($N = 26$) and dementia with LB ($N = 11$) patients and normal controls ($N = 26$) using the California Verbal Learning Test. Recency effects, but not primacy effects were intact in AD patients. Dementia with LB patients with the LB variant (LBV) of AD performed identically to AD patients. Diffuse LB disease (DLBD) patients showed the opposite pattern with preserved primacy and impaired recency recall. Thus the memory deficit of LBV patients, like those of AD reflects a secondary memory deficit, whereas the performance of the DLBD patients may indicate a deficit in primary memory.
Correspondence: *Peter Bayley, Alzheimer's Disease Research Center, 9500 Gilman Drive #0948, La Jolla, CA 92093-0948, USA.*

P.M. BEESON & A.L. HOLLAND. Consistency of Naming Performance in Individuals with Aphasia and Alzheimer's Disease.
Naming impairments have been characterized as reflecting lexical access failures or degraded semantic knowledge. Whereas access problems may intermittently disrupt word retrieval, degraded semantic knowledge is more likely to result in consistent naming failures. To test the access *versus* semantic storage dichotomy as it relates to aphasia and Alzheimer's disease (AD), we examined response consistency on a confrontation naming task presented on 10 different days. The 20 subjects with aphasia and 20 subjects with AD did not differ significantly regarding overall naming ability, and contrary to our expectations, they showed similar patterns of response consistency. A frequency effect was observed for both groups, in that high frequency words were named correctly more often than low frequency words, and both groups significantly improved their naming performance over the repeated trials.
Correspondence: *Pelagie Beeson, National Center for Neurogenic Communication Disorders, P.O. Box 210071, University of Arizona, Tucson, AZ 85721, USA.*

J. ANDRIKOPOULOS. Greater Impairment on Visual Form Discrimination *Versus* the Facial Recognition Test in Alzheimer's Disease.
The present study examined whether greater impairment exists on visual form discrimination (VFD) relative to the Facial Recognition Test (FRT) in patients with Alzheimer's disease (AD). Thirty-three healthy control subjects were matched for age and education with 63 AD patients. The control group performed significantly better than did the AD group on both measures. VFD was failed more frequently than the FRT and the AD group. This dissociation was not observed in the controls. VFD is much more sensitive to the early effects of AD than is the FRT.
Correspondence: *Jim Andrikopoulos, Neuropsychology Clinic, 1750 48th Street, Suite 2, Des Moines, IA 50310, USA.*

N. JOHNSON, M. MAPSTONE, A. HAYS, & S. WEINTRAUB. Overt and Covert Shifts of Visual Spatial Attention in Alzheimer's Disease.
Patients with a clinical diagnosis of probable Alzheimer's disease (PRAD) and healthy, age-matched controls (NC) were tested on paradigms designed to measure visual spatial components of attention. Tasks required *covert* shifts of attention in response to peripheral targets which were preceded by cues that were either valid or invalid with respect to target location. When a central arrow was used as the cue, PRAD subjects showed a longer reaction time to invalid cues presented to the left hemispace (i.e., target appears in the right hemispace). The performance of our PRAD subjects was similar to performance of patients with bilateral cerebral infarcts showing a selective impairment in the ability to shift the focus of attention to the right hemispace.
Correspondence: *Nancy Johnson, Department of Psychiatry and Behavioral Sciences, Northwestern University Medical School, 320 E. Superior Street, Suite 11-557, Chicago, IL 60611, USA.*

B.A. OBER & G.K. SHENAUT. Repetition Priming for Words and Nonwords in Alzheimer's Disease.
Thirty probable Alzheimer's disease (AD) and 34 elderly normal (EN) individuals participated in a repetition priming experiment in which both familiar (words) and nonfamiliar (pronounceable nonwords) stimuli were utilized. The repetitions occurred between a *study* phase (an orthographic orienting task) and a *test* phase (a lexical decision task). Although the AD participants showed significantly longer overall RTs (and showed a significantly larger increase in RTs for nonword compared to word trials) than the EN participants, the repetition priming effect and the degree to which the repetition priming effect was reversed for nonwords (negative priming) *versus* words (positive priming) was unaffected by AD. Thus, this experiment shows normal performance on an implicit test of memory for repeated words and nonwords (the latter showing negative priming, due to the nonword familiarity effect) in AD.
Correspondence: *Beth A. Ober, Human Development, Department HCD, University of California, Davis, CA 95616, USA.*

C. DEPP, L. BIELIAUSKAS, & B. ROPER. Recognition *Versus* Recall of Memory in Cerebrovascular and Alzheimer Dementia.
Forty-one elderly patients with diagnosed probable Alzheimer disease (DAT) and 24 patients with cerebrovascular dementia (CVD) were administered the Hopkins Verbal Learning Test, the Delayed Word Recall Test, the Object Memory Test, and the Paired Associates Recognition Task. Both groups were equated on estimated IQ, MMSE score, and educational level. As hypothesized, patients with CVD had small but significantly lower scores on multiple recognition tasks with ambiguous or nonsignificantly different performance on recall tasks. Consistent with the literature, tests of recognition *versus* recall are supported as clinically useful in differentiating DAT and CVD in demented patients, though use of multiple measures appears necessary to establish convergent evidence.
Correspondence: *Linas Bieliauskas, Psychology Service (116B), VA Medical Center, Ann Arbor, MI 48105, USA.*

GENETICS-2

W. JONES, D. ANDERSON, J. REILLY, & U. BELLUGI. Emotional Expression in Infants and Children with Williams Syndrome: A Relationship Between Temperament and Genetics?
Williams syndrome (WS) is a rare genetically based disorder. Relative strengths in linguistic and social–affective communication stand in contrast to deficiencies in visuospatial processing. Currently, very little is known about development within the social–affective domain in WS; this study examines affective expression in young children with WS. Using structured and unstructured play situations, specific affective responses were elicited from WS children and controls matched for chronological and mental age. Results suggest that children with WS express less negative affect in a parental separation situation but not in other situations designed to elicit negative (or positive) affect. The fact that less negative affect is expressed in the separation task but not in the other tasks is provocative and raises questions regarding attachment, and possibly temperament, in children with WS.
Correspondence: *Wendy Jones, Joint Doctoral Program in Clinical Psychology, University of California at San Diego/San Diego State University, and The Salk Institute, 10010 North Torrey Pines Road, San Diego, CA 92107, USA.*

D. ALHADEFF, S. GOLD, & A. SCHWEIGER. Primary Progressive Aphasia as a Variant of Pick's Disease: Neurogenetic Components.
Describes a case of primary progressive aphasia in a 58-year-old man with a family history of amyotropic lateral sclerosis, Pick's, multiple sclerosis, and muscular dystrophy, primarily affecting the paternal side of the family. H.C. exhibited nonfluent speech, moderately impaired auditory comprehension, and impaired phonology. An MRI scan showed diffuse cortical atrophy. Given that the patient's parents were first cousins and the noted familial history of neurological disorders, it is suggested that there is a

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

genetic component underlying his present condition. In view of the more recent literature and the present case, it is suggested that the underlying pathology of Pick's, neuromuscular disorders, demyelinating diseases, and possibly other neurological degenerative disorders may have a common genetic component. Research implications are discussed.
Correspondence: *Deborah Alhadeff, Center for Cognition and Communication, 952 Fifth Avenue, Suite 1A, New York, NY 10021, USA.*

R. JUNG, R. YEO, & S. GANGESTAD. Developmental Instability Predicts Individual Variation in Verbal Memory Skill Following Caffeine Ingestion.
This study tested whether individual differences in developmental instability (DI), i.e., measurement of minor physical anomalies (MPAs) and fluctuating asymmetry (FA), would predict the magnitude of caffeine-induced verbal memory deficits. Participants were administered one version of the Rey Auditory Verbal Learning Test (RAVLT), given a caffeine dose, assessed for MPAs and FA, and given an alternate version of the RAVLT. Consistent with predictions, a composite of DI predicted the magnitude of caffeine-induced memory decrements. These results may have implications for the genetic underpinnings of individual differences in drug effects.
Correspondence: *Rex Jung, Department of Psychology, University of New Mexico, Albuquerque, NM 87131, USA.*

D. CZARNECKI. Amnesic Disorder in Acute Intermittent Porphyria.
Acute intermittent porphyria was precipitated in a 28-year-old woman by barbiturates administered during surgery. She was hospitalized for 2 months, during which she remained acutely confused. She was seen for neuropsychologic examination 6 months after onset, complaining of persistent short-term memory impairment, perseverative thinking, and confabulation. She could not function independently because of severe memory deficit. Results indicated normal intelligence, language, spatial processing, problem solving, and word fluency. Attention span was intact, as was procedural memory. However, intact immediate memory was contrasted with severely impaired delayed recall for both verbal and visual information, consistent with classic amnesic disorder.
Correspondence: *D. Czarnecki, Dent Neurologic Institute, 3 Gates Circle, Buffalo, NY 14209, USA.*

L. J. CERONE & W. F. McKEEVER. Failure to Support the Right Shift Theory's Relevance to Cognitive Abilities.
Annett proposes that persons with the three genotypes postulated in her "right shift" theory differ in their patterns of verbal and visuospatial abilities. Recently, she presented a system of hand preference classification based on preferences for specific Annett Handedness Inventory items, and presented data suggesting that this new method is predictive of verbal and visuospatial ability differences. We studied the verbal and visuospatial performances of 259 college students classified according to this new "marker" system of Annett. Contrary to Annett's theorizing, we found no relationship between the putative genotype marker and performances on any of the cognitive ability tests. Thus, we conclude that Annett's putative genotype marker has no relevance to these types of cognitive abilities.
Correspondence: *Louis J. Cerone, Department of Psychology, University of Toledo, Toledo, OH 43606, USA.*

M. JACOBSON, M. KANE, D.C. DELIS, C. LOFTIS, & T. DEMADURA. Neuropsychological Deficits in Late-Onset Metachromatic Leukodystrophy.
A number of neurologic diseases present with psychiatric symptoms. We present the case of a 24-year-old male with metachromatic leukodystrophy (MLD), a rare, autosomal recessive disorder resulting in demyelination of white matter in central and peripheral nervous systems. Because MLD has an insidious onset, psychiatric diagnoses typically precede identification of the disorder. This patient was initially diagnosed as schizophrenic and was referred for neuropsychological evaluation following complaints of memory difficulties. The assessment indicated a decline in premorbid IQ, and severe impairment in executive functioning, visuomotor ability, naming, and verbal learning and memory. The assessment resulted in a diagnosis of early-onset dementia of questionable etiology, and a referral for neurologic and neuroimaging tests. His resultant diagnosis of MLD was noteworthy in its atypical neuropsychological profile resembling a cortical dementia.
Correspondence: *Mark Jacobson, Psychology Service 116B, VA Medical Center, 3350 La Jolla Village Drive, San Diego, CA 92161, USA.*

T.T. LINEWEAVER, M.W. BONDI, J.H. DELA PENA, & K.L. LANGE. Metamemory Judgments, Memory Performance, and ApoE Genotype in Nondemented Older Adults.
Understanding the accuracy of older adults' self-reports of memory is an important starting point for any neuropsychological evaluation. This study explored relationships between metamemory and objective memory performance, and the role that ApoE genotype plays in self-perceptions of memory. Sixty-seven neurologically intact older adults completed tests of global cognitive functioning, working memory, and visuospatial memory. Results suggest that participants appear to be basing their self-perceptions of memory on changes in their global cognitive functioning, rather than on memory specifically. Global cognitive functioning influenced adults' perceived memory competence, whereas depressive affect was associated with perceived decline in memory and reports of memory problems. Knowledge of ApoE genotype significantly affected perceived memory competence and perceived decline in memory, despite the absence of significant differences between ApoE E4 carriers and noncarriers in objective test performance.
Correspondence: *Tara T. Lineweaver, UCSD School of Medicine, 9500 Gilman Drive, La Jolla, CA 92093-0949, USA.*

T.G.M. VAN ERP, P.J. MOBERG, T.D. CANNON, R.L. DOTY, B.I. TURETSKY, R.C. GUR, & R.E. GUR. Olfactory Functioning in Siblings Discordant for Schizophrenia and Healthy Controls.
Olfactory deficits in schizophrenia have been shown using olfactory identification, detection threshold, and memory measures. Recently, a genetic contribution to this deficit has been hypothesized. To test this hypothesis, olfactory identification, and sensitivity were measured in 13 schizophrenic probands, 13 unaffected full siblings, and 26 healthy, age- and sex-matched controls. The probands and siblings exhibited significant deficits in right nostril odor identification performance, relative to controls. The probands also exhibited a trend toward a left nostril odor identification deficit, relative to both siblings and controls. There were no differences in odor detection threshold sensitivity between any of the groups. The results support the hypothesis that impaired olfactory identification aggregates in the family members of schizophrenic patients and may serve as an indicator of genetic vulnerability to the disorder.
Correspondence: *Theo Van Erp, Department of Psychiatry, Hospital of the University of Pennsylvania, 10th Floor Gates Building, 3400 Spruce Street, Philadelphia, PA 19104, USA.*

C.L. FRANKLIN, S.S. MATSUYAMA, L.F. JARVIK, L.M. FISHER, & W.S. BROWN. Family History of Alzheimer's Influences Category Fluency Performance.
A decrease in category fluency, considered a frontal lobe characteristic, is often an early symptom of AD. This study compared two groups of individuals, one with a family history of Alzheimer's disease (*relatives*) and one without such a history (*controls*). After controlling for intellectual functioning, the groups were compared on measures that assess parietal–visuospatial functioning, and frontal–executive functioning. A significant group difference for category fluency [F (1,39) = 13.611, $p < .001$] was observed, the controls generated more words than the relatives; no other significant group effects were found. Although lower category fluency performance has been reported in AD patients, this study is the first to report impairment in first degree relatives of AD patients, even though these relatives were without symptoms of the disease.
Correspondence: *Christi Franklin, Fuller Theological Seminary, Graduate School of Psychology, Box 1292, Pasadena, CA 91182, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

CROSS-CULTURAL NEUROPSYCHOLOGY

J.A. OGDEN, E. COOPER, M. DUDLEY, G. McFARLANE-NATHAN, & L. TIPPETT. Culturally Appropriate Neuropsychological Assessment for New Zealand Maori.
Two studies were carried out to establish a core of neuropsychological tests culturally appropriate for New Zealand Maori from a low socioeconomic group, age 16 to 30 years (the group most likely to sustain head injuries). Performance of non-brain-injured Maori on common tests (e.g., WAIS–R subtests, WMS–R Logical Memory, Rey Figure) and on adaptations of tests were compared with published norms and with performance of White New Zealander comparison groups. Results showed that selected standard and adapted tests can be appropriately used for Maori especially if given in a culturally sensitive context. Some adapted tests are equally appropriate for Maori and White New Zealanders.
Correspondence: *Jenni A. Ogden, Department of Psychology, University of Auckland, Private Bag 92019, Auckland, New Zealand.*

F.W. UNVERZAGT, K.S. HALL, S.L. HUI, & H.C. HENDRIE. Normative Data on the CERAD Neuropsychological Battery in Elderly African Americans.
We present clinically useful normative data on a commonly used cognitive screening battery in an underrepresented sample. A total of 302 normal, community-dwelling, elderly African Americans were evaluated as part of a longitudinal study of the prevalence and incidence of dementia. Cognitive testing was conducted with the Consortium to Establish a Registry for Alzheimer's Disease (CERAD) Neuropsychology Battery. Education and age affected test performance to a relatively small degree (less than 15% of the variance). Sex accounted for less than 2% of the variance. Percentile distributions of CERAD subtest scores in this large sample of elderly African Americans should assist in identifying abnormal cognitive performance in clinical practice.
Correspondence: *Frederick W. Unverzagt, Department of Psychiatry, Indiana University School of Medicine, 550 N. University Boulevard, Suite 3124, Indianapolis, IN 46202, USA.*

F. OSTROSKY, A. ARDILA, M. ROSSELLI, C. GÓMEZ, S. JIMÉNEZ, A. ARAIZA, & X. GALLEGOS. NEUROPSI: Brief Neuropsychological Test Battery in Spanish with Norms by Age and Educational Level.
The purpose of this research was to develop, standardize, and test the reliability of a short neuropsychological test battery in the Spanish language. This neuropsychological battery was named "NEUROPSI." It was especially developed to assess a wide spectrum of cognitive functions including, orientation, attention, memory, language, visuoperceptual abilities, and executive functions. The NEUROPSI has standardized procedures for both administration and scoring, it includes items that are culturally sensitive and relevant for the Spanish speaking community, and it can be applied to illiterates and low educational groups. Administration time is 25 to 30 min. Normative data in a 800-monolingual Spanish speaking subject sample from 16 to 85 years of age are presented. Four age groups were used: (1) 16–30 years, (2) 31–50 years, (3) 51–65 years, and (4) 66–85 years. In each age range, four different educational levels were taken: (1) illiterates (0 years of school), (2) low educational level subjects (1–4 years of school), (3) middle educational level (5–9 years of school), and (4) high educational level (10–24 years of formal education). The effects of age and education, as well as factor structure, common and specific subtest content, interrater and test–retest reliability are analyzed.
Correspondence: *Feggy Ostrosky-Solis, Department of Psychophysiology, National University of Mexico, Rivera de Cupia #110-71, Col. Lomas de Reforma, C.P. 11930, Mexico, D.F.*

D.F. TATE, J. J. GILBERT-TATE, & E.D. BIGLER. Berry's Test of Visual–Motor Integration and the Test of Nonverbal Intelligence: A Comparison Among School Children in India.
This study of 347 children ($M = 206$, $F = 142$) from India with a mean age of 84.5 months compared the performance scores on Berry's Revised Developmental Test of Visual–Motor Integration (VMI) with scores on the Test of Nonverbal Intelligence (TONI–2). Average standard scores for the VMI and the TONI–2 were 113.05 ($SD = 13.69$) and 88.89 ($SD = 14.37$) respectively which are significantly different from the standardized normal data (VMI $t = 17.75$, $p < .001$; TONI–2 $t = -14.41$, $p < .001$). There is also a significant correlation between VMI and TONI–2 performances ($r = .30$, $p < .005$) but they remain significantly different ($t = 22.68$, $p < .000$). This study also shows a significant sex difference with female performance higher than male performance (VMI $t = -2.54$, $p = .005$; TONI–2 $t = -2.22$, $p = .01$). Some cultural and educational explanations are used to interpret the differences.
Correspondence: *David F. Tate, Department of Psychology, Bringham Young University, 1001 SWKT, Provo, UT 84602, USA.*

J. CHEY, S. LEE, S. PARK, & E. PARK. Development of Norms for the Korean–Dementia Rating Scale.
Normative data of the elderly population (age of 55–84 years) has been collected for the Korean–Dementia Rating Scale. Norms were established to aid accurate diagnosis and valid indexing of severity for the Korean dementia population. It would be the first dementia tool to be normed for the Korean dementia population. It was hypothesized that the performance of the Korean population would be different from that of the U.S. counterpart, mainly due to their difference in language, culture, and the years of formal education. One hundred twenty-two normal elderly from the Seoul-Kyungki area participated in the study. Sampling was stratified based on the age, sex, and education to be representative of the elderly population of the Seoul-Kyungki area.
Correspondence: *Jeanyung Chey, Department of Psychology, Sungshin Women's University, Seoul 136-742, Korea.*

