

# Abstracts Presented at the Seventeenth Annual International Neuropsychological Society European Conference

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## Paper Session 1

### HEMISPHERIC ASYMMETRY

**A.C. PAPANICOLAOU, W.T. BOURBON, & P.M. PLENGER.** The Effect of Transcranial Magnetic Stimulation on the Perception of Speech Sounds.

The efficacy of Transcranial Magnetic Stimulation (TMS) as a means of assessing hemispheric specialization for the perception of speech was investigated using a series of eight normal dextral adults. Speech sounds consisting of a stop consonant and the vowel /a/ were presented monaurally via insert ear phones to either the left or the right ear while a single brief magnetic pulse was simultaneously delivered in the contralateral hemisphere over the temporal-parietal region. Error rates in identifying and repeating the syllables were significantly higher when TMS was delivered in the left hemisphere. This effect was observed in six of the eight participants. These results attest to the feasibility of using TMS as a means of interfering focally with on-going cortical function, and to the likelihood that it could be developed into a non-invasive method of performing cortical mapping.

**N. WEEKES & E. ZAIDEL.** The Effects of Steroid Hormones on Inter-hemispheric Interactions: Between- and Within-Subject Analyses.

Steroid hormones can affect behavior either through organizational or activational effects on the nervous system. We hypothesize that general sex differences are attributable to the more stable, organizational effects, while within-subject differences are more sensitive to transient, activational effects. We further posit that the two types of effects account for variations in different neural mechanisms. Specifically, variations in hemispheric specialization may result from organizational effects while changes in callosal connectivity, although sensitive to both, may be more sensitive to activational effects. It is, therefore, predicted that males and females will differ more in hemispheric specialization than callosal connectivity, whereas within-subject variations such as those found across the menstrual cycle or across season will reflect changes in callosal connectivity more than hemispheric specialization. Data testing these predictions will be presented from both dichotic listening and lateralized lexical decision tasks.

**E. ZAIDEL, J. RAYMAN, A. PASSAR-OTTI, & N. WEEKES.** Implicit Interhemispheric Transfer in the Split Brain.

Normal subjects and two patients who had complete cerebral commissurotomy participated in two priming experiments with prime and target either within the same visual hemifield (VF) or in opposite VFs. A strong test for the existence of implicit priming between the disconnected hemispheres would require (1) theoretically predictable (TP) differential priming effects within each normal hemisphere, (2) a TP discontinuity in priming across the vertical meridian in the normal brain, (3) a TP differential priming in each disconnected hemisphere consistent with the pattern in normals, and (4) a TP, reliable and consistent priming across the disconnected hemispheres. The first experiment involved covert orienting of spatial attention. The data suggested the existence of independent attentional systems in the two hemispheres and evidence for some interhemispheric priming in splits but they failed to satisfy conditions (2), (3), and (4). The second experiment involved a modified Stroop test. The data showed independent hemispheric processing and some interhemispheric priming in splits, but failed to satisfy conditions (1), (3), and (4). The results also show that Speed of Processing and Automaticity accounts of the Stroop effect are wrong.

**H. FRUH, M. REGARD, N.D. COOK, & T. LANDIS.** Deficit of Acallosal Subjects to Neglect the Irrelevant Hemifield in a Lexical Decision Task.

Two acallosal subjects and one patient with subtotal corpus callosum agenesis were presented with a lexical decision task, requiring a response with the hand ipsilateral to the cued stimulus. The cue consisted of an arrow, which was presented in the central visual field simultaneously with bilaterally presented words and nonwords, pointing either to the left or right side. Overall, performance was worse than in a normal control group. While the hemifield differences were larger for bilaterally presented stimuli in the normal group, the effect of trial types on hemifield advantages in the corpus callosum agenesis (CCA) group remains unclear. The most interesting deficit exhibited by the corpus CCA group was the inability to neglect the irrelevant side. That is, CCA patients gave about half of the responses with the incorrect hand or with both hands instead of the hand ipsilateral to the cued stimulus. Furthermore, in a test where subjects had to respond with each hand independently to the ipsilaterally presented stimulus, they performed much worse on word-nonword pairs than on word-word and nonword-nonword pairs. As possible factors for the deficits are discussed: 1) an inability to control complex hemisphere interactions, 2) insufficient suppression of ipsilateral motor pathways, and 3) impaired selective attention due to further brain anomalies of this patient group.

**E. ISAACS, D. CHRISTIE, M. MISHKIN, & F. VARGHA-KHADEM.** *Functional Ear and Hand Asymmetries in Hemiplegic Children: The Effects of Side of Injury, Age at Injury and Seizure Disorder.* The effects of side of injury, age at injury and seizure disorder on auditory, motor and intellectual functions were examined in a large group of hemiplegic children. In the absence of seizures, damage to either hemisphere led to hand function impairments, but IQ and report accuracy for dichotically presented digits were preserved. The presence of a seizure disorder adversely affected all these functions. Some children with congenital left hemisphere lesions (with and without seizure disorder) had altered ear asymmetry, i.e., a left instead of the normal right ear advantage. These children showed greater impairment in the right hand than the others, suggestive of a particularly extensive left-hemisphere lesion that may have encroached on language areas on the left, shifting language representation to the right.

### Symposium 1

#### REMEDICATION OF MEMORY DISORDERS

**J. COCKBURN.** *Remediation of Memory Disorders.*

Although memory deficits are among the most common cognitive sequelae of brain damage, attempts at remediation have met with limited success. The purpose of this symposium is to illustrate theoretically sound approaches that have viable clinical application. Individual papers discuss use of vanishing cues (paper 1) and errorless learning (paper 2) in severe amnesia, remediation of memory with associated executive impairments after traumatic brain injury (paper 3), special considerations of patients with MS (paper 4), and durability of late-stage memory remediation (paper 5). All the papers share common themes of learning of new information, use of implicit memory, provision of structure, generalisability; evaluation of effectiveness, and discuss limitations of the techniques.

**E. GLISKY.** *Can Implicit Memory Facilitate Rehabilitation?*

This paper describes the theoretical basis for an approach to the rehabilitation of memory-impaired patients and describes the conditions under which such an approach may be successful. Given that amnesic patients have preserved implicit memory processes, rehabilitation strategies may be able to take advantage of these processes to compensate for those that are damaged or lost. Findings from studies of domain-specific learning by amnesic patients and from basic experimental work in implicit memory, however, suggest some constraints on this approach such that it may be limited to the learning of single items or non-arbitrary associations.

**B.A. WILSON, J. EVANS, & A.D. BADDELEY.** *Trial-and-Error vs. Errorless Learning.*

We describe experiments comparing trial-and-error learning with errorless learning for teaching new information to people with severe memory impairment. In trial-and-error learning subjects are given the information to be learned and then tested. Errors may occur during testing. The procedure is repeated for a specific number of trials. In errorless learning subjects are prevented from making mistakes (as far as possible) during learning trials by for example providing written instructions or by physically guiding subjects through a task before testing. We provide evidence to suggest that errorless learning is superior to trial-and-error for some people and some tasks. We also discuss the practical problems in applying errorless learning to real life tasks.

**K.A. BEERS.** *Training Diary Usage in TBI Patients With Memory Impairments and Executive Problems.*

TBI patients can suffer from persistent memory and executive problems. To increase their level of independence, patients were trained to use a diary as a compensating strategy. The training is executed by all members of the rehabilitation team in an inpatient setting, in all relevant situations. The use of a diary consists of the following subskills: planning activities using written instructions, initiating these activities, summarizing and writing down important information after activities have been done. Training results of  $\pm 20$  patients are presented. Most patients learn the skills sufficiently, although individual differences exist in duration of training, ability to plan, initiate and summarise. Differences are explained by relating results to neuropsychological test profiles.