S. HOLLIDAY, R. BREY, & A. ESCALANTE. Cognitive Functioning and Psychiatric Symptoms in Lupus and Rheumatoid Arthritis: Bilingual Assessment with a Primarily Hispanic Sample.
Previous research suggests increased rates of cognitive impairment and psychiatric morbidity in patients with systemic lupus erythematosis (SLE). Our previous work using MicroCog found significant rates of cognitive impairment among our predominantly Hispanic SLE patients compared to matched controls drawn from Psych Corp's national database; but many of our patients were unable to take MicroCog due to English–reading limitations. This pilot study used nonverbal tests from the Automated Neuropsychological Assessment Metrics (ANAM) and the Brief Symptom Inventory (BSI) to evaluate 20 primarily Hispanic SLE patients and compared them with 20 age-education matched Rheumatoid Arthritis (RA) patients recruited from the same low-income rheumatology clinic. All patients were able to reliably take ANAM. Using published cutting scores, SLE patients were impaired on more ANAM tests than RA controls. However, only ANAM's digit comparison task significantly differed between the study groups. SLE patients tended to report more distress on BSI anxiety and somatic scales. For both groups, BSI measures of global distress, anxiety, and depression were significantly correlated with many ANAM summary and subtest scores. ANAM with bilingual instructions proved helpful in testing our Hispanic SLE patients but RA patients may not be good controls for SLE patients in our setting.
Correspondence: *Steve Holliday, Psychology Service (116B), 7400 Merton Minter, San Antonio, TX 78284, USA.*

L. SMITH-SEEMILLER & M.D. FRANZEN. Relationship Between Children's Cultural Background and Performance on the Test of Nonverbal Intelligence–2.
The Test of Nonverbal Intelligence–2 (TONI–2) provides a measure of intelligence that is not heavily loaded with motoric, language, or cultural factors. It can be administered within 15 min. Thus, in addition to providing an assessment of intelligence that is not culturally biased, it may be an ideal measure when time constraints or limited cooperation make more comprehensive assessment impractical. In this study we present preliminary data comparing the performance of African American and White children on the WISC–III and TONI–2. We found differences between the two

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

groups on the WISC–III, whereas TONI–2 scores did not differ significantly. Small sample size and lack of external validity data are limiting factors in this study, however additional research on the utility of the TONI–2 for minority children is warranted.
Correspondence: *L. Smith-Seemiller, Department of Psychiatry, Allegheny General Hospital, 4 Allegheny Center, 8th Floor, Pittsburgh, PA 15212-5234, USA.*

D.I. NYENHUIS, P.B. GORELICK, S. FREELS, & D.C. GARRON. Cognitive and Functional Decline in African Americans Diagnosed with Vascular Dementia or Stroke Without Dementia.
We report on rate of cognitive and functional decline in African Americans diagnosed with vascular dementia (VaD; $N = 71$) or stroke without dementia (SWD; $N = 52$), and followed with annual examinations for 4 years. Diagnoses were based on neuroimaging, neurological examination, neuropsychological examination, and epidemiologic interviews. An annual rate of change score for each of four dependent measures (MMSE, Blessed, a principle component score summarizing neuropsychological test findings, and the Barthel) was computed as the least squares estimate of the slope across time for each patient. We found that (1) VaD, but not SWD patients showed consistent cognitive and functional decline; and (2) VaD patients declined significantly more than the SWD patients. We comment on the potential source(s) of decline in patients diagnosed with VaD.
Correspondence: *David Nyenhuis, Center for Stroke Research, Rush-Presbyterian-St. Luke's Medical Center, 1645 West Jackson, Suite 400, Chicago, IL 60612, USA.*

M. ROSSELLI, A. ARDILA, F. OSTROSKY, K. JARAMILLO, M. PADILLA, V. STANDISH, L. BERRIO, & J. PALOMINO. Verbal–Motor Interference in Spanish–English Bilinguals.
Verbal–motor interference in 20 early and 20 late Spanish–English bilinguals was analyzed. All bilinguals had a normal score on both the Spanish and English BNT versions. Twenty English monolinguals were used as controls. The verbal–motor interference task used required the subject to generate Spanish and English words while (1) tapping, (2) writing, and (3) drawing. The monolingual subjects were tested in the motor tasks while saying words in English. No significant differences between the early bilinguals and the monolinguals were observed. Significant differences were observed between the two bilingual groups in most conditions.
Correspondence: *M. Rosselli, Florida Atlanti University, Miami Institute of Psychology, UNAM, Mexico, D.F.*

PEDIATRICS 6: DEVELOPMENT

L. KLENBERG & M. KORKMAN. Development of Attention and Executive Functions: Two Main Developmental Trends.
The study investigated the normal development of attentional control and executive functions. Four hundred 3–12-year-old subjects were studied with attention and executive function tests from the 1997 NEPSY, measuring impulse control and inhibition of irrelevant responses, sustained auditory and visual attention, maintaining response set, visual search, planning, and verbal and visual fluency. In attention tests, performance improved until the age of 6–8 years and the interindividual variation of performance was particularly large in younger age groups. In executive function tests of organized search–production, the development continued until the age of 10–12 years and the variation of performance increased with age. The measures clustered into four factors with attention and executive function tests loading on separate factors, giving further support to developmental separation between attentional and executive functions.
Correspondence: *Liisa Klenberg, Rehabilitation Center Larmis, Hietalahdenkatu 3 A, 00180 Helsinki, Finland.*

K.H. NIELSEN, A.E. MORGAN, G.W. HYND, & J.R. HIEMENZ. Atypical Planum Temporale Asymmetry in Children with Highly Significant PIQ > VIQ WISC–III Splits.
This study examines three consecutive cases of children who have Performance Intelligence Quotients (PIQ) that are 17–21 points greater than their Verbal Intelligence Quotients (VIQ). Two right-handed females with diagnoses of reading disabilities and one right-handed male with a diagnosis of attention deficit hyperactivity disorder were found to have reversed asymmetry of the planum temporale. Measurements included length of the left and right planum temporale and right and left intrahemispheric coefficients for temporal and parietal banks. This finding does appear consistent with other studies in that asymmetry patterns of the planum temporale may be meaningfully related to selected verbal and nonverbal cognitive abilities.
Correspondence: *Kathleen Nielsen, Center for Clinical and Developmental Neuropsychology, 570 Aderhold Hall, University of Georgia, Athens, GA 30602, USA.*

A.H. CODY, M.C. KRAL, J.R. HIEMENZ, & G.W. HYND. Sylvian Fissure Morphology in Dyslexics and Their Parents.
Witelson and Kigar's classification system for categorizing three subtypes of Sylvian fissure morphology was used on a group of dyslexic children ($N = 10$) and their biological parents ($N = 20$). Comparisons were made for both the right and left hemispheres on the frequency of the Sylvian fissure subtypes recorded in the children and their parents. Chi-square analysis indicated that similarities exist between child and parent Sylvian fissure subtypes, which would support a familial basis for brain gyral development patterns. Given the genetic and neuroanatomical evidence that exists for dyslexia, this study provides an example of an *in vivo* classification technique that may be important in future research. Further investigations of brain morphology are needed to successfully establish familial trends utilizing brain imaging techniques.
Correspondence: *Heather Cody, Center for Clinical & Developmental Neuropsychology, 570 Aderhold Hall, University of Georgia, Athens, GA 30602, USA.*

G. MORRIS, M. ALCORN, V. REVILLA, & B. MUTTER. Interrelationships Among P200 Slope, Recognition Accuracy, and Intelligence in Children and Adolescents.
A correlation between measures of intelligence and N150–P200 event-related potentials has been recently established in several independent laboratories. A backward masking task is employed to elicit these ERPs. This task also yields a measure of inspection time (IT), an index of time dependent perceptual threshold. In children and adolescents, the backward masking task elicits N150–P200 slope–Ravens correlations which change with age and may reflect underlying cortical development.
Correspondence: *Grant Morris, Department of Psychology, University of Northern Colorado, Greeley, CO 80639, USA.*

S. ARCHIBALD, K. KERNS, & J. SALTZMAN. Executive Functions in Childhood: Support for Regional Specialization.
Evidence suggests that executive functions develop in childhood and can be partitioned based on their association with distinct regions of the prefrontal cortex. Normative–developmental executive function performance was investigated in 89 children, age 6–12 years. Executive function measures were developed and selected to show a developmental progression and to differentiate between dorsolateral (self-ordered pointing; delayed alternation–nonalternation) and orbitomedial (developmental Stroop tasks; go–no-go) prefrontal zones. Principal components analysis (PCA) with orthogonal rotation revealed three well-defined factors (orbitomedial, dorsolateral, and IQ) supporting the hypothesized relation between executive functions and specific regions of the prefrontal cortex. Utilizing regression analysis, age accounted for a significant amount of the variance in both orbitomedial and dorsolateral factors.
Correspondence: *Sarah Archibald, Department of Psychology, University of Victoria, Victoria, BC V8W 3P5, Canada.*

A.B. CLINTON, J.M. KROESE, A.E. MORGAN, & G.W. HYND. Is Reversed Planum Temporale Asymmetry Associated with Language Impairment?
This study classified 19 children of below-average composite, receptive, and expressive linguistic skills and planum temporale asymmetry variables. Children with below average language scores displayed signifi-

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

cantly higher rates of reversed planar asymmetry (R > L = 68%) than typical asymmetry patterns (L > R = 21%), and rare occurrences of symmetry (10%). These findings present a complete shift from normative asymmetry expectations and suggest that reversed planum temporale asymmetry interferes with language development processes.
Correspondence: *Amanda B. Clinton, Center for Clinical and Developmental Neuropsychology, 570 Aderhold Hall, University of Georgia, Athens, GA 30602, USA.*

M. RELIN, J. REILLY, & D. ANDERSON. Emotional Representation and Identification in 4- to 7-Year-Old Children with Focal Lesions.
Research on brain damaged adults suggests that the right hemisphere plays a critical role in the representation of emotion and recognition of affective facial expression. In this study, we compared affective expression identification and emotional representation in 20 children with unilateral pre- or perinatal focal lesion brain damage (FL) with 42 age-matched controls using the Affective Judgment Questionnaire. Although right and left hemisphere damaged children did not differ, the FL group as a whole gave fewer on-target responses than normals in both identification and representation tasks and generally used more immature reasoning strategies. Both groups improved over time, although the FL group was delayed by two to three years. Together, these results suggest a link between identification and representation skills and reflect early neuroplasticity in emotion and linguistic performance.
Correspondence: *Mahri Relin, San Diego State University, 6363 Alvarado Court, #221, San Diego, CA 92120, USA.*

S.S. AMANO, K.M. HAGELTHORN, A. KHATCHIKIAN, R. ASARNOW, & W.S. BROWN. Hemispheric Integration, Bilateral Field Advantage, and Reading Ability.
Performance of complex cognitive tasks such as reading is thought to be related to callosal development and hemispheric integration. This study compared the bilateral field advantage (BFA) in a visual letter matching task (a measure of hemispheric integration) to the Woodcock–Johnson Tests of Achievement–Revised in 38 normal children age 7–17. There was a significant correlation between letter word identification in the WJ–R and BFA (calculated for reaction time). In a stepwise regression, 36.5% of the variance in BFA was related to reading ability after adjusting for age and IQ. This finding implies that the corpus callosum contributes to reading performance via efficient integration of visual information between the hemispheres, and that aspects of bilateral performance that are related to age are not the same as those contributing to reading ability.
Correspondence: *Warren S. Brown, Travis Institute and Fuller Graduate School of Psychology, 180 N. Oakland Avenue, Pasadena, CA 91101, USA.*

D. ZELINSKY, E. SHAPIRO, & C.A. NELSON. ERP Correlates of Sustained Attention in 2-Year-Old Children.
This study recorded event-related potentials (ERPs) to explore the neurophysiological processes that underlie sustained attention in very young children. ERP data were collected from 2-year-old children during a modified oddball task in which novel and familiar slides were presented. Analyses of variance provided support for the association between sustained attention and right frontal brain activity, in the form of a mid-latency negative component that was greatest to the novel stimuli and maximal at the right frontal cortex. Correlations between ERP response and measures of behavior and temperament revealed a unique relation between ERP response at the right, prefrontal area of the scalp and performance on an attentional measure that assessed vigilance. The results support the utility of a multimodal approach to neuropsychology that incorporates neurophysiological and behavioral measures.
Correspondence: *Davida Zelinsky, Department of Pediatric Neurology, University of Minnesota, Box 486 FUMC, 420 Delaware Street, S.E., Minneapolis, MN 55455, USA.*

R.D. JONES & D. TRANEL. Severe "Associative" Developmental Prosopagnosia in a Child with Superior Intellect.
To date there have been 2 cases of developmental prosopagnosia studied during childhood described in the scientific literature, both of which had significant "aperceptive" features. Here a third case of developmental prosopagnosia is presented. Similar to previous cases, the patient was intellectually gifted (FSIQ = 130), but with a marked discrepancy between verbal and nonverbal abilities (VIQ = 140, PIQ = 110). In the context of extensive experimental investigation, the patient's face recognition defect was found to be more of the "associative" type, in which visual perception was relatively preserved, whereas overt face recognition was severely impaired. Covert recognition of familiar faces based on an autonomic index was normal, as were judgments of gender and facial expression. Associations of this condition with superior intellectual abilities, a possible relation to nonverbal (right hemisphere) learning disabilities, and parallels with the literature on acquired prosopagnosia in adults are discussed.
Correspondence: *R.D. Jones, Department of Neurology, Univesity of Iowa Hospitals and Clinics, Iowa City, IA 52242, USA.*

Presidential Address/5:00–6:00 p.m.

PRECLINICAL PREDICTION OF ALZHEIMER'S DISEASE

Marilyn Albert

SATURDAY MORNING, FEBRUARY 7, 1998

Paper Session 12/9:00–10:40 a.m.

HEMISPHERIC ASYMMETRY-2

L.M. FOSTER, C. RICCIO, G.W. HYND, A.E. MORGAN, & M. VAUGHN. Planum Temporale Asymmetry and Ear Advantage in Dichotic Listening.
This study examined the relationship between planum temporale asymmetry and ear advantage in dichotic listening. The expected relationship between planum temporale asymmetry and ear advantage on the dichotic listening task was not found. Subjects who displayed an atypical left-ear advantage on the dichotic listening task tended to have larger right bank areas than those who displayed a typical right-ear advantage. There was also a positive correlation between the size of the supratentorial area and having a left-ear advantage and a negative correlation between the size of the supratentorial area and the Dichotic Listening Index. Finally, leftward temporal bank and leftward total planum asymmetry positively correlated with expressive language ability for all subjects. Thus, overall planum morphology appears to be more associated with language ability than with ear advantage in auditory processing.
Correspondence: *Lori M. Foster, Center for Clinical and Developmental Neuropsychology, 570 Aderhold Hall, University of Georgia, Athens, GA 30602, USA.*

M. IACOBONI, J. RAYMAN, & E. ZAIDEL. Contextual Facilitation in Sensorimotor Integration.
Contextual information modulates receptive field neuronal activity in visual cortical areas. It has been proposed that contextual modulation may be a common principle of cortical computation. Here we report contextual

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

modulation in simple (detection) reaction times (RT) to lateralized flashes in normal right handers. Typically, reaction times (RT) to two light flashes are faster than RT to a single light flash. This is called the redundant target effect. In a first experiment, we observed that RT to two light flashes (239 ms) presented simultaneously were faster ($p = .03$) than RT to two light flashes (245 ms) presented with stimulus onset asynchrony (SOA) of 30 ms. In a second experiment, we mixed in the same block, trials with a single light flash and trials with two light flashes, presented either simultaneously or with SOA. RT to single stimuli (251 ms) mixed with simultaneous redundant targets were faster ($p = .003$) than RT to single stimuli (255 ms) mixed with asynchronous redundant targets. This suggests that contextual facilitation is an important mechanism in sensorimotor integration and may be a general operating principle of brain functions. In particular, performance in discrete trials in psychological experiments is affected by performance in surrounding trials.
Correspondence: *Eran Zaidel, UCLA Department of Psychology, 405 Hilgard Avenue, Los Angeles, CA 90095-1563, USA.*

V. J. ROBERTS, E. McCLURE, & S. NOWICKI. Emotional Prosody Recognition and Right Hemisphere Functioning in the Elderly.
The current study examined the effect of aging on recognition of emotional prosody. The relationship between accuracy of emotional prosody recognition and performance on neuropsychological measures of right and left hemisphere functioning was also examined. Analyses revealed that elderly adults were significantly less accurate at identifying emotional prosody relative to college- and middle-aged adults. When affective valence was considered, the three groups performed comparably on recognition of positive emotional prosody. In contrast, the elderly adults were significantly less accurate in their recognition of negative emotional prosody. Elderly adults with poorer prosody performance also demonstrated poorer performance on neuropsychological tasks designed to assess right hemisphere functions. These findings lend support to the hypothesis of a relative right hemisphere decline with age.
Correspondence: *Vicki June Roberts, Emory University School of Medicine, Department of Neurology, 1841 Clifton Road N.E., Atlanta, GA 30329, USA.*

S.B. WASSERMAN, J.C. BOROD, & W.A. WINNICK. Memory for Emotional and Neutral Words in Patients with Unilateral Brain Damage.
This study tested two competing neuropsychological theories of emotion (right hemisphere hypothesis *vs.* valence hypothesis) by examining how the emotionality effect (better memory for emotional stimuli) is altered after lateralized cortical brain damage. Memory for positive, negative, and neutral words was investigated in 20 right-brain-damaged, 20 left-brain-damaged, and 20 neurologically healthy subjects. Gender, caudality of lesion, and temporal-lobe involvement were also examined. All three groups showed enhanced memory for emotional material on free recall and recognition tasks, but not on cued sentence recall. Neither valence effects nor support for lateralization of emotional memory were found. There was some indication that bilateral frontal and right hemisphere nontemporal areas may facilitate the emotionality effect, perhaps through contributions to cortical arousal.
Correspondence: *Stacy Berrin Wasserman, 31 Runyon Place, Scarsdale, NY 10583, USA.*

C. CIMINO, H. BELANGER, & T. BORGATTI. Visual Field Effects in Close *Versus* Distant Semantic Priming.
The purpose of this study was to investigate the hypothesis that lexical–semantic organization is qualitatively different in the left and right hemispheres at the single word level. To determine whether the left hemisphere is better able to process strong semantic association and the right hemisphere better able to process weak association, a lexical decision task was employed using weak strong and neutral prime–target pairs (PTP) which were operationally defined based on single word association norms. Findings revealed no visual field differences in response to strong primes. However, weak primes were responded to significantly better in RVF. These findings do not support the hypothesis proposed but rather suggest that when semantic associations are weak the left hemisphere is more capable than the right of benefiting from that association.
Correspondence: *Cynthia R. Cimino, Department of Psychology BEH-339, University of South Florida, Tampa, FL 33620, USA.*

A.M. PASSAROTTI, M.T. BANICH, & C. CHAUDHARI. A Hemispheric Asymmetry in the Degree of Interference from Stimuli in an Unattended Visual Field.
We demonstrated that interference from distractors in an unattended field is modulated by attentional demands in the LVF, but not the RVF. On all trials, two hierarchical figures were presented, one in each visual field. A simultaneously presented cue indicated to which visual field the participant should attend. On some trials, participants responded to the global aspects of the figure and on other trials, the local aspects. Interference from the unattended RVF was greater when the hierarchical figure presented in the attended LVF is incongruent at the global and local levels (which is more attentionally demanding) rather than congruent. Furthermore, the greatest interference from RVF stimuli occurred when the information in that visual field conflicted at the unattended level with information in the LVF.
Correspondence: *Alessandra Passarotti, Department of Psychology and the Beckman Institute, University of Illinois at U-C, Champaign, IL 61820, USA.*

Paper Session 13/9:00–10:40 a.m.

FRONTAL LOBES-1

A.P. SHIMAMURA, C.Y. CHEN, & J.V. BALDO. Impairment in Memory Retrieval But Not Semantic Space in Patients with Frontal Lobe Lesions.
Frontal lobe lesions impair memory retrieval on tests of verbal fluency and remote memory. These deficits could be attributed either to poor retrieval strategies or to degraded knowledge. To address these possibilities, we assessed verbal fluency and semantic knowledge in patients with dorsolateral prefrontal lesions. The fluency tests involved letter (F, A, S) or category cues (animals, occupations, fruits). Semantic knowledge was assessed using a multidimensional scaling technique (INDSCAL) in which subjects' knowledge of animals could be analyzed. In this test, subjects were presented animal names and asked to determine which two animals were most closely related. Patients with frontal lobe lesions exhibited impaired retrieval on both letter and category fluency tests. However, their representations of animals were comparable to those obtained from control subjects.
Correspondence: *Arthur P. Shimamura, Department of Psychology, University of California, Berkeley, CA 94720-1650, USA.*

A. SCHNIDER, R. PTAK, & K. GUTBROD. Long-Term Follow-Up of Spontaneous Confabulators: Recovery of Temporal Context Memory.
We have previously demonstrated that spontaneous confabulations and disorientation in the early stage of amnesia reflect a confusion of the temporal context of information acquisition in memory rather than an inability to store new information, executive failures or a tendency to fill gaps in memory (*Brain* 1996; *119*: 1365–1375, 1627–1632). We now followed up 6 previous spontaneous confabulators after 12 to 24 months. Only one was still confabulating. Using the same experiment as in the original studies to determine temporal context confusion (TCC) in memory (comparison of two runs of a continuous recognition tasks), we found that among several measures, solely TCC followed a course parallel to the clinical course: In all but the only patient who continued to confabulate, TCC had recovered or considerably improved. Our results underscore the contention that a confusion of the temporal context of information acquisition in memory fully accounts for spontaneous confabulations.
Correspondence: *Armin Schnider, Neurologische Universitätsklinik, Inselspital, CH-3010 Bern, Switzerland.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

E.R. SOWELL & T.L. JERNIGAN. Relationships between Frontal Lobe Maturation during Adolescence and Performance on a Test of Visuospatial Memory Functioning.
Eight girls and 11 boys (age 8–16 years) underwent brain magnetic resonance imaging and were given the Rey–Osterrieth Complex Figure Test (ROCF). Morphometric analyses of frontal (FL) and mesial temporal cortices revealed age-related volume reductions in both regions and a significant right greater than left FL asymmetry. Regression analyses indicated a significant relationship between delayed visuospatial memory abilities and maturing FL cortex, and this finding did not appear to be mediated by chronological age. This result was expected given earlier findings of a relationship between delayed verbal memory and FL grey matter maturation. Delayed memory on the ROCF was also correlated with FL asymmetry. Specifically, children with larger right relative to left FL were better able to remember the ROCF over a delay.
Correspondence: *Elizabeth R. Sowell, UCLA School of Medicine, Laboratory of Neuroimaging, 710 Westwood Plaza, Room 4-238, Los Angeles, CA 90024-1769, USA.*

K.D. CICERONE. Working Memory and Shifting Attention in Relation to Frontal Lobe Perseverative Behavior.
The nature of cognitive dysfunction after frontal lobe damage was examined with a working memory task which required attention to multiple stimulus attributes. Subjects with unilateral frontal lobe lesions with or without perseverative behavior were compared with subjects with posterior lesions. Frontal-perseverative subjects attended to significantly fewer stimulus attributes than either frontal-nonperseverative or posterior subjects, with no difference between the latter groups. There was no influence of positive *versus* negative feedback on performance. The results suggest that ability to simultaneously attend to multiple stimulus attributes, rather than inability to shift attention after negative feedback, is related to perseverative behavior after frontal-lobe lesions. These may represent dissociable aspects of the central executive system of working memory.
Correspondence: *Keith D. Cicerone, Division of Neuropsychology, Neuroscience Institute, JFK Medical Center, 2048 Oak Tree Road, Edison, NJ 08820, USA.*

A.W. KASZNIAK, S.L. REMINGER, S.Z. RAPCSAK, & E.L. GLISKY. Subjective Experience and Autonomic Response to Emotional Scenes in Patients with Frontal Lobe Damage.
Skin conductance response (SCR) and subjective ratings of valence and emotional arousal were recorded during the viewing of emotionally salient scenes in 8 patients with frontal lobe damage and 10 healthy controls. In comparison to controls, the patients showed a lack of SCR differentiation in response to neutral *versus* negatively or positively arousing visual stimuli, and also showed a corresponding lack of differentiation in subjectively experienced arousal. However, these same frontally-damaged patients showed valence ratings similar to those of controls. This suggests that both sympathetic autonomic response and the experience of emotional arousal (but not the determination of emotional valence) are dependent upon the integrity of frontal brain systems.
Correspondence: *Alfred W. Kaszniak, Department of Psychology, University of Arizona, 1503 E. University, Tucson, AZ 85721, USA.*

K.B. BOONE, B. MILLER, & A. LEE. Cognitive Profiles in Right *Versus* Left Frontotemporal Dementia.
Patients with frontotemporal dementia (FTD) associated with asymmetric right *versus* left frontotemporal hypoperfusion show relatively distinct cognitive profiles. Patients with "right" FTD show more marked deficits in PIQ and in executive skills tied to right frontal lobe functioning (Picture Arrangement, Tangled Lines, WCST perseverative responses, design fluency < word generation). In contrast, patients with "left" FTD show greater deficits in VIQ and language–word-retrieval tasks (Boston Naming Test, Vocabulary, Information), as well as worse performance on tasks related to left frontal lobe functioning (word generation < design generation). Memory performance and constructional skill did not differ between groups. These data indicate that FTD should not be viewed as a unitary disorder, and that neuropsychological testing holds promise for the differential diagnosis of right *versus* left FTD.
Correspondence: *Kyle Boone, Department of Psychiatry, Harbor–UCLA Medical Center, Box 498, 1000 W. Carson Street, D-5 Annex, Torrance, CA 90509, USA.*

Symposium 10/9:00–10:40 a.m.

MILD HEAD INJURY IN CHILDREN AND ADOLESCENTS

Organizer and Chair: Roger Light

R. LIGHT. Mild Head Injury (MHI) in Children and Adolescents.
The symposium seeks to clarify some of the current controversy regarding the immediate and long term effects of MHI in children and adolescents on neurobehavioral functioning. Recent studies will be presented that capture the diversity of methodologies and results. The discussant (PS) will attempt to integrate this information and other recent studies that followed the *Psychological Bulletin* review of this literature (1970–1994) by Satz et al. The symposium will also address what is not yet known in this area and offer suggestions regarding future research.
Correspondence: *Roger Light, Daniel Freeman Memorial Hospital, 333 N. Prairie Avenue, Inglewood, CA 90301, USA.*

K.M. ZAUCHA, R. LIGHT, R. ASARNOW, P. SATZ, & C.A. McCLEARY. Risk Factors and Preinjury Characteristics of Children/Adolescents with Mild Injuries.
Certain factors are known to predispose children and adolescents to accidental injuries. Many studies of pediatric mild head injury fail to measure preinjury factors or exclude subjects on the basis of critical preexisting factors occurring more frequently in injury populations. This presentation will review the incidence of factors reflected in the accident-prone pediatric population and present findings from the UCLA Studies of Mild Closed Head Injury in Children and Adolescents representing 137 mild head injured, 132 other injured and 114 noninjured children age 8 to 16 years. A nonsignificant trend of preinjury difficulties was found in both injury groups *versus* the noninjury group. The head injury group had a significantly great incidence of hyperactivity, attention deficit disorder, learning problems, and general school problems. Methodological considerations involving preinjury factors will be addressed.
Correspondence: *Kenneth M. Zaucha, UCLA Neuropsychiatric Institute, 760 Westwood Plaza, Los Angeles, CA 90024, USA.*

R. ASARNOW, R. LIGHT, K. ZAUCHA, & P. SATZ. Neuropsychological and Behavioral Outcomes after Mild Head Injury in Children and Adolescents.
Neuropsychological and academic outcomes and behavior problems were assessed in large cohorts of children with mild closed head injury, mild accidental injuries not involving the head and a group of children who had not incurred an accidental injury. Neurobehavioral outcomes were assessed at 1, 6, and 12 months postinjury. The neuropsychological tasks (measuring attention, memory, executive and motor functioning) measured functions most vulnerable to the effects of a mild closed head injury. Children and adolescents admitted to emergency rooms with mild closed head injury do not show clinically significant neuropsychological impairments, impaired academic performance, or an increased rate of behavior problems postinjury. Fundamentally different conclusions would have been reached had preinjury level of functioning not been controlled for.
Correspondence: *Robert F. Asarnow, Department of Psychiatry, UCLA School of Medicine, Room 48-240C, NPI, 760 Westwood Plaza, Los Angeles, CA 90024, USA.*

K.O. YEATES, J. LURIA, H. BARTKOWSKI, J. RUSIN, L. MARTIN, E.D. BIGLER, S.C. JOHNSON, & C. ANDERSON. Postconcussive Symptoms in Children with Mild Closed-Head Injuries.
To study postconcussive symptoms (PCS) following mild CHI, we prospectively recruited 26 children with mild CHI and 8 of their siblings, between 8 and 15 years old, from a hospital emergency room. Children with mild CHI underwent MRI and neuropsychological testing within 7 days of injury and 3 months postinjury. Ratings of PCS were elicited at both occasions, with baseline ratings intended to assess premorbid status. Siblings completed the same procedures except for MRI. Children with mild CHI did not differ from siblings in baseline ratings of PCS. After controlling for baseline ratings, they displayed significantly higher ratings on several cognitive and somatic symptoms at the 3-month assessment. Children who showed increases in PCS displayed poorer neuropsychological test performance at the baseline assessment compared to those who did not show increases in PCS and to siblings. Children who showed increases in PCS also demonstrated smaller white matter volumes on MRI than those who did not show increases in PCS, and the differences became somewhat larger over time.
Correspondence: *Keith O. Yeates, Department of Psychology, Children's Hospital, 700 Children's Drive, Columbus, OH 43205, USA.*

J. DONDERS. Neurobehavioral Screening and School Reentry after Mild Head Injury in Children and Adolescents.
Cases of mild head injury (MHI) constitute the largest proportion of acquired trauma in children and adolescents. Comprehensive neuropsychological assessments are neither necessary nor cost-effective with the majority of these students. However, a substantial minority of them do experience neurobehavioral inefficiencies in the first weeks or months after injury. This presentation will review time- and cost-efficient ways to identify, prior to school reentry, students with MHI who may be at risk for complicated neurobehavioral outcome. Issues pertaining to selection of assessment measures, as well as collaboration with local acute care hospital staff, will be emphasized. In addition, a model will be presented regarding the formation of consultation and transition teams in local school districts to facilitate service delivery to students with MHI.
Correspondence: *Jacques Donders, Psychology Service, Mary Free Bed Hospital, 235 Wealthy S.E., Grand Rapids, MI 49503, USA.*

R.S. PARKER. Reducing Missed Children's Traumatic Brain Injury Through Wide-Range Neurobehavioral Assessment.
A high proportion of children's traumatic brain injury (TBI) are not recognized in the acute or chronic phases for lack of alertness to a head injury or its effects, narrow range of procedures, and premature diagnosis. Guidelines are offered for a multi-discipline, wide-range examination including neuropsychological and medical components. Assessment includes records to determine the baseline, observation, interview of collaterals, and a wide range of qualitative and psychometric procedures. Information is elicited from domains such as sensorimotor, intelligence (structured and unstructured situations), information processing, personality, memory, and achievement. Delay of outcome assessment is pending study of late developing dysfunctions: cognitive, endocrine, emotional, neurological, personality, medical, and adaptive. More precise assessment reduces the incidence of missed TBI, enhances the delivery of services, and sensitizes the community to issues of safety.
Correspondence: *Rolland S. Parker, 50 West 96th Street (9C), New York, NY 10025, USA.*

Poster Session 6/9:00 a.m.–12:00 p.m.

PARKINSON'S AND RELATED CONDITIONS

K.K. ZAKZANIS & L. LEACH. Neuropsychological Deficits in Progressive Supranuclear Palsy.
Meta-analytic methods were used to determine the selectivity and magnitude of neuropsychological deficit in progressive supranuclear palsy (PSP) from studies dating back to 1984. The results from 151 patients with PSP and 233 healthy controls were calibrated using effect size analysis (d). The results indicate that neuropsychological tests most sensitive to discriminating PSP patients from healthy controls included the Dementia Rating Scale, Purdue Pegboard (bilateral measure), Stroop, Trails A and B, WAIS–R Performance IQ index, and Wisconsin Card Sorting Test (categories achieved). The neuropsychological deficits associated with these specific tests are distinguished by large effect sizes ($d > 3.0$) whereby most patients can be discriminated from healthy controls. Moreover, the deficit presentation of PSP suggests left-frontal executive function.
Correspondence: *Konstantine K. Zakzanis, Department of Psychology, Baycrest Center for Geriatric Care, 3560 Bathurst Street, North York, ON, M6A 2E1, Canada.*

G. VINGERHOETS, CH. VAN DER LINDEN, J. CAEMAERT, V. VANDEWALLE, & E. LANNOO. Cognitive Changes after Unilateral Stimulation of the Globus Pallidus Internus (CPi) for Treatment of Refractory Parkinson's Disease (PD).
Twenty patients with advanced PD received unilateral chronic stimulation of the GPi. Patients were neuropsychologically evaluated during the "on" phase of medication 2 months before surgery, and with the stimulator "on" 3 months after stimulator implantation to evaluate its effect on 12 cognitive measures. We calculated an impairment index representing the percentage of cognitive measures that fall 1 standard deviation below the mean of a corresponding normative sample. The mean preoperative impairment ratio was 36.6% (*SD*: 17.1%). The average postoperative impairment measured 37.9% (*SD*: 22.4%). This difference is not significant. Individual analysis showed a cognitive decline in 8 cases (40%). Patients who perform cognitively worse after pallidal stimulation are significantly older [$t(18) = -3.97$, $p = .001$], and receive higher preoperative doses of levodopa [$t(18) = -2.57$, $p = .02$]. Pallidal stimulation appears relatively safe, although some patients appear to be more vulnerable for postoperative cognitive decline.
Correspondence: *Guy Vingerhoets, Department of Psychiatry and Neuropsychology, University of Ghent, De Pintelaan 185, B-9000 Ghent, Belgium.*

S. HSIEH, C.Y. LEE, W. J. HWANG, & M.C. PAI. Source Monitoring in Parkinson's Disease.
Three experiments are reported that investigated the ability of Parkinson patients to remember the characteristics of conditions under which a memory was acquired. In Experiment 1, participants were required to indicate for each item in a surprise memory test whether it was spoken by Experimenter 1, by Experimenter 2, or it was a new item (external–external source monitoring). In Experiment 2, participants had to indicate for each item whether it was generated by themselves, by the experimenter, or it was a new item (internal–external source monitoring). In Experiment 3, participants had to judge whether an item was generated by themselves in saying, in thinking, or was a new item (internal–internal source monitoring). We found that patients with Parkinson's disease were impaired in all three kinds of source monitoring as compared to the age-matched control groups. In addition, the difference in scores of source monitoring between Parkinson and control groups was not eliminated when provided distinctive cues, i.e., perceptual cues in Experiment 1 and different-domain cues in Experiment 2. The implications of these results will be discussed.
Correspondence: *Shulan Hsieh, Department of Psychology, National Chung Cheng University, 160 San-Hsing, Ming-Hsiung, Chia-Yi, Taiwan, R.O.C., 621.*

D.A. CAHN, E.V. SULLIVAN, P.K. SHEAR, G. HEIT, & G. SILVERBERG. Contributions of Cognitive and Motor Component Processes to Independent Functioning in Parkinson's Disease.
Patients with Parkinson's disease (PD) become dependent upon caregivers because their motor and cognitive disabilities interfere with their ability to carry out activities of daily living (ADLs). However, PD patients display diverse motor and cognitive symptoms, and it is not yet known which are most responsible for ADL dysfunction. The purpose of this study was to identify the contributions that specific cognitive and motor func-

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

tions make to ADLs. Executive functioning, in particular sequencing, was a significant independent predictor of instrumental ADLs whereas simple motor functioning was not. By contrast, simple motor functioning, but not executive functioning, was a significant independent predictor of performance ADLs. The identification of selective relationships between motor and cognitive functioning and ADLs may ultimately provide a model for evaluating the benefits and limitations of different treatments for PD.
Correspondence: *Edith V. Sullivan, Department of Psychiatry & Behavioral Sciences, Stanford University School of Medicine, Stanford, CA 94305, USA.*

J.A. LUCAS, M. J. FINTON, R. J. UITTI, & R.E. WHAREN. Differential Effects of Left *Versus* Right Pallidotomy on Neurocognitive Functioning in Parkinson's Disease.
Studies of neurocognitive sequelae of pallidotomy have to date yielded inconsistent results. In the present study, 32 patients with Parkinson's disease were administered a battery of neuropsychological measures at baseline and 3 months following left ($n = 24$) or right ($n = 8$) pallidotomy. Results revealed significant declines on measures of generative naming and cognitive flexibility following left pallidotomy, but not following right pallidotomy. In contrast, nonverbal memory performance improved following pallidotomy, regardless of side of surgery. Results provide evidence for a measurable neurocognitive decline following pallidotomy, but only when performed on the left side. The specific cognitive changes following left medial pallidotomy provide further insight into the role of the globus pallidus and associated frontal subcortical pathways in cognitive functioning.
Correspondence: *John A. Lucas, Department of Psychiatry and Psychology, Mayo Clinic Jacksonville, 4500 San Pablo Road, Jacksonville, FL 32224, USA.*

J. SALTZMAN, E. STRAUSS, M. HUNTER, & S. ARCHIBALD. The Impact of Normal Human Aging and Parkinson's Disease on Theory of Mind.
The majority of research in theory of mind (TOM) has focused on young children or individuals with autism, although some recent investigations have looked at TOM in some neurologic and psychiatric populations (e.g., autism, schizophrenia). The proposed common connection between these groups is some degree of frontal dysfunction, often detected by measures of *executive function*. This study investigated the effects of both normal human aging and Parkinson's disease on TOM. We also examined the relationship of TOM performance to measures of executive function and social decentering. The results suggested that a decline in TOM ability occurs with normal human aging and that this decline is magnified by the onset of Parkinson's disease. TOM performance was related to both executive function and some aspects of social decentering. The implications for our understanding of the brain mechanisms underlying TOM as well as the impairments of Parkinson's disease are discussed.
Correspondence: *Jennifer Saltzman, Department of Psychology, University of Victoria, P.O. Box 3050, Victoria, BC V8W 3P5, Canada.*