**M.P. SMITH.** *Theoretical and Practical Issues in Rehabilitation of Memory Dysfunction in Multiple Sclerosis.*

Studies of cognitive function in multiple sclerosis show memory dysfunction to be one of the most prevalent areas of impairment. Efforts to date are concentrated on assessment rather than remediation. A summary of the recent research findings is presented and the implications for memory rehabilitation with this group are suggested. A practical approach to memory rehabilitation is very briefly described. This is based on the use of compensatory strategies rather than restoration of function and is aimed at individuals with mild physical symptoms. Some of the theoretical and practical issues considered include neuropsychological vs behavioural measures of memory deficits, factors affecting the implementation of therapy programmes, aims of therapy, and evaluating outcome. These are illustrated with examples from clinical cases.

**T.W. TEASDALE & H. OLSEN.** *Memory Remediation: How Durable? How Generalizable? A Follow-up Study of Brain-Injured Patients One Year After a Rehabilitation Program.*

This paper presents results illustrative of two major issues in memory remediation: first whether effects outlast the remediation itself, and second whether they relate to broader aspects of the life of the patient such as independence, employment, and social life. The data stem from a follow-up study of adult brain-injured patients who were tested using an extensive memory test battery prior to, following, and one-year after a rehabilitation program, and for whom wide-ranging outcome measures have also been obtained. The issues of durability and generalizability are discussed on the basis of the findings of the study.

### Poster Session 1

#### AGING AND DEMENTIA

**C. FABRIGOULE, J.F. DARTIGUES, J.M. MAZAUX, & L. LETENNEUR.** *Minor Cognitive Impairments as Predictors of Dementia in Elderly Community Residents.*

The Paquid study on the epidemiology of dementia was specifically designed to look for premonitory symptoms in a random sample of elderly people from the general population. We present here the relationships between the initial assessment of cognitive performances and the risk of subsequent dementia evaluated at the first and the third year of a cohort of 2,792 elderly community dwellers of Gironde (France). Global cognitive performance measured by the MMSE (Folstein et al., 1975), visual memory performance measured by the BVRT (Benton, 1965) and verbal fluency performance measured by the Isaacs Set Test (Isaacs & Kennie, 1973) were independent predictors of dementia and A.D., even after adjustment for age and educational level.

**E. CAPITANI, M. LAIACONA, & R. BARBAROTTO.** Does Education Influence the Age-Related Cognitive Decline? A Further Inquiry. To determine whether the age-related decline of cognitive abilities is related to education, 307 normals aged 40 to 85 entered a cross-sectional study. The battery consisted of five tests, chosen on the basis of their linear decline with age. Of three patterns of interaction between education and cognitive aging, i.e., protection by education, parallel decline and confluence of performances of elders irrespective of education, Verbal Fluency, Spatial Memory and Raven's Progressive Matrices, showed a parallelism and Visual Attention and Verbal Memory, showed protection; confluence was never observed. These results are discussed with special reference to the methodological problems related to this type of inquiry.

**M. JODAR, M. MATARO, J. DEUS, M.A. JURADO, C. GARCIA, & C. JUNQU.** Effect of Normal Aging on Concept Formation and the Ability to Maintain a Mental Set.

Impairment in concept formation and loss of mental flexibility are frontal deficits related to aging. We have studied these frontal functions using the Odd-man-out test, a task that has been previously used in the study of frontal functions in Parkinson's disease. The test was administered to four groups of healthy elderly subjects (ages = 65-69, 70-74, 75-79, 80 or more). We found significant differences between groups in concept acquisition, number of errors and number of perseverative errors. The decline of the ability to maintain a mental set is especially found after 80 years old.

**M. MITRUSHINA & P. SATZ.** Base Rates of the WAIS-R Intersubtest Scatter and VIQ-PIQ Discrepancy in Elderly.

This study provides base rates for WAIS-R VIQ-PIQ discrepancy and for three indices of intersubtest scatter in a sample of high functioning normal elderly. High correlations between indices of scatter, such as 1) range of scatter, 2) Profile Variability Index and 3) number of subtest scores which significantly deviated from the individual's own mean, indicate that easy-to-compute range can be used as an adequate measure of scatter in many clinical settings. The results suggest that bright elderly individuals display a large degree of scatter. The clinician should base judgement regarding abnormality of the WAIS-R indices on the rarity of the value demonstrated by the individual in respect to the sample of comparable age and intelligence level.

**M. KORSNES & S. MAGNUSSEN.** Age Comparisons of Position Effects in Visual Short Term Memory.

In two experiments we examined serial list short term picture memory for order information. Two groups of healthy young (25-35) and older adults (60-75) were contrasted with two categories of visual stimuli (spatial patterns and pictorial words) at three different retention intervals of 5, 15, and 25 seconds. The serial position function is not altered by aging, similar significant changes in the serial position function are demonstrated by increasing the retention interval for both groups. Results are consistent in showing that older adults perform at significant lower levels of accuracy than young adults with the spatial patterns relative to their performance with the pictorial words.

**S. BELLEVILLE, I. PERETZ, & D. MALENFANT.** Working Memory in Normal Aging and Dementia of the Alzheimer Type.

Working memory was examined in patients with dementia of the Alzheimer type, normal elderly and young subjects. The verbal and the attentional components of working memory were under study here. Digit span was found to be substantially decreased in Alzheimer patients, consistent with a working memory deficit. The comparison of span for short and long words in both the auditory and visual modalities evidenced a word length effect: short words yielding better recall than long words. This effect was found in all three groups, suggestive of a normal rehearsal procedure. However, there was evidence of a phonological defect in Alzheimer patients. There was no effect of the phonological similarity

in immediate recall: non-rhyming letters were not better recalled than rhyming letters. There was also a depressed performance in tasks of phonological analysis. This impairment in phonological tasks was not observed in normal elderly when compared to young subjects. Finally, Alzheimer patients were also significantly impaired in a task that required concurrent retention and processing. This is in line with a deficit of the central executive. The results point to the existence of multiple deficits in the working memory of Alzheimer patients: one that affects the central executive component and one that impairs retention under a phonological code.

**M. D'HOLLOSY.** Venous Hypertension: A Reversible Cause of Dementia.

The authors present a patient with a cerebral arteriovenous malformation (AVM) in the occipital-parietal region of the right, non-dominant hemisphere presenting with headache, homonymous hemianopsia, impaired gait and broad, rapidly progressive neuropsychological disturbances. There was no history of hemorrhage. Initial endovascular embolization resulted in disappearance of hemianopsia and a reversal of his dementia. Sixteen months later the patient deteriorated to below his initial demented baseline with concomitant thrombosis of venous sinuses eventuating in surgical resection of the lesion and subsequent resolution of dementia. The authors discuss venous hypertension as an etiology for the creation of a dementia second to a focal lesion and its reversibility through endovascular and surgical treatments.

**M.A. PARCET, J. PUJOL, J.L. MARTI-VILALTA, & C. JUNQU.** Cognitive Correlates of Cerebral Damage in Vascular Dementia. A Quantitative MRI Study.

We studied the relationship between structural lesions seen by brain neuroimaging techniques and several neuropsychological functions in 26 patients with vascular dementia. Neuroimaging evidence suggested the existence of two groups: a multi-infarct group (MIG) and diffuse ischemic group (DIG). At neuroimaging, MIG had a larger volume of infarction and a lesser volume of leukoaraiosis than DIG. Cognitive performance of non-verbal functions was more impaired in MIG than in DIG. Results also showed that this decline in non-verbal functions correlated negatively with leukoaraiosis in MIG and with ventricular enlargement in DIG. Other functions such as language, praxis and speed and attention are more dependent on volume of infarction in the MIG. The results suggest the relevance of subcortical factors on vascular dementia.

**A. KERTESZ, M. POLK, & S. CLYDESDALE.** White Matter Hyperintensities on M.R.I. and Cognition in Vascular Dementia (VAD) and Alzheimer's Disease (AD).