T.L. DEMADURA, D.C. DELIS, M. JACOBSON, C. LOFTIS, J. STRICHER, & D.P. SALMON. Differential Deficits in Conceptual Shifting in Patients with Alzheimer's Disease and Parkinson's Disease.
Recent studies suggest that Alzheimer's disease (AD) and Parkinson's disease (PD) patients demonstrate qualitatively different deficits in shifting of visual attention. We investigated whether or not this dissociation also occurs on a higher-level task involving shifts in conceptual analysis. Patients were asked to classify numbers as either "even" or "odd." AD patients were faster on the second of two consecutive trials when the type of abstraction remained the same (e.g., "odd"–"odd"), whereas they were markedly slower on the second of two consecutive trials when the type of abstraction changed (e.g., "odd"–"even"). In contrast, the PD patients showed the opposite pattern. These findings suggest that AD patients exhibit delayed shifts in conceptual analysis, whereas PD patients exhibit rapid shifts in conceptual analysis. In addition, these findings parallel the patient groups' qualitatively distinct deficits in shifting of visual attention.
Correspondence: *Theresa Demadura, 664/116B, Veteran's Administration Medical Center, San Diego, 3350 La Jolla Village Drive, San Diego, CA 92116, USA.*

H. KATZEN, B. LEVIN, & B. KLEIN. The Influence of Side of Onset and Predominant Motor Symptoms on Memory Performance in Parkinson's Disease.
The present study examined the influence of lateralization of symptom onset and predominant motor symptom on memory performance in Parkinson's disease (PD). One hundred and seventeen patients with idiopathic PD were administered a verbal learning and a figural recognition task. A 2×2 factorial analysis of covariance (ANCOVA) showed main effects for side of disease onset on all measures of verbal learning. Specifically, patients who developed PD symptoms on the left side of their body showed more impairments on the verbal learning task than patients who developed symptoms on the right side of their body. Our findings indicate that lateralization of symptom onset, and not predominant motor symptom is related to memory impairment in PD. We believe these deficits reflect a breakdown in the right hemisphere's capacity to monitor and regulate higher order cognitive functions.
Correspondence: *Bonnie Levin, Division of Neuropsychology, Department of Neurology, 1150 N.W. 14th Street, Suite 715, Miami, FL 33136, USA.*

R.I. MESHOLAM, P. J. MOBERG, R.N. MAHR, & R.L. DOTY. Olfaction in Neurodegenerative Disease: A Meta-Analysis of Olfactory Functioning in Alzheimer's and Parkinson's Disease.
The presence of olfactory deficits in Alzheimer's disease (AD) and idiopathic Parkinson's disease (PD) has been well established by researchers over the past decade. Using meta-analytic procedures, the present work sought to clarify and review this literature by evaluating the evidence for this dysfunction in three olfactory domains including odor identification, recognition, and detection threshold. As expected, severe deficits were found for both AD and PD patients in each of the three olfactory domains relative to healthy elderly individuals. However, no discriminating olfactory deficits were seen between the patient groups nor amongst the three measured olfactory domains, suggesting a similar dysfunction in olfactory brain regions between patients with these two neurodegenerative diseases.
Correspondence: *Raquelle I. Mesholam, Brain-Behavior Laboratory, Department of Psychiatry, 10th Floor, Gates Building, Hospital of the University of Pennsylvania, 3400 Spruce Street, Philadelphia, PA 19104, USA.*

G.G. BROWN, S. J. BROWN, J. CHRISTENSON, C. LOFTIS, & C. SHULTS. Normal Priming on Neely's Paradigm in Parkinson's Disease.
Two previous studies published from our laboratory reported abnormally large magnitudes of lexical priming on a modification of Neely's (1977) category priming task among patients with Parkinson's disease (PD). However, in both studies twice as many word targets were presented as nonwords. In this study equal numbers of word and nonword targets were presented. PD patients demonstrated the same amount of lexical priming as controls in all conditions. Further, PD patients in this study showed significantly less liberal, word–response biases following category primes than did PD patients in our other two studies. In addition to lexical determinants of PD performance on lexical decision tasks, features of task structure appear to contribute importantly to the magnitude of priming.
Correspondence: *Gregory G. Brown, San Diego VA Healthcare System, 3350 La Jolla Village Drive, San Diego, CA 92161, USA.*

DEMENTIA-5: HUNTINGTON'S DISEASE

B. J. DIAMOND, J. DeLUCA, S.K. JOHNSON, A. RUBIN, S.M. KELLY, & S. GROSS. Processing Speed, Memory and Executive Function in Huntington's Disease.
Huntington's disease (HD) is characterized by impairments in memory, executive functions, and information *processing speed*. The key aim of

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

this study was, therefore, to measure visual processing speed and its relationship to memory and executive function using the Visual Threshold–Serial Addition Test (VT–SAT). Subjects consisted of 13 patients with Huntington's disease and 12 healthy matched controls. HD patients (M = 2.87 s, SD = 1.4) showed slower visual processing speed than controls (M = 1.4, SD = .55). Moreover, intact and impaired processing HD groups were found. Interestingly, while memory and executive function were related to processing speed, neither could predict speed of processing. Importantly, the data suggest that speed of processing may be a sensitive differentiator of levels of cognitive impairment in HD.
Correspondence: *Bruce J. Diamond, Kessler Institute, Department of Research, 1199 Pleasant Valley Way, West Orange, NJ 07052, USA.*

A.K. TROYER, J.B. RICH, F.W. BYLSMA, & J. BRANDT. Verbal Fluency Switching but Not Clustering Is Related to Severity of Huntington's Disease.
Huntington's disease (HD) is associated with disruptions of frontal–subcortical pathways and impaired performance on tests with major executive components such as verbal fluency. We examined clustering (i.e., generating words within subcategories) and switching (e.g., shifting between subcategories) in phonemic fluency performance among 72 HD patients and 41 normal controls. HD patients were impaired on switching but not on clustering. Among HD patients, switching but not clustering was highly correlated with severity of neurologic impairment and was moderately correlated with global cognitive functioning. These results extend previous findings of verbal fluency performance with other populations suggesting that switching depends on the integrity of the frontal–subcortical system whereas clustering relies on temporal-lobe functioning.
Correspondence: *Angela Troyer, Rotman Research Institute of Baycrest Centre, 3560 Bathurst Street, North York, ON, M6A 2E1, Canada.*

P. MAKI, F.W. BYLSMA, & J. BRANDT. Conceptual and Perceptual Implicit Memory in Huntington's Disease.
Current perspectives posit that frontal lobe dysfunction underlies impairment on tests of conceptual implicit memory (CIM). This predicts impaired CIM in Huntington's disease (HD). Sixteen patients with HD and 16 healthy controls completed structurally parallel conceptual and perceptual implicit tests, namely category and rhyme exemplar generation tests. HD patients showed significant impairment in generating rhymes, and this impairment correlated significantly with severity of neurological impairment. They also showed impaired priming on the implicit rhyming test, but not on the implicit category test, as well as impaired explicit and source memory. The normal performance of HD patients on the category exemplar generation test suggests that frontal lobes do not mediate CIM.
Correspondence: *Pauline M. Maki, Department of Psychiatry, Division of Medical Psychology, Meyer 218, 600 North Wolfe Street, Baltimore, MD 21224, USA.*

L.M. PHILPOTT, O.V. KOPYOV, M.C. YANG, L. DOW, S. JACQUES, K.S. EAGLE, & G. BUCKWALTER. Neuropsychological Functioning and MRI-Based Striatal Volume Measurements in Huntington's Disease (HD).
The present study examines the relationship between one index of striatal degeneration, based on striatal volume, and cognitive abilities reported to be impaired in HD. Fourteen HD patients were administered a comprehensive neuropsychological battery and MRI. Significant correlations were found between the index of striatal degeneration and measures of word generation, visuoperceptual and visuospatial ability, and visual–nonverbal memory. The preliminary data suggest a strong relationship between striatal degeneration and several cognitive abilities reported to be affected early in HD. Future investigations will compare changes in neuropsychological test scores with increased striatal volume posttransplantation of human fetal striatal tissue.
Correspondence: *Linda M. Philpott, Director of Neuropsychology, Neuroscience Institute, Hospital of the Good Samaritan, 1245 Wilshire Boulevard, Suite 801, Los Angeles, CA 90017, USA.*

FRONTAL LOBES-2

D. FUJII, J. SLAY, H. MORSE, J. De VIVA, C. SYKORA, & D. CHAN. Exceeding Working Memory Capacity: Can Frontal-Lobe-Type Memory Deficits Be Induced in Normal College Students?
This study examined the Just and Carpenter model of working memory deficits which states that memory deficits occur when the information to be recalled exceeds the amount of activation in working memory. It also investigated whether memory deficits similar to those found in individuals with frontal lobe dysfunction can be simulated in college students by taxing the capacity of working memory. Subjects in control, experimental, and ADHD groups were administered the CVLT. In the experimental condition, the CVLT was administered in the context of a divided attention task. Results indicate that the experimental and ADHD groups earned significantly weaker scores across the five trials, but scored equally well on the recognition trial. Significant results were also found for discriminability and false positive responses on the recognition trial. Trends were found for total number of intrusions and semantic clustering. Clinical implications and areas for future research were discussed.
Correspondence: *Daryl Fujii, Department of Neuropsychology, Hawaii State Hospital, 45-710 Keaahala Road, Kaneohe, HI 96744, USA.*

M.L. VAUGHN, C.A. RICCIO, G.W. HYND, & L.M. FOSTER. Executive Dysfunction in Aggression: Is the WCST Assessing Executive Functioning or Verbal Mediation?
This study compared aggressive (N = 46) and nonaggressive (N = 50) children on measures of language and executive function. Group differences were not obtained on the Executive functions factor but were obtained on a Language factor. Results showed that CELF–R Receptive language scores and maternal ratings of Aggression best predicted WCST Categories Achieved and Perseverative Errors. Because Receptive language served as a better predictor than measures of executive function or behavior, there is certainly a component of verbal mediation in those two tasks. Only PIQ predicted WCST Failure to Maintain Set, which suggests that nonverbal ability also plays a role. No variables significantly predicted WCST Cognitive Index scores. Thus, the WCST does seem to be assessing some aspect of verbal mediation. While undeniably associated as a component of executive processes, it does appear that measures of receptive language best discriminate children with impulse control deficits.
Correspondence: *George W. Hynd, School of Professional Studies, University of Georgia, Athens, GA 30602, USA.*

L. GODBOUT & C. BOUCHARD. Involvement of the Frontal Lobe in Processing Time and Space Components of Schematic Organization of Knowledge.
Eleven patients with frontal lesion and 12 control subjects were tested on a script generation task in which the spatial and temporal contents of the scripts were manipulated in two conditions: routine (forward sequence) and nonroutine (backward sequence). Subjects were also administered two tests that provided estimates of their capacity to manipulate knowledge in a space or a time frame. Patients displayed typical sequence and perseverative errors when asked to generate scripts in a backward sequence, regardless of the nature of the information. They also showed a lower performance on both temporal and spatial tests. The results suggest a generalized organization deficit in frontal lesion patients, especially when the difficulty of the task was increased (nonroutine). Results are discussed within Shallice's theoretical framework (SAS).
Correspondence: *Lucie Godbout, Dép. de psychologie, UQTR, C.P. 500, Trois-Rivières, QC G9A 5H7, Canada.*

B. BETZ, J. DUNKIN, A.F. LEUCHTER, & E. WITTE. Utility of the Modified Wisconsin Card Sorting Test in Detecting Cognitive Changes Associated with White Matter Lesions.
Measures of executive functioning, including the Modified Wisconsin Card Sorting Test (MWCS), Controlled Oral Word Association Test (COWAT), and the Shipley Abstractions Test (SAT), were administered to subjects

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

free from depression, cerebrovascular risk factors, neurological impairment, and dementia. All subjects underwent magnetic resonance imaging, after which scans were segmented and total white matter lesion (WML) volumes were calculated. While significant negative correlations were found between total WML volume and performance on the COWAT and SAT, no significant correlations were found between WML volume and MWCS variables. Further, subjects with the highest level of WML volume performed at a level comparable to that of low WML volume counterparts on all aspects of the MWCS. Results indicate that the MWCS lacks the sensitivity necessary to detect mild deficits in executive functioning associated with diffuse white matter lesions.
Correspondence: *Brian Betz, 910 Alfred Street #5, Los Angeles, CA 90069, USA.*

G.R. J. CHRISTOFFERSEN, A.V. GROTH, L. MARSTRAND, J.B. NIELSEN, & L.E. NIELSEN. Analysis of Frontal Event-Related Potentials Associated with Anticipation of Auditory Perception.
Event-related potentials measured during expectation of future perception have been described as "stimulus preceding negativity" (SPN) measured in delay tasks with temporal separation between movements and stimuli. In order to eliminate motor contributions to SPN, a purely perceptual delay task was presently employed: A warning tone was followed 3 s later by a second tone. Anticipatory attention to the second tone was upheld during recording sessions by using two frequencies in a target–nontarget oddball paradigm and asking subjects to silently count the target tones. The results showed SPN beginning 800 ms before the second tone and reaching $-6\ \mu$V just before the tone. A spatial amplitude gradient of increasing SPN was observed in the posterior–anterior direction from Cz toward Fp1 and Fp2.
Correspondence: *Gert Christoffersen, Neuroscience Centre for Cognition and Memory, August Krogh Institute, University of Copenhagen, Universitetsparken 13, DK-2100 Copenhagen, Denmark.*

C. BOULET & F. RICHER. Frontal Lesions and Fluctuations in Response Preparation.
This study examined the effects of frontal lesions on fluctuations in response preparation. We compared 8 patients with a unilateral frontal excision to 8 patients with a temporal excision and 8 controls in three keypressing tasks in which the response was specified in advance and the subject waited for a command to respond. The response signal was presented after either (1) a short unpredictable delay (1–1.5 s), (2) a long unpredictable delay (4.75–5.25 s), or (3) a long delay filled with a countdown cuing the arrival of the response signal. Frontals showed normal error rates and normal average response times (RT) in all tasks. However, they showed abnormally high variability in RT in the two unpredictable preparation tasks with no delay effect. This excessive variability disappeared in the presence of a countdown. The data indicate that abnormal fluctuations in response preparation characterize rapid discrete responses in frontals and these fluctuations can be compensated by high temporal predictability.
Correspondence: *Francois Richer, Departement de neurologie, Pavillon Notre-Dame, CHUM, 1560, rue Sherbrooke est, Montreal, QC H2L 4M1, Canada.*

L.M. GRATTAN, D.R. GREENBERG, D. REEDER, & F.A. ALDRICH. The Effects of Gyrus Rectus Resection on Neuropsychological Outcome after Surgical Correction of ACoA Aneurysm.
Amnesia and other disturbances of cognition and affect have been reported in ACoA aneurysm patients. The effect of gyrus rectus (GR) damage on these behavioral deficits remains unspecified. To examine the relationship between GR resection and neurobehavioral outcome after rupture and surgical clipping of ACoA aneurysms, 15 men and women with and without GR resections were studied with a comprehensive, standardized neuropsychological examination 5 months postoperatively. Patients with GR resections performed significantly better than the non-GR group on measures of general memory ($t = -2.31$, $p < .05$), visual memory ($t = 2.31$, $p < .05$), and depression ($t = 2.71$, $p < .02$). In contrast, the GR group had more perseverative errors on the WCST ($t = 1.92$, $p < .08$). GR resection may not play a significant role in the memory disturbance associated with ACoA aneurysm surgery; however, it may produce disturbances of cognitive flexibility.
Correspondence: *Lynn Grattan, Department of Neurology, University of Maryland Medical Center, Baltimore, MD 21201, USA.*

L.M. GRATTAN, J.K. TRACY, & G.K. BERGEY. Recovery of Functions after Early Childhood Partial Left Frontal Lobectomy.
The developmental consequences of partial left frontal lobectomy in a child, A.F., (age 2 years, 10 months) were studied 6 years postoperatively. A.F. underwent surgery after 23 months of intractable seizures and hemiparesis secondary to a circumscribed tumor, dsyembryoplastic neuroepithelial tumor. With the exception of some difficulty with complex constructional praxis, A.F.'s cognitive examination was normal. Personality and behavioral profiles indicates a well-adjusted, well-mannered, and socially-appropriate child with excellent grades at school. Findings suggest that (1) motor and premotor cortices of the left frontal lobe appear to have an increased capacity for plasticity between 2 and 3 years of age, (2) language functions may also have the capacity for reorganization at this time, and (3) further evidence is provided for the "crowding" hypothesis in recovery of function.
Correspondence: *Lynn M. Grattan, Department of Neurology, Box 175, University of Maryland Medical System, 22 S. Greene Street, Baltimore, MD 21201-1595, USA.*

S.Z. RAPCSAK, A.W. KASZNIAK, S.L. REMINGER, & E.L. GLISKY. Overt and Covert Recognition of Faces Following Frontal Lobe Damage.
Overt (verbal) and covert (autonomic) measures of face recognition memory were investigated in patients with frontal lobe damage and normal controls. Analysis of overt recognition responses revealed that the majority of frontal patients were able to identify famous faces as well as controls. However, some frontal patients produced a strikingly high number of false recognition errors in response to unfamiliar faces. Using the skin conductance response (SCR) as the covert measure of recognition, we found that autonomic discrimination of familiar faces was abolished in some frontal patients, whereas others generated discriminatory SCRs to familiar faces that were similar to those observed in controls. The implications of these findings for cognitive and neuroanatomical models of face recognition are discussed.
Correspondence: *Steven Z. Rapcsak, Neurology Section (127), VA Medical Center, Tucson, AZ 85723, USA.*

K.A. ESPY, P.M. KAUFMANN, M. McDIARMID, & M.A. GLISKY. A-not-B: Developmental Performance and Construct Validity.
The A-not-B task has been hypothesized to measure executive–frontal lobe function; however, the measurement characteristics of this task have not been investigated. Performance on the A-not-B task and on other comparison tasks adapted from the developmental neuroscientific literature was examined in 115 preschool children (age 23–66 months). Age significantly predicted performance on A-not-B, Delayed Alternation, Spatial Reversal, Color Reversal, and Self Control tasks. A four factor analytic model best fit task performance data. The A-not-B task indices loaded with measures from the Self Control task, but were unrelated to performance on the other delayed response tasks despite similarities in task administration and presumed cognitive demand (working memory). These results indicate that the A-not-B task is sensitive to individual differences in age-related performance in preschool children and suggest that A-not-B performance is related to inhibition processes in this age range. Inhibition, therefore, may be a more important aspect of working memory in young children than previously considered.
Correspondence: *Kimberly Andrews Espy, Department of Behavioral and Social Sciences, Southern Illinois University School of Medicine, Carbondale, IL 62901-6517, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

M.B. CASEY, R.L. NUTTALL, D. MITCHELL, E. PEZARIS, J. MARCATO, & S. FREEDMAN. Subclinical ADHD Symptoms in Normal Families May Be Part of a Behavioral Inhibition Dimension with ADHD at the Lower End.

Many individuals experience symptoms relating to the DSM–IV ADHD criteria, but do not reach the DSM–IV cutoff. Risky behaviors, speech problems and handedness were examined as predictors of DSM–IV ADHD symptoms in normal families using a structured interview of 57 families (yielding 285 subjects). A regression on the 18-item ADHD scale gave an R^2 of .33. All three variables, *risky behaviors* (beta = .28, $p < .001$), *reduced laterality* (ambidexterity *vs.* strong left or right hand dominance; beta = .26, $p < .001$), and *speech problems* (beta = .14, $p = .015$) entered the equation. For the *inattentive* subscale, all three variables again entered the equation ($R^2 = .36$), while for the *hyperactivity–impulsivity* subscale, risky behaviors and reduced laterality entered, but speech problems did not ($R^2 = .21$). Consistent with findings related to a clinical diagnosis of ADHD, the present results show that normal individuals with subclinical ADHD symptoms also have a propensity for risk-taking and for speech problems. The relationship between ADHD symptoms and reduced laterality in this sample of normal individuals suggest atypical motor control processes. The findings with normal individuals support Barkley's information-processing model of ADHD.

Correspondence: *M. Beth Casey, 201 Campion, Boston College, Chestnut Hill, MA 02167-3813, USA.*

J.C. STOUT, J.Y. SUH, P.R. FINN, B. WEINZAPFEL, S. O'CONNOR, D. KAREKEN, & G. HUTCHINS. Regional Cerebral Blood Flow (rCBF) in High *Versus* Low Disinhibited Health Subjects During a Test of Response Inhibition.

High levels of disinhibited behavior are associated with increased risk for alcoholism and other negative outcomes. On a continuous performance task requiring inhibition of a habitually performed response, highly disinhibited healthy subjects (HIGH) perform more poorly compared to low disinhibited subjects (LOW) and show differences in brain electrical activity in the frontal lobes. We examined frontal rCBF in this task using positron emission tomography (PET) with [^{15}O]-H_2O as the radiotracer in a pilot study of 7 subjects selected for their extreme high ($N = 3$) or low ($N = 4$) scores for the disinhibited behavior trait. Results indicated that the HIGH group had significantly larger decrease in rCBF in right anterior prefrontal cortex and motor areas, and higher increase in rCBF in the anterior cingulate. The data support the notion that differences in the function in frontal brain regions are associated with behavior differences observed in subjects with high *versus* low disinhibited behavior traits.

Correspondence: *Julie C. Stout, Department of Psychology, Indiana University, Bloomington IN 47405, USA.*

M. J. HOPKINS, J. DYWAN, & S. SEGALOWITZ. Electrodermal Activity to Facial Expression in TBI: Support for Somatic Marker Theory.

According to Damasio et al.'s somatic marker theory, damage to ventral frontal regions affects self-initiated somatic activation to socially relevant stimuli and this in turn can result in maladaptive coping over the long term. We hypothesized that similar alterations in somatic activation might be relevant after traumatic brain injury (TBI) and this might also affect long term adaptive functioning. We monitored electrodermal activity (EDA) in TBI and matched control participants (Pcs) as they viewed positive and negative faces in either passive or active conditions. TBI Pcs produced significantly less EDA to negative faces in the passive condition than did controls and variance in their reactivity in this condition predicted social monitoring. This relationship was statistically mediated by family ratings of arousal and attention.

Correspondence: *Jane Dywan, Department of Psychology, Brock University, St. Catharines, ON L2S 3A1, Canada.*

REHABILITATION-2

F. CONSTANTINIDOU. Retroactive Interference and Recognition Performance During a Multitrial Verbal Learning Paradigm Following Closed Head Injury.

This study investigated the effects of retroactive interference on the recall and recognition performance in 31 patients with moderate–severe closed head injury (CHI) and 31 normal subjects. A multitrial free recall paradigm incorporating three modalities (auditory, visual, and auditory plus visual) was implemented. The presence of an interference list resulted in a significantly greater decline in word recall performance for the CHI subjects. The visual presentation of information was the most resistive to interference as compared to the auditory presentation or auditory plus visual presentation. Recognition performance was superior to free recall. Furthermore, visually presented information (with or without simultaneous auditory presentation of names) resulted in better recognition performance than auditory presentation alone. Implications for cognitive rehabilitation will be discussed.

Correspondence: *Fofi Constantinidou, Department of Communication, Miami University, Oxford, OH 45056, USA.*

L. RAPPORT, R. HANKS, S. MILLIS, & S. DESHPANDE. Executive Functioning and Predictors of Falls in the Rehabilitation Setting.

The incremental utility of executive function tests in the prediction of inpatient falls was examined among consecutive admissions to a rehabilitation hospital ($N = 90$). Multiple regression indicated that WCST perseverative errors and Stroop Test performance accounted for unique variance in falls beyond that explained by age and motor functioning. Visuospatial functioning, while not directly related to falls, was a significant predictor in combination with measures of executive functioning. The influence of motor and sensory impairments on falls appear mediated, in part, by executive functioning. Patients with intact executive functioning are less likely to act in ways that could result in a fall; thus, aggressive fall prevention measures may be unnecessary. In contrast, executive dysfunction may necessitate intervention, even among patients without traditional risk factors for fall.

Correspondence: *Lisa Rapport, Department of Psychology, 71 W. Warren, Wayne State University, Detroit, MI 48202, USA.*

D.C. KOLTAI, L.G. BRANCH, L.M. McINTYRE, & K.A. WELSH-BOHMER. The Effect of Cognitive–Affective Interventions on Adjustment in Dementia Patients: Preliminary Results.

A pilot study that examined the effect of cognitive and affective interventions on adjustment in mild to moderate dementia patients is presented. Twenty-four subjects (*M* age = 73.2 years) were randomly assigned to individual treatment, group treatment, or wait-list control conditions. The study demonstrated the feasibility of such a randomized trial, and was useful in refining the intervention and clarifying the domains and measures that could be expected to be influenced by treatment. As anticipated, differences in cognitive performance were not found. However, encouraging trends were revealed that suggested better adjustment and less perceived memory failures as a result of intervention. The relative efficacy of individual *versus* group treatment was similar in this sample. Variables likely affecting treatment outcome were identified, suggesting directions for future research.

Correspondence: *D.C. Koltai, Bryan ADRC, Duke University Medical Center, 2200 W. Main Street, Suite A230, Durham, NC 27705, USA.*

T. NOVACK & B. BUSH. Community Reentry after Traumatic Brain Injury: Association of Demographic, Acute Care, and Neuropsychological Variables.

The association of selected demographic, acute care, and neuropsychological variables with community reentry, as measured by the Community Integration Questionnaire, was examined in 42 individuals 6 months after moderate to severe traumatic brain injury. Analyzed as groupings of variables, the demographic and acute care information accounted for 10% and

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

6%, respectively, of the variance in CIQ scores. Neuropsychological variables, including measures of memory, problem-solving, and attention, accounted for 37% of the variance in CIQ results, underscoring the importance of cognitive recovery in resuming community activities. The results also suggest that improvement in cognitive recovery, possibly through cognitive remediation, could impact the success of community reentry.
Correspondence: *Tom Novack, Spain Rehab Center, 1717 6th Avenue S., Birmingham, AL 35233, USA.*

L.D. STANFORD. A Pediatric Case Study of Herpes Simplex Viral Encephalitis with Bilateral Hippocampal Involvement and Multifocal Seizures: The Role of the Neuropsychologist in Diagnosis and Treatment.
This case study describes a 15-year-old female who contracted HSVE, at 6 years of age, which produced bilateral hippocampal lesions and intractable multifocal seizures. Neuropsychological evaluation indicated severe anterograde amnesia, intact remote memory for events prior to the onset of illness, graphesthesia, finger agnosia, right–left confusion, slow mental processing, and dysnomia. Outcome with regard to response to intervention will be provided. Graphic illustrations of MRI, PET scan, EEG, and neuropsychological test results will be presented. The necessity of the neuropsychologist's involvement with the family and school systems for accommodations of complex neurocognitive and behavioral deficits will also be discussed. Long-term studies of children with herpes simplex viral encephalitis are needed to further clarify neuropsychological profiles, treatment recommendations, and outcome of interventions.
Correspondence: *Lisa D. Stanford, Department of Psychiatry/Psychology, Cleveland Clinic Foundation, Cleveland, OH 44195, USA.*

R.S. FISCHER & G.C. LAFLECHE. Executive Functioning and Rehabilitation Outcome.
In recent years, considerable attention has been paid to the medical, physical and psychosocial aspects of outcome in a stroke population, but less attention has been paid to the role of higher level cognitive operations in predicting functional levels of care following rehabilitation. Many studies have revealed, that taken as a group, right hemisphere patients show a lesser degree of recovery than left hemisphere patients. Various cognitive factors such as spatial–constructional deficits, hemispatial neglect, and attentional defects have been identified as playing an important role in determining their poor functional status, but it remains unclear if different cognitive variables influence outcomes differently for different stroke populations with equivalent levels of functional and neurological impairment. In the present study we examined 108 unilateral right hemisphere (R CVA) patients of equivalent education and general level of intelligence who were matched on admission for levels of functional and neurologic impairment to determine the importance of executive deficits in predicting outcome. Results indicate that despite comparable levels of motor deficits, continence care, neurologic and functional impairments, age and severe executive deficits are related to need for continued nursing home care and poorer functional independence following rehabilitation for R CVA.
Correspondence: *Richard S. Fischer, Neuropsychology Department, New England Sinai Hospital, 150 York Street, Stoughton, MA 02172, USA.*

S. RASKIN. Investigation of P300 as Measure of Efficacy of Cognitive Rehabilitation.
Studies that have demonstrated cognitive improvement following structured cognitive rehabilitation, are often lacking any evidence of change in brain function. All subjects were subjected to a within subject A-B-A-B design. The A condition was a systematic program of attention retraining, the control (B) condition was nonchallenging tasks. At initiation and completion of training, subjects were administered a test of attention in everyday functioning, neuropsychological battery, tests of automatic and controlled processing, and P300 were elicited with an auditory oddball. All subjects demonstrated improvement on attention tasks. P300 had been attenuated in all subjects prior to training, and returned to normative values following training. Subjects showed improvement on only tests of automatic processing following training.
Correspondence: *Sarah Raskin, Department of Psychology, Trinity College, Hartford, CT 06106, USA.*

J.E. HERRON, L.M. GRATTAN, D. RIGAMONTI, & F.A. ALDRICH. Depression and Coping after Focal Lesion.
Depression is a common debilitating behavioral consequence of ischemic stroke, intracerebral hemorrhage, and subarachnoid hemorrhage. Coping is implicated as an important outcome mediator in normal, medical, head-injured, and stroke populations. The relationship between depression and coping in patients after stroke remains minimally known. The influence of depression (CES-D) on the use of specific coping strategies (COPE) was investigated in 42 patients who underwent surgical correction of cerebrovascular abnormalities. MANOVA procedures indicated that the depressed patients endorsed significantly greater reliance on coping strategies that included *denial* [$F(1,40) = 16.04$, $p < .001$], *behavioral disengagement* [$F(1,40) = 15.64$, $p < .001$], *mental disengagement* [$F(1,40) = 21.48$, $p < .001$], *focus on and venting emotions* [$F(1,40) = 15.53$, $p < .001$], *suppression of competing activities* [$F(1,40) = 10.92$, $p = .002$], and *planning* [$F(1,40) = 3.96$, $p = .05$] than the nondepressed patients. Depressed patients used a variety of strategies, but relied primarily on passive or maladaptive emotion-focused strategies.
Correspondence: *Lynn M. Grattan, Department of Neurology, University of Maryland School of Medicine, 22 S. Greene Street, Baltimore, MD 21201, USA.*

C. BOAKE, M. MacLEOD, W.M. HIGH, Jr., & L.D. LEHMKUHL. Driving Safety after Traumatic Brain Injury: Influence of Injury Severity and Neuropsychological Deficits.
Neuropsychological test scores were used to predict the rate of traffic violations in 48 persons who resumed driving after traumatic brain injury (TBI) and who retained driving privileges over a 3–6-year follow-up period. The results showed that neither neuropsychological test scores nor brain injury severity were significantly related to rates of at-fault crashes or all moving violations, as documented in official driving records. It is recommended that predriving screening should rely primarily on behind-the-wheel evaluation and that neuropsychological testing should not be substituted for functional assessment.
Correspondence: *Corwin Boake, TIRR, 1333 Moursund, Houston, TX 77030, USA.*

R.B. FRIEDMAN & S.N. LOTT. Using Models of Memory to Predict Generalization Effects in Treatment for Alexia.
In a new approach to the design of effective rehabilitation programs for aphasia and alexia, neuropsychological models of declarative and procedural learning and memory were used to predict generalization effects in treatment studies of acquired alexias. One study focused on retraining phonological reading in 2 patients with deep alexia. A second study employed a tactile–kinesthetic speeded letter naming technique to improve the speed and accuracy of reading of a patient with pure alexia. In both studies, the predicted patterns of generalization were observed.
Correspondence: *Rhonda Friedman, GICCS, EP-04 New Research Building, Georgetown University Medical Center, 3970 Reservoir Road N.W., Washington, DC 20007, USA.*

D. DUKETTE, K. BAYNES, B. REDFERN, L. SHARE, C. LUDY, & N. DRONKERS. Lexical Dual Access in Production: A Targeted Rehabilitation Study.
It has been proposed that there are two distinct stages of lexical access that underlie the process of sentence production: the meaning-based form (semantic) and the sound-based form (phonological). The psychological reality of this model was addressed through a targeted rehabilitation study. Patients with LH CVA whose naming difficulties were thought to originate at either the meaning or sound-based level participated in both semantic and phonological periods of indirect training designed to facilitate nam-

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

ing. Despite the length of time since insult (>2 years) patients performance improved following training. An analysis of generalization of improvement as well as changes in sentence structural complexity are considered.
Correspondence: *Dianne Dukette, VA NCHCS, 150 Muir Road (126S), Martinez, CA 94553, USA.*

R. WOESSNER & B. CAPLAN. Changes in Emotional Distress from Admission to Discharge in Rehabilitation Inpatients with Stroke.
Emotional distress is a common obstacle to effective rehabilitation of stroke patients. In this study, we examine the change in emotional distress reported by rehabilitation inpatients with stroke from the time of admission until discharge using the Symptom Checklist 90–Revised (SCL–90–R). Among a sample of 23 patients hospitalized for acute rehabilitation following unilateral stroke, all SCL–90–R scores but one were lower at discharge than admission; four symptom dimensions and one summary index were significantly lower. Eighteen individual symptoms were significantly lower at discharge, but only five of these were symptoms identified by experts as "stroke symptoms." Decline in emotional distress during rehabilitation appears to result from symptom reduction in the areas of somatic complaints, interpersonal sensitivity, and hostility as well as depression.
Correspondence: *Russell Woessner, Department of Psychology, Moss-Rehab Hospital, 1200 West Tabor Road, Philadelphia, PA 19141, USA.*

ATTENTION

A. J. LUNDERVOLD, K. HUGDAHL, & O.-B. TYSNES. Attentional Network Dysfunction after Infarction of the Right Basal Ganglia.
The basal ganglia are part of a neural network for activation of attentional processes, conveyed by complex corticosubcortical circuits. The present study investigated visual attention in 5 patients with focal lesions in the right basal ganglia, using neuropsychological tests and an experimental paradigm of attentional networks modified from Posner & Raichle. All patients were impaired on tests of self-generative activation. Isolated basal ganglia lesions led to selective dysfunction of the executive network. Patients with more extensive lesions showed dysfunction in the orienting network and symptoms of visual neglect. We conclude that detailed neuroimaging investigation together with experimental design based on cognitive models enable better understanding of the basal ganglia and its functional role in attention. Functional dissociations between cortico-subcortical neural circuits were suggested.
Correspondence: *A.J. Lundervold, Department of Neurology, Haukeland University Hospital, N-5021 Bergen, Norway.*

J.V. FILOTEO, F. J. FRIEDRICH, & J.L. STRICKER. Intrastimulus Attentional Shifts in a Patient with Right Temporal–Parietal Lobe Damage.
Shifts of attention to different levels of global–local stimuli were examined in normal participants and a patient with right temporal–parietal lobe damage. Global–local stimuli were presented in sequential couplets and the target location could either be at the same global–local level or the target could change levels within each couplet. Normal participants were faster to respond to the second stimulus when the target remained at the same level as compared to when it changed levels. In contrast, the patient did not demonstrate any effects of the target changing locations when the time between the two stimulus presentations was short, whereas when the time between the two stimulus presentations was long, he was much faster to identify the target on the second stimulus presentation when it remained at the local level as compared to when the target remained at the global level. Results suggest that the right temporal–parietal lobes may be involved in shifting and maintaining attention to different levels of global-local stimuli.
Correspondence: *J. Vincent Filoteo, 502 Behavioral Science Building, Department of Psychology, University of Utah, Salt Lake City, UT 84112, USA.*

Å. HAMMAR, K. HUGDAHL, A. LUND, A. ASBJØRNSEN, & A. RONESS. Attentional Vigilance Is Dependent on Target–Distractor Compatibility: Evidence from a New Neuropsychological Test.
The ability to detect a visual target stimulus among similar distractors was studied in 28 normal subjects. The aim of the study was to investigate attentional vigilance when stimulus elements have to be scanned in order for their detection. The distractors were the letter "E" evenly distributed across the computer screen, with four different targets: "F," "L," "I," "S." It was predicted that detective accuracy/latency should be linearly related to how similar the target was to the distractors. The results showed that the "F" target (which shares three features with the "E" distractor) had the lowest accuracy and longest RT. Accuracy was also dependent on the visual field quadrant the target was presented in, with reduced accuracy in the upper right field. Males performed overall inferiorly to females.
Correspondence: *Åsa Hammar, Department of Medical and Biological Psychology, University of Bergen, Årstadveien 21, 5009, Bergen, Norway.*

M. LAMB. Volitional and Nonvolitional Control of Attention to Global and Local Objects.
We have shown that damage involving the left superior temporal gyrus (LSTG) affects the perception of local objects while damage on the right (RSTG) affects the perception of global objects. Further, Lamb et al. and Robertson et al. showed that damage involving the inferior parietal lobe (IPL) affects the ability to shift attention between local and global forms. Thus it might be possible to help patients with lesions restricted to the STG to compensate for their perceptual deficit by training them to use their intact attentional mechanism to bias attention to the impaired level. To do so, however, we must understand the conditions under which attention can be so biased. In the present studies we specify conditions under which attention is under volitional control, and conditions where it is not.
Correspondence: *Marvin R. Lamb, Department of Psychology, California State University, Hayward, CA 94542-3091, USA.*