Neuroimaging and cognitive changes correlate to some extent in dementia, but the results depend on the populations studied. Particular difficulty is encountered in the definition of vascular dementia (VAD). We defined dementia as a global deterioration of mental function and excluded strokes causing focal deficit, and quantitated white matter hyperintensities (WMH). Considerable overlap exists between the MRI appearance of clinically defined VAD, AD, and normal aging using the modified ischemic score (4) and Dementia Rating Scale (123) cut-off. Objective scoring of MRIs discriminates AD from VAD better than clinical impression. Patients with higher WMH scores have more cognitive impairment, particularly in comprehension and attention, but patients with atrophy are impaired on memory and conceptualization tasks. Although overall correlation between the extent of WM change and cognition exists, the exceptions decrease the specificity of this finding.

**V. PARLATO, S. CARLOMAGNO, A. IAVARONE, M. PANISSET, G. DALLA BARBA, A. SANTORO, & V. BONAVITA.** Neuropsychological Aspects of Cortical and Subcortical Atrophy in Vascular Dementia Patients.

To evaluate the effect of cortical and subcortical atrophy on cognitive profile of vascular dementia patients (VaD) we selected 102 patients hos-

pitalized at the Institute of Neurological Science of Naples, suffering from vascular dementia according to the criteria proposed by Roman et al. (1993). Neuropsychological profiles were evaluated by means of the Mental Deterioration Battery (Caltagirone et al., 1979); the MMSE, the digit-symbol and the digit and Corsi span. Based on CT scan reports, 20 patients showed cortical atrophy, 12 patients subcortical atrophy, 36 cortical and subcortical atrophy and 34 did not show atrophy. Only the verbal memory Rey's test discriminated the performances of the four groups of patients. Patients with subcortical atrophy (with or without cortical atrophy) performed worse than the other groups.

**S. CARLOMAGNO, V. PARLATO, M. PANISSET, A. SANTORO, V. BLASI, F. BOLLER, & V. BONAVITA.** Neuropsychological Aspects of Leukoaraiosis in Patients with Cerebrovascular Disease or Vascular Dementia.

To determine the effect of leukoaraiosis on the neuropsychological profile of patients suffering from cerebrovascular disease (CVD) with or without dementia, we studied 102 vascular dementia (VaD) patients who met criteria proposed by Roman et al. (1993) and 57 CVD non demented patients. Based on CT scan reports, 52 VaD patients and 29 CVD patients showed leukoaraiosis. Neuropsychological profiles were evaluated by means of the Mental Deterioration Battery (Caltagirone et al., 1979); the MMSE, the digit-symbol and the digit and Corsi span. No difference between VaD or CVD patients with or without leukoaraiosis was observed on all subtests of the battery. Our results showed that leukoaraiosis is not associated with a particular pattern of cognitive impairment.

**V. PARLATO, S. CARLOMAGNO, G. DALLA BARBA, A. SANTORO, A. IAVARONE, F. BOLLER, & V. BONAVITA.** The Role of Depression on Neuropsychological Performances of Patients With Cerebrovascular Disease and Vascular Dementia.

To determine the neuropsychological profile of depressed and non-depressed patients suffering from vascular dementia or cerebrovascular disease (CVD), we studied 102 VaD and 57 CVD non-demented patients. All patients received a neuropsychological examination: the MMSE, the Mental Deterioration Battery (Caltagirone et al., 1979), the digit-symbol and the digit and Corsi span. A clinical diagnosis of major depression using DSM III criteria was reached for 19/102 VaD and 14/57 CVD non-demented patients. Depression did not affect the neuropsychological performances of both groups on all tasks, with exclusion of the digit-symbol test. In this task, depressed patients performed worse than non-depressed ones. Results suggest that the main effect of depression was evident on a task based on selective and sustained attention.

**S.M. GORDON, R.A. COHEN, & M. FISHER.** Differentiation of Vascular and Alzheimer's Dementia Based on Neurological, Neuropsychological, and Neuroradiologic Imaging Data.

Retrospective analysis of clinical data from 200 consecutive dementia patients revealed that Alzheimer's disease and vascular dementia can be differentiated based on neurological, brain imaging, and neuropsychological indices. Thirty-two vascular dementia (VD) patients, classified according to NINDS-AIREN criteria as possible ( $n = 18$ ) or probable ( $n = 14$ ) were compared with age-matched Alzheimer's (SDAT) patients. Probable VD patients exhibited milder impairments on five neuropsychological tests, and were more frequently ADL independent at follow-up. Conversely, findings of primitive reflexes, weakness, and bradykinesia were more prevalent in probable VD. Discriminant functions analyses correctly classified patients at a 91% rate based on the neurological signs. Findings of subcortical dysfunction help to differentiate VD from SDAT.

**K. SHAHROKHI, O.B. LIGHTFOOT, & M.A. FOLEY.** Race and Gender Differences: Role of Language in Behavior of Dementia Patients. This study investigated the relationship between language, behavior, race and gender in 43 patients with dementia. Neuropsychological assessments and 24-hour behavioral ratings were carried out on all patients. Seven-

teen patients were severely demented and 26 were moderately demented. In the severe group, gross language abnormalities were present in 80% of white males, 50% of white females and 25% of black females. Aggressive behavior was found in the same proportions as the above. With behavioral interventions, 75% of black females made moderate to major improvement, followed by white females at 33%. No white male made more than mild improvement. In the moderate group, 44% of white males and 36% of white females were found to have significant impairments in language function. No such deficits were found in black females. The most common "acting-out" behavior in this group was demanding and intrusive behavior. Patients with a language disturbance were twice as likely to present with this behavior. With behavioral interventions, 75% of the white females made major improvement in this area and 100% of black females. For males, 33% made moderate improvement and 66% made mild improvement. These findings suggested that having impairments in language appear to have a negative impact on behavior. As language function deteriorated, percent of behavioral improvement diminished. There appeared to be a race and gender differential in that language was most impaired in white males, followed by white females and least in black females. This was also the same direction for behavioral disinhibition. These findings held true across etiologies. The current findings suggest that language function, race and gender may prove to be important variables when planning behavioral programs. The most common presenting behavioral problems across etiologies, severity, race and gender will also be discussed along with behavioral techniques used in this study.

**B. SKA, P. LEMIEUX, A. POISSANT, & Y. JOANETTE.** Language Deterioration Profiles in DAT: A Longitudinal Study.

According to the traditional point of view, language impairment in DAT first involves lexico-semantics then syntax and finally, phonology. However, such a homogeneous profile of deterioration has been questioned. The objectives of the present study was to explore (a) the possible heterogeneity of language components impairments in early DAT patients, (b) the heterogeneity of the deterioration profiles and (c) the heterogeneity of the time course to reach a given level of deterioration. Thirteen DAT patients were evaluated at least three times and up to eight times at an interval of 6 months. At the first evaluation, results showed four different profiles. Three subjects had no linguistic problem, four subjects had lexico-semantic impairment only, five subjects had lexico-semantic and syntactic difficulties and the last subject was impaired in all three linguistic components. The patients differed in the sequence of the linguistic impairments. Indeed, when lexico-semantic impairment appeared first, one subject had phonological problems and another had syntactical problems at a second time whereas two others were impaired on both syntax and phonology. Finally, patients differed in the time course of linguistic deterioration.

**C. RAINVILLE, R. PASSINI, N. MARCHAND, & Y. JOANETTE.** Spatial Disorientation in Dementia of the Alzheimer Type. A Case Study.