R.S. FISCHER & G.C. LAFLECHE. Sustained Attention and Functional Outcome Following Right Hemisphere Stroke.
Over the past several decades considerable attention has been paid to the neurological and functional deficits following stroke and in identifying variables that might affect rehabilitation outcome. Studies have focused on motor and sensory recovery, bowel and bladder functions, visual and perceptual impairments, communication disturbances, and psychological/cognitive factors. Although this research has added substantially to the understanding of factors affecting stroke recovery, there is still considerable uncertainty as to which cognitive factors might improve clinical prediction of rehabilitation outcomes. Recently, it has been suggested that sustained attention plays a critical role in motor recovery after stroke explaining why right hemisphere damaged patients (R CVA) show a smaller degree of improvement than left brain damaged patients, but it remains unclear if (R CVA) patients with equivalent levels of functional and neurological impairment following right hemisphere damage have different outcomes based upon different levels of sustained attentional deficits. In the present study we examined 72 (R CVA) patients of equivalent age, education, and general level of intelligence who were matched on admission for levels of functional and neurologic impairment, but who differed in their performance on a sustained attention task. Findings indicate that R CVA patients with severe deficits in sustained attention undergoing rehabilitation show a worse functional outcome than matched controls and are more likely to go to nursing homes.
Correspondence: *Richard S. Fischer, Neuropsychology Department, New England Sinai Hospital, 150 York Street, Stoughton, MA 02172, USA.*

A. MAYER, D. KOSSON, & M. PRIMEAU. Intermodal Selective Attention in a Visual–Spatial Cuing Paradigm.
The present experiment was designed to examine Posner's proposal that attentional and language processes may share common cognitive resources. The present study investigated this theory by measuring the

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

effectiveness of auditory and visual linguistic cues in producing shifts of visual–spatial attention. The experiment also assessed whether linguistic cuing could be disrupted by presenting linguistic distractors in a different sensory modality than cues. Twenty-five right-handed participants completed the study. Linguistic cues were effective in producing both intermodal and intramodal endogenous shifts of visual attention. Moreover, such cuing was reduced by presenting linguistic distractors, and auditory linguistic distractors were more effective than visual linguistic distractors at disrupting shifts of visual–spatial attention.
Correspondence: *Andrew Mayer, Department of Psychology, FUHS/Chicago Medical School, North Chicago, IL 60064, USA.*

PEDIATRICS-7: DISORDERS

B. SHAPIRO, L. WATERHOUSE, D. FEIN, M. DUNN, I. RAPIN, & D. ALLEN. The Relationship Between Social Functioning and Memory in Autism.
Since the medial temporal lobe has been suggested as the primary site of dysfunction in autism, and medial temporal lobe structures appear to underlie aspects of both social and memory functions in mammals, this study looked at the relationship between memory and social functioning in 9-year-old high-functioning autistic children. Social variables included measures of both skills and abnormalities. Partial correlations were conducted between memory and social variables, controlling for IQ. Social skills and abnormalities were not significantly correlated with immediate memory. Social skills were significantly correlated with verbal learning over time and with delayed verbal recall, and abnormalities were significantly correlated with delayed verbal recall. The results further support a role for the medial temporal lobe in autism.
Correspondence: *Brenda Shapiro, University of Connecticut, Department of Psychology, U-20, 406 Babbidge Road, Storrs, CT 06269-1020, USA.*

J.A. HAUCK & D. DEWEY. Hand Preference and Related Functioning in Young Children with Autism.
This study has attempted to provide data on hand preference in young children with autism, compared to matched developmentally delayed and normally developing children. In addition, it examined the relationship between hand preference and the following variables: motor skills, receptive language ability, mental age. The results indicate that the lack of development of a hand preference in children with autism is not a function of their cognitive delay, and also does not appear to be related to a lack of motor skill development. Children with autism with a definite hand preference have better cognitive, verbal, and motor functioning. This pattern is not seen in the comparison groups.
Correspondence: *Joy A. Hauck, Program in Clinical Psychology, Ed. B 292, University of Calgary, 2500 University Drive N.W., Calgary, AB T2N 1N4, Canada.*

S.F. PELLETIER & E.M. MAHONE. Neuropsychological Deficits Following Resection of Benign Pilocytic Cerebellar Astrocytoma in Childhood.
We present the case of a 12-year-old male with history of gross total resection of a pilocytic cerebellar tumor at age 5 years. He received no treatment with chemotherapy or radiation. Prior to the surgery the patient was left-handed. Following surgery he became right-handed. Results of neuropsychological assessment at age 12 years revealed a prominent neurobehavioral syndrome implicating diffuse neuropsychological deficits, with preponderance of findings implicating right hemisphere inefficiency. These findings are in contrast to previously reported literature which has suggested that nonradiated pilocytic cerebellar astrocytomas have little impact on higher cognitive functions.
Correspondence: *E. Mark Mahone, Department of Neuropsychology, Kennedy Krieger Institute, 707 North Broadway, Baltimore, MD 21005, USA.*

M. KIBBY, R. MULHERN, & L. KUN. Higher-Order Cognitive Functioning Is Impaired Among Children with Low-Grade Cerebellar Tumors.
Although cerebellar lesions are associated with disorders of volitional movement, effects on higher-order cognitive functioning remain controversial. We assessed 20 children aged 6 months to 2 years, following surgical resection of low-grade cerebellar tumors (medial or hemispheric). The hypothesis was that higher-order cognitive functions, such as language functioning, visual-spatial processing, mathematical reasoning, and attention would be more impaired among children with larger tumors or residual disease post-surgery. Anatomic tumor site was not associated with severity of cognitive deficits. In contrast, larger presurgical tumor volume predicted poorer language skills, and the presence of postsurgical residual tumor predicted poorer language skills, mathematical reasoning and visual–spatial processing. The results support the potential for cerebellar injury to impair higher-order cognitive processing.
Correspondence: *Michelle Kibby, St. June Children's Research Hospital, 332 N. Lauderdale, Memphis, TN 38105-2794, USA.*

N. J. MINSHEW, J.A. SWEENEY, & B. LUNA. Shifting Attention *Versus* Executive Regulation of Attention in Autism.
Several attentional theories have been proposed for autism, most recently involving a deficit in shifting attention regulated by cerebellar lobules VI and VII. However, other recent models emphasize executive dysfunction as the cause of abnormal regulation of attention in autism. In this study, shifting attention subserved by vermal lobules VI and VII and the volitional control of attention by frontal systems were examined with the laboratory assessment of saccadic eye movements in 20 pairs of high functioning autistic and control subjects. Data revealed intact visually guided saccades subserved by vermal lobules VI–VII and impairments on oculomotor delayed response and antisaccade tasks subserved by frontal systems. These findings suggest that abnormalities in regulating the focus of attention in autism have an executive function and frontal systems origin.
Correspondence: *Nancy J. Minshew, Western Psychiatric Institute and Clinic, 3811 O'Hara Street, 430 Bellefield Towers, Pittsburgh, PA 15213, USA.*

D. J. SIEGEL, G. GOLDSTEIN, S. BEERS, & N. J. MINSHEW. A Comparison of IQ Profiles in Adults with Developmental Learning Problems.
Autism and developmental learning disabilities share delays in language acquisition, cognitive functioning, and the attainment of academic skills. IQ profiles of adults with these neurodevelopmental disorders were analyzed to characterize patterns of intellectual functioning associated with each group. The WAIS–R performance of learning disabled and high functioning autistic individuals was examined using Verbal Comprehension, Perceptual Organization, and Freedom from Distractibility factor scores, and Bannatyne's system for recategorizing subtests. Significant group differences were found for Sequential and Acquired Knowledge categories, and Freedom from Distractibility Index scores. Results were consistent with the integrity of information acquisition and simple memory in autism, and for deficits in information acquisition and processing, and attention in learning disabled individuals.
Correspondence: *Don Siegel, Western Psychiatric Institute and Clinic, 3811 O'Hara Street, 430 Bellefield Towers, Pittsburgh, PA 15213, USA.*

M. STEVENS, D. FEIN, I. RAPIN, L. WATERHOUSE, & M. DUNN. Season of Birth Effects in Autism.
This study examined a sample of autistic preschool age children to identify patterns of birth dates that deviated from expected frequencies. The birth dates of autistic children were compared to U.S. census data and also to a nonautistic sibling control group. Statistical analyses included two types of chi-square analyses and a seasonal harmonic trend analysis. A significant elevation was found for the month of March in the sample drawn from Boston, MA. This sub-sample was small ($N = 37$), and largely contained low-functioning, autistic boys, which is consistent with previous findings in the literature. Previously undiscovered findings are a seasonal

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

effect for females within the entire sample, and both a seasonal and monthly birth effect for children classified as socially *passive* by the Wing Autistic Disorder Interview.
Correspondence: *Michael C. Stevens, Department of Psychology, University of Connecticut, Storrs, CT 06269, USA.*

S. PRÉCOURT, P. ROBAEY, I. LAMOTHE, M. LASSONDE, C. SAUERWEIN, S. KABÈNE, M. BOURASSA, & A. MOGHRABI. Intelligence, Memory, and Learning Strategies in Girls Treated for Acute Lymphoblastic Leukemia by Brain Irradiation and/or Intrathecal Chemotherapy.
Neuropsychological impairment has been linked to treatment in acute lymphoblastic leukemia (ALL). Although treatment has improved dramatically the survival rate for ALL children, it also has been shown to induce neuropsychological deficits. The combination of cranial irradiation therapy (CRT) and intrathecal chemotherapy (ICT) seems to yield more deficits than ICT alone. Our results corroborate those findings, but pinpoint to more specific verbal learning deficits in ALL children treated with ICT + CRT. Moreover, the ICT–CRT group was found to be impaired in the second half of the learning trials of the CVLT–C, which suggests a fatigue effect. These results can be used to devise special educational assistance to these children.
Correspondence: *Philippe Robaey, Laboratoire de Psychophysiologie Cognitive, Centre de Recherche de l'Hopital Ste-Justine, 3100 Ellendale, Montréal, QC H3S 1W3, Canada.*

J. SCHATZ, S. CRAFT, M.R. DEBAUN, et al. Spatial Deficits Following Unilateral *Versus* Bilateral Childhood Stroke.
Differential recovery for the two cerebral hemispheres during development have been suggested because of greater sparing of language abilities following childhood brain injury. Certain spatial skills, however, appear to be predominantly mediated by each hemisphere. We examined performance on lateralized spatial tasks for the left (component level processing, categorical spatial judgments) and right hemisphere (configural level processing, coordinate spatial judgments) in children with unilateral left (N = 11), unilateral right (N = 5), or bilateral (N = 11) infarcts as compared to 16 healthy, age-matched children. Left hemisphere injury was associated with deficits in identifying component level information and relative difficulties with categorical judgments. Right hemisphere and bilateral injury were associated with deficits in configural level processing and in making coordinate spatial judgments. Effect sizes for the left *versus* right hemisphere injury groups suggested larger deficits in certain spatial skills following right hemisphere injury. Lesion volume or location in each hemisphere did not account for the bilateral injury group's difficulties with right hemisphere spatial functions. Similar to studies of language *versus* nonlanguage skills, left hemisphere spatial abilities may show greater sparing following injury than right hemisphere abilities.
Correspondence: *Jeffrey Schatz, UCSF, Box 0984-CPT, 401 Parnassus Avenue, San Francisco, CA 94143, USA.*

S.L. NICHOLS, W. JONES, & D.A. TRAUNER. The Effect of Early Focal Brain Lesions on Category Test Performance in Children.
The Category Test has been widely used with both adults and children and has been found to be sensitive to brain damage in general. The purpose of this study was to examine the relationship of children's performance on the test to the presence, location and extent of early focal brain damage. Thirteen children ages 6 through 12 years with pre- or perinatally acquired unilateral brain lesions and 45 controls performed either the Children's or Intermediate Halstead Category Tests as appropriate. The FL group made significantly more errors than controls. Performance did not map consistently onto hemisphere or location of the lesions, replicating findings with adults, but did appear to be sensitive to the extent of the lesion as children with the largest lesions performed most poorly.
Correspondence: *Sharon Nichols, Department of Neurosciences, University of California, San Diego, 9500 Gilman Drive, #0935, La Jolla, CA 92093, USA.*

K. WILLS & E. HAYES. Behavioral Correlates of Ventricular Shunting, Ambulation, and Urologic Status in Children with Spina Bifida (Myelomeningocele).
Children with myelomeningocele spina bifida (SB) vary greatly in the nature and severity of related medical complications which contribute to individual cognitive and (less well delineated) psychosocial differences. In this study, associations among medical and demographic variables (shunt presence, location, and infection; seizure disorder; spinal lesion level; ambulation and urologic status; sex, ethnicity, and SES) and mother-rated Child Behavior Checklist scores were explored using a database that includes 177 children with SB, shunted by 4 weeks, and either recruited as participants in several related studies or seen for routine developmental screening. Cases referred for behavioral problems or suspected shunt malfunction were excluded. These children, especially boys, had increased risk of school and behavior problems, particularly inattention and social immaturity, compared to test norms. Children with right-hemisphere or bilateral shunt tracks had more school problems, social immaturity, and inattention than those with left-hemisphere shunt tracks, despite equivalent intelligent quotients. Independence in toileting (*vs.* use of catheters or diapers) decreases the risk of anxiety/depression whereas independent walking (*vs.* use of braces or wheelchair) increases this risk perhaps because independent ambulators more often compete and compare themselves against nondisabled peers ("marginality"). Both neurologic (e.g., shunt locus) and social (e.g., marginality) issues contribute to adjustment in SB.
Correspondence: *Karen E. Wills, Department of Psychology, Loyola University Chicago, 6525 N. Sheridan Road, Chicago, IL 60626, USA.*

D. RIVA, V. SALETTI, & F. NICHELLI. Bilateral Perisylvian Polymicrogyria: Effects on Neuropsychological Functioning.
In this study we report the neuropsychological findings of a family (mother and 2 sons), 2 twins (one normal) and 2 children with bilateral perisylvian polymicrogyria. The cerebral malformation is pure in 2 cases and in the others is present in a more complex malformative pattern. The patients underwent a neuropsychological assessment in the following areas: intelligence, language production and comprehension, memory and attention, visuoperceptual and graphomotor abilities and practice functions, depending on the age. The results show an important variability in the intellectual performances and in the neuropsychological functionality in relation to severity and extension of the malformation. The expressive language (verbal and gestual) is always impaired. The neuropsychological deficits are related with the lesion site, confirming that also congenital brain structural changes, if sufficiently localized, produce specific focal deficits.
Correspondence: *Daria Riva, Div. Dev. Neurol., Istituto Nazionale Neurologico "C. Besta," 11 via Celoria, 20133 Milan, Italy.*

Paper Session 14/11:00 a.m.–12:30 p.m.

AGING-2

M. SCHMITTER-EDGECOMBE & A. SIMPSON. Age Differences in the Effects of Divided Attention on Automatic and Controlled Aspects of Memory: An Application of the Process Dissociation Framework.
The relation between attention available at encoding and automatic and consciously controlled aspects of memory was investigated within a single task using the process-dissociation procedure of Jacoby. Sixty-four older adults and 64 younger adults studied a word list in either a full or a divided attention condition. Recall cued with word stems was tested immediately, at a 20-min delay, and at a 60-min delay. In contrast to consciously controlled influences of memory, automatic influences of memory (1) did not differ across the age groups, (2) remained invariant across the manipulation of attention, and (3) remained invariant across the 60-min time course. Furthermore, age did not interact with the attentional manipulation or the time course factor. Implications of the results for aging an attentional resource model are discussed.
Correspondence: *Maureen Schmitter-Edgecombe, Department of Psychology, Washington State University, P.O. Box 644820, Pullman, WA 99164-4820, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

M. SILVER, K. NEWELL, J. GROWDON, B. HYMAN, E.T. HEDLEY-WHYTE, & T. PERLS. Is Dementia Inevitable in Extreme Old Age? Neuropsychological and Neuropathological Studies of Cognitive Functioning in Centenarians.

There has been a tendency to assume that dementia is an inevitable consequence of aging and that all dementia in old age is "Alzheimer's disease." If one follows this line of reasoning, all centenarians should be demented and have Alzheimer's disease. The New England Centenarian Study addresses these assumptions through the study of centenarian subjects who have had both neuropsychological testing and postmortem brain studies. Clinical normal subjects and subjects with mild to severe dementia will be discussed. The absence of dementia in some centenarians and the variety of etiologies in demented subjects provide a caveat that one should not always equate dementia with Alzheimer's disease or old age with dementia.

Correspondence: *Margery Silver, Division on Aging, Harvard Medical School, 643 Huntington Avenue, Boston, MA 02115, USA.*

L.L. SYMONDS, J.A. GLADSJO, R.K. HEATON, & D.V. JESTE. Patterns of Successful Neurocognitive Aging.

This cross-sectional study examines the cognitive abilities of 128 normal individuals in their 6th through 10th decades who were administered a comprehensive neuropsychological battery. Mean scaled scores on motor and sensory ability areas declined by the 60s. Psychomotor, abstraction–flexibility, and learning each showed initial declines in the 70s and later in the 90s. Attention and verbal ability showed almost no decline across all five decades. Memory (percent retained) did not decline until the 90s. Subjects were defined as meeting criterion for successful neurocognitive aging on a given test based upon the norms for equally educated 20–34-year-olds. In each decade of life there is a sizable proportion of those who demonstrate optimal neurocognitive functioning on at least some cognitive tests, with some abilities, including memory, remaining remarkably stable for virtually all subjects. Finally, a computed index of health did not significantly predict successful neurocognitive aging.

Correspondence: *J.A. Gladsjo, Geriatric Clinical Research Center (116A-1), VA Medical Center, 3350 La Jolla Village Drive, San Diego, CA 92161, USA.*

E.B. DRAKE, V.W. HENDERSON, W.S. BROWN, C.A. McCLEARY, G.A. MURDOCK, & J.G. BUCKWALTER. The Relationship Between Circulating Steroid Sex Hormones and Cognition in Nondemented Elderly Women.

Fluctuations in steroid sex hormones, notably estradiol (E_2), have been shown to influence cognitive performance in pre- and postmenopausal women. In this study, circulating sex hormone levels (E_2, non-sex-hormone-binding globulin bound E_2, testosterone (T) and androstenedione) were directly measured in 39 well educated, nondemented, predominantly White postmenopausal women. Results were correlated with neuropsychological test scores. Semipartial correlational analyses, controlling for age, education, testing frequency, and depression, indicated that higher E_2 levels were related to better delayed verbal memory and retrieval efficiency and to poorer immediate and long-term visual memory. Higher T levels were associated with better verbal fluency. Findings provide support for the relevance of both estrogen and testosterone in the cognitive functioning of postmenopausal women.

Correspondence: *J. Galen Buckwalter, Andrus Gerontology Center, University of Southern California, University Park, MC-0191, Los Angeles, CA 90089, USA.*

G.E. SWAN, D. CARMELLI, A. LaRUE, & C. DeCARLI. Stroke Risk and Neuropsychological Performance in the Elderly: A 5-Year Follow-Up.

The purpose of the present investigation was to examine the 5-year prospective relationship between stroke risk and neuropsychological performance in older adults who at baseline were free of disease. Data for the present analysis were available from 627 older male participants in the Western Collaborative Group Study, a long-term study of health and aging now in its 37th year of follow-up, who were assessed in 1988 for stroke risk factors and subsequently examined in 1993 for both medical and neuropsychological status. A stroke risk score was constructed for each individual free of stroke at baseline according to the following formula: .051 × Age + .014 × Systolic blood pressure + .326 × Hypertensive medication + .338 × Diabetes Mellitus + .515 × Cigarettes smoked per day + .520 × Cardiovascular disease. Regression analysis with the stroke risk score as the independent variable and neuropsychological status 5 years later as the dependent variable was then conducted for each of the cognitive tests. The regression analyses were also conducted with education included as a covariate. Results indicate that risk factors predictive of stroke were associated primarily with speeded test performance (e.g., Trail Making, Digit Symbol Substitution, Stroop color-word), consistent with previous research examining the independent effects of each risk factor separately (e.g., blood pressure).