Spatial disorientation in dementia of the Alzheimer type (DAT) appears during the early stages. The causes of this disorientation are not well known. To study the cognitive deficits related to spatial orientation one DAT patient was studied extensively. The patient was a 77-year-old female diagnosed with DAT, who was in the early stage of the disease. She conformed to the diagnostic criteria of the NINCDS-ADRDA group. She complained of a mnemonic deficit and spatial disorientation. To document the deficit, she was asked to reach an unfamiliar destination in a large hospital setting, following which she was asked to return to the point of departure. She was then asked to do a series of clinical tests (e.g., Porteus maze test). Finally, she was exposed to a protocol evaluating basic spatio-cognitive operations in a human scale labyrinth. She failed to reach the destination unaided in the wayfinding task. In addition, a planning deficit was observed. Analysis showed that easy decisions (e.g., based on the information) were still possible while decisions involving higher order manipulation (e.g., inferential decisions) were

impaired. Labyrinth tasks showed a deficit in the spatio-cognitive operations. Moreover, learning a route as well as inverting a route were impaired. Spatial conceptualisation tasks were severely affected. Results suggest a planning deficit rather than an impairment.

**B. CROISILE, B. SKA, M.J. BRABANT, A. DUCHENE, T. CARMOI, G. AIMARD, & M. TRILLET.** Comparison of Oral and Written Picture Descriptions in Patients with Alzheimer's Disease (AD). Oral and written picture descriptions were compared in 22 AD patients and 24 control subjects. Written texts of AD patients showed fewer number of words and subordinate clauses. In both descriptions, AD patients produced fewer information items. AD patients also demonstrated word-finding difficulties and incoherent features. No phonemic paraphasias were observed, in contrast to numerous graphemic paraphasias. In both groups, syntactic errors predominated in written texts, without significant increase in AD patients. Thus, AD patients demonstrated shorter written texts with simplified sentential complexity. Dementia deteriorates the linguistic features of writing more than those of spoken language.

**L. LALAMI, E.S. ANDERSEN, D. KEMPLER, & M.S. SEIDENBERG.** How General Are Category-Specific Impairments?

This study investigates the nature of the dissociation between natural kinds and artifacts in Alzheimer's disease (AD). The study compares naming latency patterns of normal controls (NCs) with AD patients' error patterns on naming and knowledge probe tasks. The data reveal that RTs to artifacts are shorter than RTs to natural kinds for each category, and that error patterns of AD patients on the naming and knowledge probes tasks demonstrate the same overall pattern of better performance on artifacts than on natural kinds. However, the overall dissociation between natural kinds and artifacts was not consistent across the subtypes within each category. Two general findings emerge from these data. The first is that the tendency for certain types of patients (e.g., those with herpes encephalitis and Alzheimer's disease) to be more impaired on living things than artifacts may well reflect different levels of difficulty for these categories in the normal population. But secondly, the finding that this pattern is not consistent across different types of natural kinds and artifacts suggest a need to do finer level of analyses if we are to understand what factors underlie this dissociation.

**D. RIPICH & M. WYKLE.** Communication Skills Intervention With Alzheimer's Disease Caregivers: The FOCUSED Program.

This poster describes a six-part communication training program for professionals caring for Alzheimer's Disease (AD) patients. To date, 17 Nursing Assistants participated in the 12-hour program. Knowledge of dementia and attitudes toward AD patients were tested pre- and post-training. Scores on the knowledge measures improved for all six parts of the training with significant changes in the areas of differences in depression and AD and the FOCUSED program and its application. Scores on the attitude survey indicated a significant improvement in satisfaction with AD patient communication. Gained knowledge and altered attitudes indicate the program is efficacious. This study was supported by NIH/NIA grant AGO-8012.

**A. AGNIEL, J.F. DMONET, M. PUEL, D. CARDEBAT, & P. CELSIS.** Dysfunction of "The Articulatory Loop System", in Early Stages of Parkinson's Disease: A Verbal Memorizing Activation Study With SPECT.

Task-induced changes in rCBF during memory activation were compared in 18 right-handed patients with early PD and 20 normal volunteers using the same activation paradigm. We used SPECT and  $^{133}\text{Xe}$  in 21 regions of interest during rest, passive listening of a word list, and memorizing of another word list which was followed by a free recall test immediately after completion of the rCBF measurement. The average performance on free recall was not significantly lower in PD patients

than in controls. In normal subjects, five left-sided regions (anterior middle frontal, posterior inferior frontal, superior middle temporal, thalamic and lenticular) showed a significant increase at memorizing compared to passive listening. This pattern of activation suggests the existence of a verbal rehearsal strategy during the memorizing task in normals. In PD patients, increases in these regions did not reach significance, whereas significant activations were noted in superior prefrontal regions. Such alterations to the pattern of activation in PD patients, in spite of memory performance similar to that of controls, is viewed as a consequence of an early dysfunction of the articulatory loop system and of compensatory mechanisms in other parts of the frontal lobe emerging at the early stages of the disease.

**A. AGNIEL, J.F. DMONET, M. PUEL, D. CARDEBAT, & P. CELSIS.** Heterogeneity of Neuropsychological and Haemodynamical Patterns in Parkinson's Disease With Dementia.

The characterization of dementia syndromes associated with Parkinson's disease (PD) remains unclear. In this study, we compared neuropsychological and haemodynamical patterns (SPECT) of 10 demented PD patients with those of 10 PD patients without any cognitive impairment, 10 patients with probable Dementia of the Alzheimer Type (DAT) and 20 normal subjects. Compared to the control group, both the demented PD and the DAT groups presented significant post-rolandic hypoperfusions. However, beyond this group study, an individual analysis of neuropsychological and regional cerebral blood flow (rCBF) data in the demented PD patients showed a marked across-individual heterogeneity of the patterns. Six out of ten demented PD patients presented cortical cognitive deficits compatible with DAT and in five of these six cases, significant hypoperfusion was observed in most of the cortical regions (particularly in the post-rolandic regions). In the four remaining demented PD patients, various cognitive profiles were noted which all differed from DAT and were compatible with the neuropsychological diagnosis of "subcortical dementia." In only one of these four cases, rCBF was significantly decreased in many cortical regions, whereas in the remaining three cases, we observed a diffuse moderate rCBF decrease without predominant subcortical or frontal hypoperfusions.

**C.A. HEY, J.M. GRAY, A.W. YOUNG, & S. DAY.** Facial Information Processing in Huntington's Disease Patients: An Analysis in Terms of Bruce and Young's Functional Model.

As well as motor symptoms and cognitive impairment, Huntington's Disease is characterized by psychiatric and behavioural changes including changes in social information processing. A range of neuropsychological tests of facial information processing were applied to 14 Huntington's Disease patients and 20 Alzheimer's patients, matched on memory ability. Results are compared to published data on the information processing skills of people with Asperger's Syndrome and mental handicap, and discussed in terms of Bruce and Young's model of facial processing.

**L. YAGUEZ, G.E. STELMACH, A.G.M. CANAVAN, H.W. LANGE, & V. HOMBERG.** Motor Pre-Programming in Huntington's Chorea. Twelve patients with Huntington's Chorea (HC) and 20 healthy age- and education-matched controls were examined with tests of simple- and choice-RTs (reaction times). In every condition a home-button was surrounded by a semi-circle of seven goal-buttons, allowing the separation of DTs (decision times) and MTs (movement times). The goal-button to be pressed on each trial was signalled by the lighting of a red bulb fixed onto the response-switch itself. HC patients were significantly slower in both DTs and MTs in the simple-RT task, in which the goal-button was always the one directly in front of the home-button. Unlike controls, the patients showed increased MTs in the choice-RT task, in which the goal-button could be any one of the seven available. This is interpreted as lack of motor pre-programming in HC. In the condition measuring motor pre-programming directly, all goal-buttons lighted up as soon as the home-button was left. It was predicted that this distraction would have no effect upon MTs if the entire movement had been pro-

grammed during the DT before leaving the home-button, but that MTs would be prolonged in HC patients if this pre-programming had not been fully achieved before beginning the movement. This turned out to be true only for early trials; the HC patients quickly learned to remain on

the home-button for a much longer time than usual on later trials, preserving choice-MTs at the expense of choice-DTs. It is speculated that a conscious strategy of caution can account for many of the slowed RT results described for HC patients in the literature.