Correspondence: *Gary E. Swan, Center for Health Sciences, SRI International (formerly Stanford Research Institute), 333 Ravenswood Avenue, Menlo Park, CA 94025, USA.*

J. J. MANLY, D.M. JACOBS, M. SANO, K. BELL, C.A. MERCHANT, S.A. SMALL, & Y. STERN. Literacy and Neuropsychological Test Performance Among Elders with No Formal Education.

The current investigation compared test performance of nondemented literate and illiterate elders who reported receiving no formal education. Participants were a randomly selected, community-based sample of residents of Northern Manhattan above age 64 years. All participants had no formal education, and had no neurological or functional signs of dementia as independently determined by a neurologist. ANOVAs revealed that illiterate elders obtained significantly lower scores on measures of figural memory, orientation, verbal abstraction, naming, comprehension, and construction. The fact that our measures of verbal learning and memory (Selective Reminding Test) and letter fluency (Controlled Oral Word Association) were not affected by literacy status suggests that these tests can be used in illiterate elders to assess memory and language abilities that are affected in dementia.

Correspondence: *Jennifer Manly, Gertrude H. Sergievsky Center, 630 West 168th Street, New York, NY 10032, USA.*

Paper Session 15/11:00 a.m.–12:30 p.m.

EPILEPSY-2

G.P. LEE, K. J. MEADOR, D.W. LORING, J. ARENA, & N.R. DENNIS. Emotional Processing Alters Autonomic Arousal in Patients with Left Mesial Temporal Lobe Seizure Onset.

Converging lines of evidence from lesion, electroencephalographic, and Wada studies suggest that the right cerebral hemisphere may be specialized for negative, and the left hemisphere for positive, emotional expression. This hypothesis was investigated in 17 unilateral onset temporal lobe epilepsy (TLE) patients by measuring skin conductance responses (SCRs) and heart rates (HRs) while they viewed positive and negative emotional slides. Right TLEs showed no statistically significant differences in SCR or HR during emotional slide viewing. In contrast, left TLEs exhibited selective SCR hyperarousal to negative emotional slides only. Results are consistent with hemispheric specialization for emotional expression. Dysfunction of left mesial temporal lobe structures may allow unrestrained expression of the right hemisphere's negative emotional tendencies as evidenced by autonomic hyperarousal only in response to negative emotional stimuli.

Correspondence: *Gregory P. Lee, Section of Neurosurgery, Medical College of Georgia, Augusta, GA 30912-4010, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

R. MARTIN, E. BILIR, S. HO, D. ROTH, J. HUGG, F. GILLIAM, E. FAUGHT, & R. KUZNIECKY. MRI Volumetry of Hippocampal and Amygdala Structures: Relations to Visual Memory in Temporal Lobe Epilepsy.
This study examined relations between MRI-based volumetry of hippocampal and amygdala structures and visual memory in patients with temporal lobe epilepsy (TLE). MRI measurement of hippocampal, and amygdala structures was determined in 86 TLE patients (48 left, 38 right). Hippocampal and amygdala structural abnormalities were present in 76 patients. For the left TLE patients, visual memory performance was related to contralateral hippocampal and amygdala volume measurements. However, no structural volume measurement significantly correlated with visual memory in right TLE patients. These results indicate that amygdala structural abnormalities commonly occur in temporal lobe epilepsy and may provide additional information regarding our understanding of visual memory performance in TLE.
Correspondence: *Roy Martin, UAB Epilepsy Center, University of Alabama at Birmingham, Birmingham, AL 35294-0021, USA.*

M. BENGTSON, R. MARTIN, E. BILIR, S. HO, D. ROTH, J. HUGG, F. GILLIAM, E. FAUGHT, & R. KUZNIECKY. Relationships between Gender, MRI Hippocampal Volume, and Verbal Memory in Patients with Temporal Lobe Epilepsy.
Recent investigations have found exclusively strong associations between left and right hippocampal volumes (LVOL, RVOL) and preoperative verbal memory in females with left temporal lobe epilepsy implicating differential sex effects on memory "plasticity." This study attempted to replicate this finding. Seventeen men and 21 women who underwent left temporal lobectomy (LTL), and 13 men and 19 women who underwent right temporal lobectomy (RTL) were studied. A significant relationship was found between preoperative verbal memory and LVOL in RTL females. LVOL and RVOL were, however, associated with verbal memory outcome in LTL and RTL male patients. This study found differential sex–MRI volume relationships following TL that corresponded to hippocampal integrity. However, selective memory plasticity in females with temporal lobe epilepsy was not as evident.
Correspondence: *Roy C. Martin, UAB Epilepsy Center, University of Alabama at Birmingham, Birmingham, AL 35294-0021, USA.*

T.M. FLYNN, C.M. LEONARD, E.B. FENNELL, R.M. BAUER, B. CROSSON, & R. GILMORE. Callosal Morphology and IQ in Epilepsy: Influence of Age at Seizure Onset.
Strauss, Wada, and Hunter reported a significant positive correlation between area of the splenium and FSIQ in a sample of people with refractory epilepsy. Sixty-two right-handed subjects with intractable epilepsy, left-hemisphere language dominance, and a unilateral temporal lobe seizure focus were tested with the WAIS–R. A significant positive correlation was replicated between FSIQ and midsagittal area of the splenium, the callosal region including interhemispheric fibers linking posterior association cortex. The finding did not differ depending upon subject's sex or laterality of seizure focus, and was not attributable to differences in midsagittal area of cortex. However, the nature of the relationship differed depending on subjects' age at seizure onset. Larger area of posterior callosum was significantly associated with higher FSIQ among subjects with onset of chronic seizures after age 5 years. The correlation was significantly different for subjects with an earlier seizure onset; the direction appeared reversed. The findings are discussed in the context of evidence that interhemispheric communication plays a role in coordinating distributed information processing resources, and the effect early seizures have on the pruning of excess juvenile callosal projections.
Correspondence: *T. Flynn, Psychology Division, Children's Hospital Medical Center, Cincinnati, OH 45229, USA.*

K.L. FUCHS, J.I. BREIER, D.D. CAUDLE, B.L. BROOKSHIRE, A.B. THOMAS, J.W. WHELESS, J. CONSTANTINOU, L. J. WILLMORE, & A. PAPANICOLAOU. Language Lateralization Affects Wada Memory Performance in Left Temporal Lobe Epilepsy.
We evaluated the effect of language laterality on recognition memory for objects during the IAP for 75 epilepsy surgery candidates (41 with right and 34 with left temporal lobe seizure onset). Individuals with a left sided seizure onset were more likely than those with a right sided seizure onset to demonstrate incomplete left, bilateral, or right hemisphere lateralization of language. In patients with left temporal lobe epilepsy (LTLE) anomalous language lateralization was associated with relatively better memory during left injection and relatively poorer memory during right injection as compared to individuals with predominantly left language lateralization. As a result LTLE patients with anomalous organization exhibited reduced interhemispheric asymmetries in memory performance relative to patients who were predominantly left lateralized for language. These data suggest that language laterality should be taken into account in interpreting IAP memory performance. Individuals who are potentially strong candidates for surgery may have IAP memory data that is misleading as to side of seizure onset.
Correspondence: *K.L. Fuchs, Department of Psychology, University of Houston, Houston, TX 77024, USA.*

C. FLAHERTY & P. ESLINGER. Executive Functioning Abilities as Prognostic Indicators of Psychosocial Success Following Surgery for Temporal Lobe Epilepsy.
The relationship between presurgical executive deficiencies and psychosocial outcome following surgical relief of temporal lobe epilepsy remains inexplicit. We hypothesized that analysis of the preoperative executive profile would reveal traits predictive of psychosocial outcome, measured by the Washington Psychosocial Seizure Inventory, unaffected by seizure-free status following temporal lobectomy. Thirty-eight patients (18 left, 20 right) assessed pre- and postoperatively, completed four executive functioning measures: Controlled Oral Word Association (COWA), Dichotic Listening, Trail Making (TM), and The Wisconsin Card Sort. Preoperative deficiencies in COWA predicted poor psychosocial outcome in financial status and vocational adjustment, while preoperative deficiencies in TM were prognostic for poor interpersonal adjustment. Findings suggest that the preoperative executive profile may serve as a reliable prognostic indicator of postoperative psychosocial outcome following surgical relief of TLE.
Correspondence: *Claire Flaherty, Division of Neurology, Pennsylvania State University, Hershey Medical Center, Hershey, PA 17033, USA.*

Symposium 11/11:00 a.m.–12:30 p.m.

THE ORGANIZATION OF REMOTE MEMORIES IN THE BRAIN: CLUES FROM RETROGRADE AMNESIA

Organizer and Chair: D.P. Salmon

B. LEVINE. The Organization of Remote Memories in the Brain: Clues from Retrograde Amnesia.
Retrograde amnesia has spurred considerable debate among memory theorists. In this symposium, data from a variety of patient groups will illustrate that retrograde amnesia is not unitary. The degree of deficit, affected memory content domains, and temporal gradients vary according to profiles of damage in diencephalic, medial temporal, and frontal regions. In turn, these factors interact with testing methods. While the extent of hippocampal damage can determine outcome, there is now evidence that forms of retrograde amnesia can occur without structural hippocampal lesions. In such cases, lesions affecting frontal cortex or its connections to subcortical and temporal regions are critical.
Correspondence: *Brian Levine, Rotman Research Institute of Baycrest Centre, 3560 Bathurst Street, North York, ON M6A 2E1, Canada.*

D.P. SALMON. Retrograde Amnesia in Dementia.
Most demented patients exhibit an impaired ability to recollect information that was known prior to the onset of their dementing disorder (i.e., retrograde amnesia). In a series of studies, we demonstrated that Huntington's disease (HD) patients exhibit a mild retrograde amnesia that is equally severe across all decades, perhaps due to a general retrieval deficit attrib-

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

utable to their extensive frontostriatal damage. In contrast, patients with dementia of the Alzheimer's type (DAT), who have hippocampal and cortical damage, exhibit severe, temporally graded retrograde amnesia (i.e., better recall of distant than recent memories). This pattern is consistent with inadequate consolidation and may reflect a failure of personal episodic memory to become a part of semantic memory with repeated rehearsal or reexposure over time.
Correspondence: *David P. Salmon, Department of Neurosciences (0948), University of California, San Diego, CA 92093-0948, USA.*

M. KOPELMAN & N. STANHOPE. Retrograde Amnesia in Focal Lesions.
A comparison will be made of patterns of retrograde memory loss in patients with focal brain lesions across a wide variety of tasks. In particular, evidence from recognition and cued recall will be used to suggest a retrieval component to the deficit. Evidence from quantitative MRI and PET studies, as well as performance on other cognitive tasks, will be used to examine the relationship of retrograde amnesia to the extent of hippocampal damage, cortical damage, and other cognitive impairments.
Correspondence: *Michael Kopelman, Division of Psychiatry and Psychology, UMDS (University of London), St. Thomas's Hospital, London SE1 7EH, UK.*

B. LEVINE, R. CABEZA, S. BLACK, M. SINDEN, E. TULVING, & D.T. STUSS. Reorganized Brain Systems Support New Learning in a Case of Retrograde Amnesia Following Traumatic Frontal–Temporal Disconnection.
Structural and functional neuroimaging were used to describe the neural substrates of impaired and spared mnemonic abilities in a case of dense focal retrograde amnesia precipitated by severe traumatic brain injury (TBI). MRI indicated traumatic transection of the frontal projections of the right uncinate fasciculus, a frontal-temporal band of fibers previously hypothesized to be involved in retrieval of personal episodic memories. On an $H_2[^{15}O]$-PET activation paradigm that reliably elicits right frontal activation at retrieval and left frontal activation at encoding, the patient showed reduced right frontal polar and increased left hippocampal rCBF during retrieval as compared to 12 healthy controls and 6 carefully matched TBI controls. The results suggest that frontal–temporal disconnection disrupts access to old memories and that new learning is accomplished through a reorganized neural system.
Correspondence: *Brian Levine, Rotman Research Institute of Baycrest Centre, 3560 Bathurst Street, North York, ON M6A 2E1, Canada.*

M. MOSCOVITCH & L. NADEL. Consolidation and Remote Memory: Evidence from Amnesia.
Results from recent studies of retrograde amnesia following damage to the hippocampal complex of human and nonhuman subjects have shown that retrograde amnesia is extensive and can encompass much of a subject's lifetime; the degree of loss may depend upon the type of memory assessed. These and other findings suggest that the hippocampal formation and related structures are involved in certain forms of memory (e.g., autobiographical episodic and spatial memory) for as long as they exist and contribute to the transformation and stabilization of other forms of memory stored elsewhere in the brain. The frontal lobes, on the other hand, are needed to initiate and guide memory research and to monitor and verify the memories that are recovered. Evidence from the literature and from our own studies of remote memory will be presented to support these theoretical claims, and to suggest a neuropsychological model of remote memory.
Correspondence: *Morris Moscovitch, Rotman Research Institute of Baycrest Centre, 3560 Bathurst Street, North York, ON M6A 2E1, Canada.*

SATURDAY AFTERNOON, FEBRUARY 7, 1998

Paper Session 16/1:30–3:10 p.m.

PEDIATRICS-8: DEVELOPMENT

A. BOUMA, J.W. VAN STRIEN, M.I. GEERLINGS, & W. KRAAY. Word Recognition in Adult Dyslexics: Effects of Regularity and Word Length in Lexical Decision Tasks.
The present study was designed to investigate the nature of word recognition deficits in adult dyslexics. Lexical decision tasks were employed by asking subjects to discriminate words (regular and irregular words) from pseudowords. The effect of word length was examined by presenting stimuli of four, five, or six letters. Compared to controls, the results revealed that dyslexics needed much more time to read pseudowords than to read familiar words. Moreover, dyslexics exhibited a strong word length effect, irrespective of the type of word stimuli, while the controls did not. None of the groups showed a significant regularity effect. Although dyslexics appear to be capable of using a lexical reading strategy, the results suggest that they also rely heavily on a serial, phonological processing strategy, presumably as an extra check in word recognition.
Correspondence: *Anke Bouma, Department of Clinical Psychology, Vrije Universiteit, De Boelelaan 1109, 1081 HV Amsterdam, The Netherlands.*

M. SEMRUD-CLIKEMAN, K. HARRINGTON, A. CLINTON, B. CONNOR, & L. SYLVESTER. Attention Functioning in Two Groups of ADHD Children With and Without Attention Training Intervention.
Utilizing a multimodal and multi-informant method for diagnosis, children were selected by teacher nomination with attention and work completion problems, and those without such difficulties. Children in the attention group showed significantly poorer performance on the visual attention task, measures of visual–motor ability, and perceptual analysis. Problems were also present on measures of auditory attention, vocabulary development, and cognitive flexibility. Prior to the intervention, children were divided into three groups: ADHD–non-intervention, ADHD–intervention, and controls. Children in both attention groups showed significantly poorer initial performance on the visual attention task. While the ADHD–intervention group showed commensurate performance to the normal control group after training, the ADHD control group did not show significant improvement over that same period of time. Auditory attention was poorer compared to the control group for both ADHD groups initially and improved only for the ADHD–intervention group.
Correspondence: *Margaret Semrud-Clikeman, Department of Educational Psychology, SZB 504, University of Texas, Austin, TX 78712-1296, USA.*

A. HEMPEL & G. RISSE. Factors Related to Reorganization of Language in Pediatric Epilepsy Patients.
This study examined the relationship between atypical language lateralization (as assessed with the intracarotid amobarbital procedure (IAP)) and several variables, including age of seizure onset, gender, family history of left-handedness, and etiology of seizures. Patients were 18 male and 18 female pediatric epilepsy patients who evidenced a clear left-hemisphere seizure onset during long-term video EEG recording. Eight of 9 patients who displayed evidence of an early structural lesion on MRI (e.g., cortical dysplasia, prenatal stroke) were found to be right hemisphere dominant for language. Of the remaining 27 patients, atypical language lateralization (right or bilateral) was more likely among females than males, patients with early seizure onset and, in families only, those with a first degree left-handed relative.
Correspondence: *Ann Hempel, Minnesota Epilepsy Group, P.A., 310 N. Smith Avenue, Suite 300, St. Paul, MN 55102, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

K. KERNS & N. WILDE. A New Measure of Prospective Memory in Children: Results from Developmental and Clinical Samples.
This study describes a new computerized measure of prospective memory (PM) designed for children. PM can be defined as the timely execution of a previously formed intention, and is critical in daily life because of its inherent involvement in goal directed behavior. Systems involved in prospective memory have been linked to the prefrontal cortex and related to working memory and executive functions. Here, PM is examined in a "driving game" task. In a sample of 80 children, aged 6–12 years, variables from this task demonstrated a significant age effect and were significantly correlated with other well known measures of executive function. In a smaller clinical sample comparing ADHD and control subjects, several aspects of performance on the PM task demonstrated significant differences between the groups.
Correspondence: *Kimberly Kerns, Department of Psychology, University of Victoria, Victoria, BC V8W 3P5, Canada.*

J.H. KRAMER, D.C. DELIS, & E. KAPLAN. The Development of Executive Functioning in Normal Children.
The development of different aspects of executive functioning was evaluated by administering 9 subtests from the Delis–Kaplan Executive Function Scale (D–KEFS) to 109 unimpaired children between the ages of 8 and 18. Factor analysis indicated three main components of executive ability: Reasoning–problem solving; processing speed–fluency; and inhibition of overlearned or previously established response patterns. Univariate analyses indicated that processing speed–fluency developed through age 18, while peak performance on the reasoning–problem solving factor peaked at age 15. There appeared to be fairly early developing in the ability to inhibit responses, with adult level performance reached by age 9 or 10. Results support the view that "executive functioning" is heterogeneous and can be fractionated into subcomponents that have different development vectors.
Correspondence: *Joel H. Kramer, Department of Psychiatry, UC-Medical Center, San Francisco, CA 94143, USA.*

M. FISCHER, R.A. BARKLEY, K.F. FLETCHER, & L. SMALLISH. Persistence of ADHD into Adulthood: It May Depend on the Informant.
Previous prospective studies of ADHD children found an elevated risk (11–36%) for continuation of the disorder into adulthood. A recent reanalysis of longitudinal studies estimated the persistence of childhood ADHD to be even lower, about 0.8% at age 20. However, this reanalysis had methodological flaws including its failure to consider the use of different types of measures in childhood *versus* adulthood. We followed 148 (of 158) children diagnosed with hyperactivity and 76 (of 81) control children for 15 years into their early 20s. When self-report measures were examined, we found a rate of persistence around 25%, consistent with other studies. However, parent report measures suggested that the rate of persistence is much higher (58–68%). Reasons for this discrepancy are discussed.
Correspondence: *Mariellen Fischer, Section of Neuropsychology, Department of Neurology, Medical College of Wisconsin, 9200 W. Wisconsin Avenue, Milwaukee, WI 53226, USA.*

Paper Session 17/1:30–3:10 p.m.