## THURSDAY AFTERNOON, JUNE 23, 1994

### Paper Session 2

#### EPILEPSY

**E. STRAUSS. Risk Factors for Cognitive Impairment in Epilepsy.** The literature suggests that seizure disorders are associated with an increased likelihood of intellectual problems, prompting researchers to investigate risk factors of cognitive impairment in epileptics. This study examined the combined and unique contribution of certain seizure- (age of seizure onset, duration, etiology, seizure type) and non-seizure related variables (sex, handedness, cerebral speech pattern) to verbal and non-verbal cognitive functions in patients with medically refractory seizures. The results revealed that particular risk factors differed in their importance depending upon the type of cognitive impairment. Age of seizure onset, duration of disorder, gender and cerebral speech pattern were relevant indicators of verbal ability whereas hand preference proved a reliable marker of spatial ability. Except for age at seizure onset (the earlier the age of onset, the poorer the outcome), however, the effects were generally limited in magnitude. The unique contributions of etiology and seizure type were negligible.

**A. INCISA DELLA ROCCHETTA, D.G. GADIAN, A. CONNELLY, C.L. JOHNSON, G.D. JACKSON, W. TAYLOR, C.E. POLKEY, M. MISHKIN, & F. VARGHA-KHADEM. Verbal Memory Impairment After Right Temporal-Lobe Surgery: The Role of Contralateral Damage as Revealed by <sup>1</sup>H MRS and T2 Relaxometry.** Forty-eight patients who had undergone either enbloc temporal lobectomy or selective amygdalohippocampectomy were tested on Logical Memory and Paired Associate Learning from the Wechsler Memory Scale Form I. <sup>1</sup>H MRS and T2 Relaxometry were used to detect temporal-lobe abnormalities on the side contralateral to the operated one. Excision in the left temporal lobe impaired immediate and delayed recall of the Logical Memory prose passages as well as performance on the third learning trial and delayed recall of paired associates, irrespective of the presence or absence of contralateral abnormality. Excisions in the right temporal lobe also impaired delayed recall of both the prose passages and paired associates, but only if there was abnormality in the contralateral side.

**C. GROTE, F. MORRELL, L. DE TOLEDO-MORRELL, D. BERGEN, A. KANNER, S. PIERRE-LOUIS, R. RISTANOVIC, & M. SMITH. Relationship Between IAP Memory Scores and Lateralization of Speech and Epileptogenic Foci.** We investigated whether intracarotid amobarbital procedure (IAP) memory scores are related to characteristics of the non-injected hemisphere (presence or absence of epileptogenic lesion; (non) dominance for expressive speech). We examined memory scores following left and right IAP injections of 36 consecutive patients with unilateral temporal lobe epileptogenic foci. The highest IAP memory scores were obtained when the speech-dominant, non-epileptic hemisphere was "active" (non-injected), and the lowest scores were obtained when the nondominant, epileptic

hemisphere was active. Memory scores from the non-dominant, non-epileptic and the dominant, epileptic hemispheres fell between these extremes. This study suggests that IAP memory scores do reflect important characteristics of the non-injected hemisphere, demonstrates a partial material-specificity effect, and provides support for the use of this procedure to estimate the mnemonic capacity of each hemisphere.

**M. SADEH, D. INBAR, & S. KIVITY. Sub-clinical Epilepsy With Lateralized Cognitive Deficits: Persistent Cognitive Deficits After Recovery.** We present an 11-year-old boy, who has recovered from sub-clinical epilepsy yet his cognitive functioning associated with the site of discharges remains deficient. Seizure activity was in the right-occipital lobe. Brain imaging is normal. At age 5, while on medication, he had an IQ of 89, exhibited severe attention problems and impulsive behavior. His speech though syntactically accurate, lacked cohesion of content. A neuropsychological examination, after recovery, showed an IQ of 95 (VIQ = 110; PIQ = 78) with right-hemisphere cognitive deficits including lack of gestalt in visual perception, difficulties understanding relationships between complex parts and tactile difficulties. The improvement between the two tests was in his behavior, attention and content speech. This case demonstrates that recovery from epileptic brain activity does not necessarily imply recovery of cognitive functioning.

**J. WILLIAMS, G. SHARP, M. GRIEBEL, G.T. SPENCE, & P. THOMAS. Memory Function in Children With Epilepsy Based on Seizure Type, Level of Control, and Medications.** Performances for subjects ( $n = 84$ ) on the WRAML were compared for medically controlled versus uncontrolled children with complex partial or absence seizure disorders. Children with documented learning disabilities or attention deficits were excluded. Results indicate all groups scored significantly below average on measures involving auditory attention (mean = 7.3) and visual attention (mean = 7.9). Two-way ANOVAs did not indicate significant group differences according to seizure type; however, level of control affected recall of complex verbal information. Poly-therapy resulted in significantly lower verbal and visual memory scores than monotherapy. Findings suggest children with epilepsy, with no documented learning disorders, may have difficulty with attention skills and need repetition of new information. The use of monotherapy appears to decrease interference with memory and attention.

### Symposium 2

#### THE SINGULAR CASE STUDY: PART II

**I.S. BARON. The Singular Case Study: Part II.** In clinical practice, there are fortunate and rare times when a patient is referred for evaluation whose presentation is distinctive. Such a patient

may defy classical teachings, and may cause one to rethink long-held assumptions about brain-behavior relationships. This symposium continues the forum of dialog between the presenters of such cases and the audience. Each symposium participant will present a memorable case that resulted in intense scrutiny, with sufficient data and detail to enable the audience to consider the case anew. The implications of these cases for our current understanding of brain-behavior relationships and for their heuristic value will be discussed.

**M. KOPELMAN. The Great Escape: A Neuropsychological Study of Psychogenic Amnesia.**

A patient will be presented who experienced a "fugue" state (functional retrograde amnesia) of one week duration, but whose complaints of complete loss of autobiographical memory persisted for over a year. Neuropsychological tests that indicated anomalous performance will be discussed, as will an Amytal abreaction which produced a substantial recovery of her memories. Anterograde memory measures were unimpaired. Data suggesting the abreaction may have had a beneficial effect upon access to the implicit as well as explicit representations of autobiographical memories will be presented.

**A.-L. CHRISTENSEN. Rehabilitation—Pressing the Limits.**

The patient is now a 47-year-old musician and a professor at a music conservatory in her special field. She has regained her position after a period of severe problems in her relationship to her employer, colleagues, and students. Five years ago, she sustained a severe head trauma in an accident where her husband, who was also her close collaborator, died. The immediate sequelae were contusion mainly to the anterior right hemisphere, unconsciousness, and fractures of the left thigh. She was in hospital for 8 months and started work after a summer vacation. The reactions were negative and followed by threats of dismissal if she did not improve considerably. She was admitted to rehabilitation which progressed with support but also with strong demands being made on her, ending when returning to work with a peer evaluation of her capacities that were judged satisfactory. The content and process of rehabilitation will be discussed.

**A. CASTRO-CALDAS & M.G. LEAL. Seventeen Years of Follow-up of a Global Aphasic With Sequential Brain Lesions.**

A 52-yr-old man was studied in our Laboratory for the first time in 1975 following a stroke on the left hemisphere that rendered him global aphasic (without hemiplegia). In 1991, he had a second stroke on the right hemisphere followed by another stroke on the left in 1992. He died in 1992. During these 17 years he was reassessed several times and accompanied in speech therapy in the first year following the first stroke. The recovery process and the effects of the two latter lesions will be discussed. The more important aspect concerns analysis of the adaptive process to global aphasia based on right hemisphere functioning.

**J.J. EVANS, A.J. HEGGS, & J.R. HODGES. Progressive Prosopagnosia: A Case of Focal Atrophy of the Right Temporal Lobe.**

We describe a 68-year-old patient who presented with a 12-year history of deterioration in her ability to recognize faces. Neuropsychological testing indicated no deterioration in intellectual ability (high average current IQ which is in line with estimates of pre-morbid IQ), and little or no change in memory, language, general perceptual or executive functioning. However, on tests of face recognition she is severely impaired, though face perception skills are intact. Knowledge of people from names is good. MRI scanning revealed selective atrophy of the right temporal lobe. There have in recent years been a number of descriptions of progressive fluent aphasia resulting from atrophy of the left temporal lobe. This case appears to represent a corresponding dementia process affecting the right temporal lobe.