TRAUMATIC BRAIN INJURY-3

A.K. SOLBAKK, I. REINVANG, K. SUNDET, & C. NIELSEN. ERP Indicators of Disturbed Attention in Mild Closed Head Injury.
Neuropsychological test results (FAS, TMT, Stroop) and measures of cerebral event related potentials (ERPs) during selective attention were studied in patients with mild closed head injuries ($N = 12$) and healthy controls ($N = 12$). A dichotic listening paradigm was used to assess the differential processing between attended and nonattended auditory stimuli (processing negativity). ERPs related to processing negativity differed between the groups. Head injured patients showed reduced Nd1 amplitudes and increased Nd2 latencies compared to controls. ERP parameters contributed significantly to predicting group membership when added to neuropsychological data.
Correspondence: *Anne-Kristin Solbakk, Institute of Psychology, University of Oslo, P.B. 1094, Blindern, 0317 Oslo, Norway.*

J. PONSFORD, C. WILLMOTT, A. ROTHWELL, P. CAMERON, A. KELLY, G. AYTON, R. NELMS, & C. CURRAN. Outcome Following Mild Traumatic Brain Injury in Adults.
This study examined outcome three months after mild traumatic brain injury (TBI) and the impact of early assessment and information provision. One hundred twenty mild TBI adults were assessed 1 week and 3 months postinjury and 126 at 3 months only. Reported symptomatology and performances on measures of attention, speed, memory, and psychological adjustment were compared with two matched control groups. Mild TBI subjects reported more symptoms than controls at 1 week, but few differences were apparent on neuropsychological measures. Although initial problems had generally resolved by 3 months, a subgroup (18%) had significant ongoing problems. They were more likely to be females, students, have neck–back pain, have been injured in motor vehicle accidents and/or have other stresses in their lives. The group not seen at 1 week and given information was more depressed.
Correspondence: *Jennie Ponsford, Department of Psychology, Bethesda Hospital, 30 Erin Street, Richmond 3121, Victoria, Australia.*

G. IVERSON, M. FRANZEN, M. LOVELL, & S. SMITH. Complicated *Versus* Uncomplicated Mild Head Injury.
The purpose of this study was to investigate the neuropsychological functioning of patients with either a complicated or an uncomplicated mild head injury. Participants were 620 patients with Glasgow Coma Scale scores between 13–15 who underwent CT scanning at admission. All patients were administered a brief battery of tests within approximately 72 hr of injury; most were completed on the day of injury. At the time of testing, the patients were not experiencing posttraumatic amnesia, as assessed by the Galveston Orientation and Amnesia Test. Patients with acute complicated mild head injuries (i.e., those with CT abnormalities) performed more poorly on most measures of attention, learning, and memory than patients with acute uncomplicated mild head injuries. A disproportionate number of patients with complicated head injuries fell in the *impaired* classification range on the neuropsychological measures. The complicated–uncomplicated distinction needs to be addressed in future research regarding mild head injury.
Correspondence: *Grant Iverson, Department of Psychiatry, University of British Columbia, 2255 Wesbrook Mall, Vancouver, BC V6T 2B4, Canada.*

C. BOAKE, M. MacLEOD, W.M. HIGH, Jr., & L.D. LEHMKUHL. Increased Risk of Motor Vehicle Crashes Among Drivers with Traumatic Brain Injury.
The traffic violation records of 56 persons who resumed driving after traumatic brain injury (TBI) were compared to the 1989–91 state population of licensed drivers. The annual rate of motor vehicle crashes was significantly higher in the sample (.106–.135) than in the population (.057–.066), even after adjusting for sex and age differences between the sample and population. Since the sample included mostly persons with moderate to severe TBI, the results should not be generalized to all drivers with TBI. It is possible that the higher crash rate in the sample was due to preinjury driving habits, in addition to the direct effects of brain injury.
Correspondence: *Corwin Boake, TIRR, 1333 Moursund, Houston, TX 77030, USA.*

A.M. SANDER, R.T. SEEL, & J.S. KREUTZER. Relationship Between Everyday Neurobehavioral Problems and Neuropsychological Test Performance in Patients with Traumatic Brain Injury.
The current study investigated the relationship between everyday neurobehavioral difficulties and neuropsychological test performance in 309 patients with traumatic brain injury. The full range of injury severity was

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

represented with most patients (64%) having sustained mild injury. Patients and family members completed the Neurobehavioral Functioning Inventory (NFI), which assesses patients' everyday problems. Patients also completed a battery of neuropsychological tests assessing memory, attention, expressive language, and motor functioning. Correlation coefficients revealed minimal relationship between patients' ratings of functioning and test performance. In contrast, family members' ratings were significantly related to patients' test performance in the areas of memory, attention, communication, and motor functioning. Patients with mild injury endorsed more difficulties in memory, attention, and motor functioning.
Correspondence: *Angelle Sander, Brain Injury Research Center, 4007 Bellaire Boulevard, Houston, TX 77025, USA.*

T. HART, T. CAREW, M. MONTGOMERY, & M. SCHWARTZ. Awareness of Errors in Naturalistic Action Following Traumatic Brain Injury.
Subjects with severe traumatic brain injury (TBI) and uninjured controls were videotaped while performing a set of standardized naturalistic action tasks (e.g., packing a lunchbox) developed by Schwartz et al. A coding system was developed to assess subjects' awareness of errors (which included corrections and attempted corrections) as they occurred on-line. Even when base rate of errors was controlled, subjects with TBI demonstrated significantly lower rates of error awareness than controls. However, error awareness was variable in both groups, partly as a function of the difficulty of the task and the types of errors studied. Reduced ability to detect–correct on-line errors may contribute to clinical phenomena of unawareness of deficit in TBI.
Correspondence: *Tessa Hart, Drucker Brain Injury Center, Moss Rehab Hospital, 1200 W. Tabor Road, Philadelphia, PA 19141, USA.*

Symposium 12/1:30–3:30 p.m.

THE INTRACAROTID AMOBARBITAL PROCEDURE REVISITED: CONTEMPORARY RELEVANCE IN THE FACE OF NEW TECHNOLOGY

Organizer and Chair: Gail L. Risse

G.L. RISSE. The Intracarotid Amobarbital Procedure Revisited: Contemporary Relevance in the Face of New Technology.
The intracarotid amobarbital procedure (IAP) remains the accepted standard for determining hemispheric dominance for language and for assessing risk of amnestic outcome following unilateral temporal lobectomy. Recently, the development of functional imaging techniques has raised questions concerning the continued appropriateness of IAP for assessing language lateralization given the associated medical risk. This symposium will examine the relative value of language and memory data obtained in IAP compared to fMRI and functional mapping with subdural electrode array (SEA). In addition, the ability of IAP memory data to predict hemisphere of seizure onset and postoperative memory outcome will be reviewed and compared to other diagnostic measures including mesial temporal volumetric MRI and histopathologic analysis of the hippocampus. It is concluded that newer methods of functional localization can enhance but not replace the IAP at this time.
Correspondence: *Gail L. Risse, The Minnesota Epilepsy Group, 310 North Smith Avenue, Suite 300, St. Paul, MN 55102, USA.*

S. J. SWANSON, J.R. BINDER, T.A. HAMMEKE, J.A. FROST, J.A. SPRINGER, P.S.F. BELLGOWAN, M. FISCHER, G.L. MORRIS, & W.M. MUELLER. Functional Magnetic Resonance Imaging (fMRI) is Not Currently a Replacement for Wada Testing.
fMRI, a noninvasive method that provides detailed functional maps of the human brain, has the potential for making Wada testing obsolete. Initial studies on the correlation between Wada and fMRI language laterality scores are promising, but more data is needed before fMRI can be used as a clinical tool for making predictions about an individual patient's seizure focus and postsurgical cognitive and seizure outcome. While fMRI may eventually provide localization maps within the hemisphere of surgical interest, clinical use of such maps awaits validity studies. Previous Wada–fMRI studies are reviewed, needed studies are outlined, and new preliminary data on concurrent (compared to intraoperative stimulation mapping) and predictive (compared to cognitive outcome) validity are presented. At present fMRI is not a viable replacement for Wada testing.
Correspondence: *Sara J. Swanson, Section of Neuropsychology, Department of Neurology, Medical College of Wisconsin, 9200 W. Wisconsin Avenue, Milwaukee, WI 53226, USA.*

G.L. RISSE, J.R. GATES, J.C. LIN, C.L. TRUITT, C.A. NELSON, A. HEMPEL, & M.C. FANGMAN. Language Localization: A Comparison of Data from IAP, fMRI, and Cortical Mapping with SEA.
The intracarotid amobarbital procedure (IAP) and cortical mapping with subdural electrode array (SEA) are well established but invasive procedures for lateralizing and localizing language cortex. The recent introduction of functional magnetic resonance imaging as a noninvasive alternative is very promising. In this study, data from 11 epilepsy surgery candidates who underwent all three procedures is compared. IAP and SEA language data was concordant in all language modalities assessed. fMRI was limited to a single subvocal word generation task and was consistent with IAP language lateralization in 8 of 11 cases (73%), and frontal lobe SEA localization in 4 of 6 cases. Comparison of SEA cortical language maps to fMRI frontal and temporal activation sites will be presented and directions for future research will be discussed.
Correspondence: *Gail L. Risse, The Minnesota Epilepsy Group, 310 North Smith Avenue, Suite 300, St. Paul, MN 55102, USA.*

B.P HERMANN. Mesial Temporal Lobe Epilepsy: Hippocampal Sclerosis, Material-Specific Memory Impairment, and Wada Test Memory Asymmetry.
The syndrome of mesial temporal lobe epilepsy (MTLE) is a surgically remediable condition, the core features of which include hippocampal sclerosis and onset of recurrent seizures and/or initial precipitating injury within the first decade of life. A variety of symptom complexes have been proposed to characterize MTLE, including material-specific memory impairments and Wada Test memory asymmetry. This presentation will review the syndrome of MTLE, the core neuropathological substrate (hippocampal sclerosis), and the relationship between the presence–degree of hippocampal sclerosis, material-specific memory impairment, Wada Test memory asymmetry, and pre- to postoperative memory change.
Correspondence: *Bruce Hermann, Department of Neurology, University of Wisconsin, Madison, WI 53792, USA.*

M.R. TRENERRY, C.R. JACK Jr., G.D. CASCINO, F.W. SHARBROUGH, & E.L. SO. Wada Memory Test Performance and Volumetric Magnetic Resonance Imaging.
This paper provides a review and update on relationship between Wada testing, volumetric MRI, and quantitative T2 relaxometry in temporal lobectomy (TL) patients. Independent reports indicate that Wada memory performance predicts postoperative seizure control, and memory outcome following TL. Wada stimulus type and presentation timing are significant in determining Wada Test performance. Loring et al. report that Wada memory asymmetry and MRI hippocampal volume asymmetry are correlated ($r = -.78$) in TL patients. Our data demonstrate a relationship between Wada memory asymmetry and (1) the difference between hippocampal quantitative T2 signal ($N = 8$, $r = .86$), and (2) hippocampal volume asymmetry ($N = 9$, $r = -.71$). No direct comparison of Wada and MRI for prediction of postoperative seizure control or memory outcome currently exists.
Correspondence: *Max Trenerry, Division of Psychology, Mayo Clinic, 200 1st Street S.W., Rochester, MN 55905, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press

I. ROULEAU, J. ROBIDOUX, K. LAFLAMME, R. LABRECQUE, & C. DENAULT. Memory Testing During the Intracarotid Amobarbital Procedure (IAP): Reliability of Late Item Presentation.
Memory items presentation during IAP often cannot be completed during maximal EEG delta. This study assesses the reliability of late items in detecting contralateral temporal lobe dysfunction. Twenty unilateral temporal lobe epilepsy patients received right and left IAP on successive days. Seven to 8 min after injection (20–30% delta), three objects were shown one at a time to be named and remembered by the subject. Recognition memory was assessed at 1 min (short-term memory; STM) and 10 to 15 min (long-term memory; LTM) following presentation. For the STM measure, no effect of site (ipsilateral *vs*. contralateral) was observed. However, for the LTM measure, greater impairment followed injection contralateral to the epileptic focus ($p < .001$). No correlation between memory results and time since injection or percentage of delta during item presentation was observed. Methodological factors (timing, type of stimuli and processing, etc.) will be discussed.
Correspondence: *I. Rouleau, Service de neurologie, Hopital-Notre-Dame, 1560 Sherbrooke est, Montreal, QC H2L 4M1, Canada.*

Symposium 13/1:30–3:30 p.m.

ETHNICITY, CULTURE, AND NEUROPSYCHOLOGY

Organizer: Jennifer J. Manly
Chair: S. Walden Miller

J. J. MANLY & S.W. MILLER. Ethnicity, Culture, and Neuropsychology.
Despite widespread use and validity of neuropsychological measures in many settings, lack of proper validation among ethnic minorities and non-English speakers may lead to decreased sensitivity and specificity of tests when used in culturally diverse settings. This symposium presents an overview of recent cross-cultural research, focusing on how investigations of culturally and linguistically diverse groups can offer an ultimate assessment of construct validity for cognitive tests. Presentations include: 1) the relationship of performance on a measure of executive functioning among Spanish-speaking individuals with diverse educational and cultural experiences, 2) clinical competence for assessment of Hispanics, 3) cognitive assessment of HIV infection in a multiethnic sample, 4) acculturation and neuropsychological test performance among African American elders from two geographical regions, and 5) test-retest data from a neurologically normal African American sample.
Correspondence: *Jennifer Manly, Ph.D., G.H. Sergievsky Center, 630 W. 168th Street, New York, NY 10032-3702. Email: manlyje@sergievsky.cpmc.columbia.edu.*

L. ARTIOLA i FORTUNY, R.K. HEATON, & D. HERMOSILLO. Neuropsychological Comparisons of Spanish-Speaking Subjects from U.S.-Mexico Border Region *Versus* Spain: The Wisconsin Card Sorting Test.
Over the past four years we have been conducting a normative study of a variety of neuropsychological instruments with two populations of Spanish-speaking subjects. The project has provided normative data for approximately 400 Spanish-speaking persons from 15 to 75 years of age, with 0 to 20 years of formal education. In this symposium we focus on results obtained by subjects from Spain and the U.S./Mexico Borderland area in a test of mental flexibility, the Wisconsin Card Sorting Test. We present results indicating that, for subjects from the U.S. Mexico Borderland, residence in the United States correlates with success in completing this task. We coment on the possible inappropriateness of administering this test to individuals with low levels of education.
Correspondence: *Lidia Artiola i Fortuny, Ph.D., 5930 E. Pima Street, Ste 208, Tuscon, AZ 85712, USA.*

M. PONTÓN. Cultural Competence in the Neuropsychological Assessment of Hispanics.
Neuropsychological assessment of Hispanic populations is affected by a number of problems including the lack of appropriate measures and norms. The impact of culture on the evaluation process is reviewed, providing data and guidelines as to what constitutes a competent clinical evaluation with this population. Social scripts and attitudes are reviewed as they impact the role of the psychologist and the researcher with this population. Specific guidelines for the clinician and researcher are provided in order to help neuropsychologists better understand this population and to impact the quality and quantity of services provided to this growing segment of the American population.
Correspondence: *Marcel Pontón, Ph.D., Harbor-UCLA Medical Center, Building F-9, 1000 W. Carson St., Torrance, CA 90509, USA.*

R.S. DURVASULA, E.N. MILLER, H. MYERS, P. SATZ, & G.E. WYATT. Neuropsychological Performance and HIV in Ethnic Minority Samples of Women and Men: Serostatus Effects, Comparative Data, and Methodological Considerations.
Data were gathered on neuropsychological sequelae of HIV infection as part of two large studies of HIV-infected, multiethnic women (N=190) and men (N=237). Women demonstrated slower motor speed as a function of HIV serostatus while slower sequential reaction time as a function of symptom status was noted for men only. No HIV serostatus differences for either men or women were obtained on other measures of psychomotor speed, memory, or attention. While differences in education or other demographics, may partially account for the dissociation between the men's and women's samples—other issues, including the differential contribution of substance use will be addressed. Characterization of samples, test selection, and other methodological issues will be highlighted.
Correspondence: *Ramani S. Durvasula, Department of Psychiatry and Biobehavioral Sciences, UCLA Neuropsychiatric Institute, Room C9-533, Los Angeles, CA 90024, USA.*

J.A. LUCAS. Acculturation and Neuropsychological Test Performance in Elderly African Americans.
The relationship between acculturation and neuropsychological test performance was examined in 110 normal elderly African Americans participating in Mayo's Older Americans Normative Studies (MOANS). The degree to which participants identified with traditional African American values was measured using the short form of the African American Acculturation Scale (AAAS-33; Klonoff & Landrine, 1995). Hierarchical regression analyses revealed a significant relationship between acculturation and performance on verbal cognitive measures, with AAAS-33 scores accounting for an additional 4–6% of the variance beyond that accounted for by age, sex, and years of education. Acculturation was not related to performance on nonverbal measures. Results suggest that differences in cultural experiences within the African American community may have a differential impact on some neuropsychological test results.
Correspondence: *John A. Lucas, Department of Psychiatry and Psychology, Mayo Clinic Jacksonville, 4500 San Pablo Rd., Jacksonville, FL 32224, USA.*

J. J. MANLY, D.M. JACOBS, M. SANO, K. BELL, C.A. MERCHANT, S.A. SMALL, & Y. STERN. African American Acculturation and Neuropsychological Test Performance Among Nondemented Community Elders.
The relationship of within-group cultural variation to neuropsychological test performance was investigated among 52 randomly selected African American elders who reside in Northern Manhattan. A comprehensive neuropsychological battery and the 33-item African American Acculturation Scale were administered. Participants had no neurological or functional signs of dementia as determined by a neurologist. Multiple regression analyses showed that after accounting for age, years of education, and gender, less acculturated elders obtained significantly lower scores on measures of figural memory, naming, repetition, drawing, and figure matching. Findings suggest that certain measures may have reduced specificity for the detec-

tion of dementia among unacculturated elders, because they assess cognitive abilities which may not be salient within traditional African American culture.

Correspondence: *Jennifer Manly, Ph.D., Gertrude H. Sergievsky Center, 630 West 168th Street, New York, NY 10032-3702. E-mail: manlyje@sergievsky.cpmc.columbia.edu.*

S.W. MILLER, R.K. HEATON, J.A. McCUTCHAN, R. HOUGH, I. GRANT, I. ABRAMSON, & THE HNRC GROUP. African American Neuropsychological Retest Performance.

One year following the completion of an initial neuropsychological evaluation, 25 female and 35 male neurologically normal African American adults, ranging in age from 18–64 years, were retested using the same, expanded Halstead-Reitan battery used at baseline. Practice effects were observed on several of the tests but not on others. The test results of males and females in equivalent age and education strata were roughly the same at baseline and remained so at retest. In this study of normal African American retest performance, comparisons were made with the retest performance of age, education, and gender-matched normal White subjects. In addition we report comparisons between HIV positive Whites and African Americans, and examine the differences found between normal and HIV positive African Americans. The study has provided the opportunity to document test-retest reliability over an extended (one year) period of time and to establish confidence intervals for determining meaningful change, stability, or expected magnitude of practice effects, and base rates of expected change.

Correspondence: *S.W. Miller, Department of Psychiatry, HNRC, University of California, San Diego, 2760 5th Avenue, San Diego, CA 92103, USA.*

https://doi.org/10.1017/S1355617798000010 Published online by Cambridge University Press