Poster Session 2

MEMORY AND ASSESSMENT PROCEDURES

**P.L. CHRISTIANSEN & S.A. WINGENFELD. Comparison of the Booklet and Computer Category Tests: Are the Two Versions Equivalent?** The purpose of this study was to examine the equivalence of the Booklet and the Computer Category Tests. One-hundred college students completed the Booklet Category Test (BCT) and the Computer Category Test (CCT) under either regular standardized or interactive administration procedures. Results show high correlations between BCT and CCT under standard testing conditions and moderate correlations for the interactive procedures. Irrespective of test order and type of test administration, subjects tended to be more impulsive and make more errors on the CCT. These data raise the question whether separate norms are needed to evaluate CCT performance.

**M. SEDO & R. LEVENSON. Reading-Free Stroop Interference Tests: Automatic and Effortful Tasks.**

"NUMBER STROOP" aims at creating a duplicate Stroop Test to be used on English- and non-English-speakers, readers and non-readers. It uses numbers 1 to 6, patterns 1 to 6 such as those on playing cards and an interfered version where patterns are made out of incongruous digits. "FRUIT TEST" merges the Trail-Making Test and the Stroop test by using the numbers 1 to 20 (in sequence and out of sequence) and drawings of four fruits (painted the right color or the wrong color) to create a task of control of attention in three steps: naming; visual scanning plus naming; visual scanning plus naming digit plus Stroop (naming the fruit corresponding to the wrong color).

**M. SEDO & J. PLAUD. High Definition Testing of Geometric Drawing Skills.**

"44 MODELS" is a high-definition synthesis of a test of Gestalt perception and a test of developmental visual-motor integration. The task involves a combination of abilities such as: spatial orientation; instant perception and visual memory for patterns and for features; exploration vs. impulsivity; verbal mediation; constructional planning and motor control. 44 MODELS features four items sampling each one of 12 age levels, from 3 to adulthood. Reference norms were obtained for ages 5 to 18 (120 students in each age) using equal numbers of lower, middle and upper-class students. Measure brings high discrimination power to experimental, educational and clinical settings. Longitudinal research will explore long-term correlation with several aspects of achievement.

**E. LANNON, G. VINGERHOETS, & S. BAUWENS. Performance on the Money Road-Map Test in Normal and Brain-Damaged Subjects.** The Money Road-Map Test for left-right orientation was administered to 63 normal subjects and 50 patients with localised brain lesions. Because some of the test items require an egocentric mental rotation in space, the 32 items were divided into three categories according to the degree of mental rotation required. In normal adults, accuracy and speed decreased as the degree of mental rotation required increased. Males performed faster and more accurate than females, especially when left-right discrimination required mental rotation. Patients with parietal brain lesions performed less accurate than patients with frontal lesions. This difference in accuracy was predominantly due to errors in items requiring mental rotation. A diagnostic contribution to the lateralisation of the lesions was not found.

**G. VINGERHOETS, G. DE SOETE, & C. JANNES. The Effect of Emotional Stress on Cognition: Testing in a Cardiac Surgery Ward.** Impending surgery provides a natural stress paradigm within which the effect of stress on cognitive functioning can be assessed. Cardiac patients

scheduled for open-heart surgery were tested for cognitive and emotional status on the day before ( $N = 130$ ) and seven days after surgery ( $N = 109$ ). We correlated the self-reported anxiety and depression scores with the performance on eleven neuropsychological tests on both pre- and postoperative examinations. The results indicate that the significantly elevated emotional arousal in these patients has no relevant effect on their cognitive performance. This finding underlines the validity of neuropsychological testing in more acute clinical settings.

**C. LAFOSSE, I. LEENEN, H. MAES, & E. VANDENBUSSCHE.** *The Inter-Response-Interval as an Implicit Measure of Short Term Memory.* Short-term memory (STM) was implicitly assessed by measuring the inter-response-interval (IRI) of subjects in a task where 30 digit strings, presented successively on the monitor of the computer, had to be echoed on the keyboard of a PC. Each string consisted of 5 digits. Based on the Hebb Recurring-Digit paradigm we have two arguments for the validity of the median IRI as a measure of STM performance. 1. The median IRI of the non-repeated digit strings correlated significantly with the Digit Span score of the WAIS in three different groups (Normals,  $N = 107$ ; learning disabled adolescents,  $N = 18$ ; and patients with brain dysfunctions,  $N = 25$ ). 2. We found that the IRI of the recurring digit string reduced compared to the non-recurring digit strings, due to transfer from short- to long-term memory.

**S. RASKIN, C. MATEER, & R. TWEETEN.** *Neuropsychological Assessment of Individuals With Mild Traumatic Brain Injury.* Individuals with mild traumatic brain injury (MTBI) ( $N = 148$ ) were administered a battery of neuropsychological measures. The greatest number of individuals were impaired on tests of complex attention, working memory, and verbal learning. Males and females differed significantly on neuropsychological measures, and on the emotional measures. The sample was divided into two age groups ( $>40$ ,  $<40$ ), and  $t$ -tests revealed significant differences on measures of general intelligence and verbal learning and recall. No significant relationships were found between any neuropsychological variables and occupational level, education, involvement in litigation, depression, or anxiety, suggesting that neuropsychological deficits in individuals with MTBI are likely not due solely to either emotional factors or involvement in litigation.

**E.S. PARKER, S.C. WHIPPLE, E.M. EATON, P.N.R. HESELTINE, & T.P. BRIDGE.** *The University of Southern California Repeatable Episodic Memory Test.* The University of Southern California Repeatable Episodic Memory Test (USC-REMT) was developed to provide a brief, sensitive assay of verbal memory for use in clinical trials requiring frequent memory assessment. Each of 7 alternate forms is composed of 15 high frequency, semantically unrelated nouns which are presented in a different order on three learning trials. The test measures amount recalled and subjective organization. Subjects were 50 gay or bisexual males. Thirty-six were HIV + in various stages of illness. HIV + subjects recalled significantly fewer words and had lower subjective organization scores than HIV- subjects. There were no practice effects over the first three administrations. The 7 alternate forms were essentially equivalent. Thus the USC-REMT appears to be a useful test of verbal memory.

**B.L. ROPER, L.A. BIELIAUSKAS, & M. BRATSBURG.** *Validity of Three Recognition Memory Measures in Geriatric Patients.* The Hopkins Verbal Learning Test (HVL), Object Memory Test (OMT), and Paired Associates Recognition (PAR) were administered to 104 geriatric medicine outpatients with putative cognitive complaints. Subjects were divided into those with and without cognitive impairment based on MMSE scores. Impaired subjects performed more poorly on all recognition memory tests. The HVL and PAR were highly sensitive to impairment. The OMT, while not highly sensitive, showed high

positive predictive power. Results suggest that incidental memory measures (i.e., OMT) are not more difficult in recognition than more face valid measures in this population.

**C.E. SKILBECK & J.L. WELCH.** *WMS—Factor Scores, Subtest Scores, Age & IQ in Neurological Patients.* Despite the introduction of the WMS-R, the WMS continues to be employed by many clinicians and researchers. The main purpose of the present paper is to provide reference information on the WMS, using the factor structure reported by Skilbeck & Woods (1980). The study presents data on approximately 1,000 neurological patients tested at two Regional Neurological Centres in the UK, with an age range of 16–80 years. Factor scores, individual subtest scores, and data on age, IQ, and diagnosis are included. Statistical analysis also includes examination of WMS scores in relation to site of lesion and diagnosis. Significant differences relate to diffuse/focal, lateralisation, localisation, and specific diagnosis parameters in relation to both factor scores and individual subtest results.

**A. ESTVEZ-GONZALEZ & C. GARCIA-SANCHEZ.** *Writing Speed in Aging: Normal and Brain-Damaged Subjects.* In 20 brain-damaged patients (age range 55–80) and 26 age- and schooling years-matched controls writing speed was measured as speed of copying an eight-word sentence printed in manuscript type, repeatedly during 60 seconds. Patients and controls were right-handed according to a modified Edinburgh Inventory. The patient group showed slower writing speed than controls. Patients and controls performed, respectively, 17.4 and 24.7 words. The difference between the groups was significant at the  $p < 0.006$  level ( $F [1,44] = 8.54$ ). Writing speed is a function sensitive to suffer interference in neurological patients. As well, Writing Speed is an uncommon exploration but it is an easy and quick test for daily practice.

**M. PONTON, P. SATZ, & L. HERRERA.** *Factor Analysis of a Neuropsychological Screening Battery for Hispanics (NeSBHIS).* Neuropsychological Screening Battery for Hispanics (NeSBHIS) is an attempt to provide clinicians and researchers with a tool to assess culturally diverse populations correcting for cultural and educational variables. The present study reports the factor structure of the NeSBHIS. Four factors were identified: an attentional factor, which includes Digit Symbol, Color Trails 1 and 2, and Digit Span; a learning factor, which included all the AVLT scores; a language factor, which included the F-A-S and the Ponton-Satz Boston Naming Test, and a visual processing factor, which loaded on the EIWA Block Design, Rey-Osterreith Copy and Memory, and the Raven's SPM total score. This was a stable factor structure, suggesting that the NeSBHIS is a reliable screening battery, which samples different cognitive domains.

**T. WARD.** *The Link Between the Phonological Loop Aspect of Working Memory and Depth of Vocabulary in Adults.* There is some indication in the literature that phonological short term memory and vocabulary acquisition are linked. The existing evidence relates to children, either learning their first language in the early school years or a second language a few years later. This paper presents data collected during a large normative study. Correlations show significant association between scores on a vocabulary test of low frequency irregular words and phonological short term memory as measured by digit span. To further examine this relationship and the role of fluid intelligence, two subgroups were constructed. Differences between the two groups suggest that fluid intelligence and phonological short term memory can be dissociated. The implication of this is that since vocabulary measures are often used to indicate premorbid abilities in neuropsychological assessment, perhaps one could also say something about premorbid short term memory abilities from such measures.



**E. VAKIL, A. KAHANA, & H. BLACHSTEIN.** Automatic Temporal Order Judgment: The Effects of Age and Intentionality of Retrieval. In this study the effect of age on temporal order memory in incidental and intentional retrieval conditions was tested. Four different groups whose age ranged from 18–30, 31–45, 46–60, and 61–70, participated. Each of these subjects was presented with a list of nouns five times. In the incidental retrieval condition, subjects were asked just to recall words. In the intentional retrieval condition, words were presented in an order different than that in the original presentation. Subjects were asked to rearrange the words to match the original order. For both conditions, the order in which words were recalled was compared to the order in which they were originally presented. Most of the groups differed significantly in the intentional retrieval condition, but not in the incidental retrieval condition. This study highlights two major points: 1) Intentionality at the retrieval stage determines the effortfulness with which information is processed. 2) The more automatic the task, the better it is preserved over age.

**H. YOSHIMASU, M. KATO, & H. KASHIMA.** Neuropsychological Investigations on Retrograde Amnesia in Alcoholic Korsakoff Syndrome. We investigated the relationships between retrograde amnesia and general intelligence, anterograde amnesia, and frontal dysfunctions in Alcoholic Korsakoff Syndrome. The subjects were 12 Alcoholic Korsakoff patients with WAIS IQ of 90 or more, 13 Alcoholics, and 6 Normal Controls. We evaluated retrograde amnesia by the Japanese version of autobiographical memory (ABM) test and personal semantic memory (PSM) test. Anterograde amnesia was evaluated with 7 words memory test, Rey paired verbal associate learning test, Rey audio-verbal learning test, and Rey-Osterrieth complex figure test. Frontal dysfunctions were assessed with Color form sorting test, our version of Wisconsin card sorting test, Maze test, Word fluency test, Modified stroop test. Retrograde amnesia evaluated by ABM test and PSM test did not significantly correlate with intelligence, anterograde amnesia, and frontal dysfunctions in Alcoholic Korsakoff Patients. And it is suggested that retrograde amnesia in Alcoholic Korsakoff Syndrome is an independent symptom.

**K. HENKE, M. REGARD, A. BUCK, & T. LANDIS.** Implicit Memory in Transient Global Amnesia. Implicit memory has been demonstrated in various ways in patients with persisting severe amnesia, but not in patients with transient global amnesia (TGA). We report three patients with TGA in whom implicit memory was found during the acute episode in a visual integration task. Gollin-like pictures, presented in 10 steps from a very fragmented to a complete representation, had to be identified with the least possible information. Patients were presented twice with the whole picture set during the episode. They identified the pictures significantly earlier in the second run, i.e., in a more fragmented state, while not yet able to recognize the pictures. Improvement as measured by the difference of the identification thresholds between run 1 and 2 did not significantly differ from subjects with intact memory (10 healthy controls), but was better, though not significantly, than the improvement of 10 patients with posterior lesions. This improvement is not due to procedural learning, but implicit episodic memory. We conclude that implicit episodic memory remains intact during temporary but dense amnesia in patients with abnormal perfusion as seen in SPECT and without structural lesions.

**T. HAMANAKA, A. MATSUI, T. TAKIZAWA, K. FUJITA, T. HIBINO, S. YOSHIDA, M. NAKANISHI, & K. HADANO.** Semantic Dementia: Report of 3 Cases with Contrasting Category Specificity and PET-Findings. This paper details 3 cases (right-handers) of semantic dementia which exhibited different types of category-specificity and contrasting distribution of cerebral involvement. The first 2 cases with predominantly left temporal lobe atrophy and hypometabolism (PET) presented transcortical sensory aphasia, exhibiting later marked impairment of semantic memory for common objects in daily use and mental deterioration in

the absence of semantic amnesia for persons and animate objects. In the 3rd case with predominantly right temporal lobe atrophy and hypometabolism (PET), marked impairment of semantic memory for familiar persons as well as animate objects (animals, vegetables) was confirmed in the absence of mental deterioration in the initial stage, developing in the course of 3 years more extensive impairments of semantic memory (for monumental buildings, professional clothings, social signs, common objects). Both cases exhibited no explicit deficits in episodic memory and visuo-spatial abilities.

**C.B. RIEDLINGER & W. SOMMER.** Activation and Elaboration Effects in Semantic Networks of Amnesic Patients. Amnesic patients are held to show intact activation of pre-existing associations in semantic networks but cannot establish new connections because they do not profit from elaborative encoding. We tested this hypothesis with incidental paired associate learning and implicit testing. Ss were 7 severely amnesic patients and 15 matched controls. Closely and distantly related or unrelated word pairs were either orthographically compared or embedded in sentences. Recall was tested with free associations, immediately and after 1 h. Recall after orthographic comparisons was better for close than distant pairs—declining with delay—and zero for unrelated pairs. This pattern of pure activation effects was identical in both groups. Elaborative encoding drastically improved performance in controls independent of delay and semantic relatedness. Unexpectedly, elaboration also tended to enhance patient performance but only for immediate recall and restricted to distant word pairs. Thus, amnesics may profit from elaborative encoding but only temporarily and for preexisting semantic connections.

**M. KATO, T. HONDA, H. YOSHIMASU, M. MURAKAMI, H. KASHIMA, & M. ASAI.** Forced Repetitive Recall of Episodic Memory in a Case With Amnesic Syndrome. We reported a patient with amnesic syndrome after operation of AVM, who showed forced repetitive recall of episodic memory. Three years after his onset, he repeatedly recalled a couple of particular episodes, though he had extensive amnesia to various events. MR Image revealed a lesion in the right temporooccipital area and severe bilateral hippocampal atrophies. His general intelligence, selective attention, constructional function, and frontal function were favorable. The tests of anterograde amnesia revealed severe memory disturbances. The characteristic features of forced repetitive recall phenomenon are 1) the patient was repeatedly forced to recall episodic memory of some particular events, 2) repetitive recall tended to be induced by visceral sensation and unpleasant feelings, 3) the episodes recalled repeatedly were experienced in amnesic state. However, they were accompanied by extremely strong unpleasant emotion, 4) this symptom is similar to Obsessive Compulsive Disorder (OCD). However, while obsessive ideas in OCD include ideas or abstract thoughts, corresponding to semantic memory, this phenomenon was characterized by “obsessive recall” of episodic memory, 5) Clomipramine was effective for this symptom.

**B. DEWEER, B. DEFONTAINES, C. MALAPANI, B. PILLON, Y. AGID, & B. DUBOIS.** Procedural Learning in Patients With Focal Lesions in Sub-Regions of the Basal Ganglia. This study was aimed at assessing explicit memory and procedural learning (rotor pursuit, serial reaction time task, mirror reading) in patients with focal lesions in the basal ganglia. They showed procedural learning deficits along with relatively preserved explicit memory. These deficits varied according to the localization of lesions. One patient with putaminal lesions was only impaired at the rotor pursuit task. Patients with caudate and bipallidal lesions were normal at rotor pursuit but severely impaired on the other tasks requiring either a response choice or the inversion of an overlearned habit. These data suggest that different procedural learning tasks, either externally- or internally-guided, are mediated by distinct striato-frontal loops.

**K. SCHMIDTKE. Cognitive Procedural Learning in Amnesia.**

Four new cognitive tasks were trained on three days in 20 amnesic and 45 healthy subjects: (1) Solution of logical trigrams; (2) Arrangement of jumbled words to sentences; (3) Area estimation; (4) Category identification in groups of symbols. The Tower of Hanoi and 2 perceptual tasks (mirror reading, mental rotation) were also applied. In controls, baseline performances and learning were linearly related. Thus, models of normal learning could be defined and applied to amnesics, allowing independent evaluation of baseline performances and learning. In all tasks, some amnesics showed subnormal baseline performances and subnormal learning, suggesting that both depend on the integrity of the same neuronal structures. The majority with normal baselines showed normal learning of perceptual tasks, of Hanoi "numbers of steps" and of tasks (1) to (3), extending the range of cognitive procedural learning shown to be intact in amnesia. However, learning was clearly subnormal in task (4) and Hanoi "time to complete". Only in these tasks were scores correlated with explicit memory, suggesting they comprise a declarative component.

**G. MICELI, A. DANIELE, C. MARRA, D. PERANI, & F. FAZIO. Isolated Amnesia of Undefined Aetiology.**

EDS is a 72-year-old patient with an amnesic syndrome that started insidiously at age 63 and remained isolated over the following years. At age 67, EDS was referred because of increasing memory problems. Follow-up neuropsychological examination showed a moderate-to-severe impairment of episodic verbal long-term memory and a mild impairment of episodic visual long-term memory, in the absence of noticeable deficits of other cognitive abilities. This selective memory impairment has remained substantially unchanged over the past five years. Positron emission tomography showed focal hypometabolism in the left hippocampus and in the left dorso-medial thalamic nucleus. Amnesia in this patient may be due to a focal degenerative pathology affecting the left hippocampus and the left dorso-medial thalamic nucleus.

**M. VAN DER LINDEN, S. BRÉDART, & N. DEPOORTER. Semantic Memory and Amnesia: A Case Study.**

AC was a profoundly amnesic patient who showed well-preserved intellectual and short-term memory abilities. He was completely unable to durably maintain any record of ongoing events. AC's ability to recollect specific personal episodes was severely impaired but his general (semantic) personal knowledge was globally preserved (Autobiographical Memory Interview, Baddeley et al., 1990). Moreover AC was also submitted to a famous persons identification task in which faces or names of personalities were presented. Surprisingly, AC was able to provide relevant and precise pieces of biographical information about several personalities who have become famous after his accident. Data are discussed in relation with the current debate on the acquisition on new semantic information in amnesic patients.

**J.E. DEL DOTTO, D. LOESCH, M. ROSENBLUM, & J.L. FISK. Neuropsychological Deficits Secondary to Cavernous Angioma: A Case Study.**

Cavernous malformations are one of the four classified types of cerebral vascular malformations. We report the neuropsychological effects in the first case of a moderately sized cavernous angioma arising from the mammillary bodies which presented as a suprasellar mass. Neurobehavioral findings revealed rather circumscribed impairment of amnesic functions involving active recall and retrieval of information under immediate and time delayed conditions. The impairments were profound in both the verbal and nonverbal domains. The patient's memory disturbances are discussed in the framework of the diencephalic amnesic syndrome.

**J. GREEN, J.L. VITEK, M. BARON, & M.R. DELONG. Absence of Pervasive Deficits in Verbal Learning and Memory in Patients With Medically-Intractable Parkinson's Disease.**

We compared 14 patients with medically intractable PD and 14 age- and education-matched controls on measures derived from the California

Verbal Learning Test. It was hypothesized that patients would show deficits on measures reflecting frontal lobe function and memory recall. Patients were undemented, had disease duration averaging 12.5 years, had been treated with dopaminergic and anticholinergic medication, and were being evaluated for treatment with pallidotomy. Results indicated that patients showed deficits only on Recall of List B and Total intrusion errors. It was concluded that deficits in learning and memory were not pervasive in these patients. However, this sample was relatively young (mean age = 56.9 years) and well-educated. The generalizability of these results to the general population of PD patients, particularly older patients, requires further study.

**B. DESGRANGES, F. EUSTACHE, V. DE LA SAYETTE, M.C. PETIT, P. RIOUX, B. LECHEVALIER, & J.C. BARON. A Reappraisal of the Multiple Memory Systems Approach: Cognitive-Metabolic Correlations in Alzheimer's Disease.**

In order to investigate the relationships between memory subsystems and brain areas, 18 patients with Alzheimer's disease were administered tests to assess short term (span), episodic (story and geometrical figure recall and words learning), semantic (semantic knowledge and verbal fluency) and implicit (word stem completion, maze learning and mirror reading) memory. Regional cerebral glucose metabolism was also measured at rest with 18FDG and a high-resolution PET camera, in brain areas selected according to their putative implication in the memory subsystems. Correlations between memory scores and normalized metabolic values corroborate some hypotheses (mainly for semantic and episodic memory) and are in agreement with multiple memory systems approach. Furthermore, they suggest that memory subsystems involve distributed and interconnected networks in cortical, sub-cortical and cerebellar areas.

**M. MITRUSHINA, J. ABARA, & A. BLUMENFELD. A Comparison of Cognitive Profiles in Schizophrenia and Other Psychiatric Disorders.**

The present study compared patients across 5 psychiatric groups: Depression, Mania, Schizophrenia, Schizoaffective Disorder and Psychosis NOS, all of whom are psychotic. Differences in overall cognitive profiles and in dysfunctional memory mechanisms, as well as effect of psychosis on cognitive functioning were explored using the Neurobehavioral Cognitive Status Examination (NCSE), a brief screening instrument. Results indicated pronounced deficit in memory and abstract reasoning associated with schizophrenic illness, which is not secondary to psychosis and points to localized brain dysfunction. Both encoding and postencoding memory mechanisms were affected. Results support a hypothesis of progressive dysfunction associated with the severity and chronicity of the schizophrenic illness. Implications of findings in aiding diagnostic determination, patient management and rehabilitation are discussed.

**G. VILLA, A. BARTOLI, A. SOLIDA, C. MARRA, & D. MONTELEONE. Pattern of Memory Impairment in Early HIV-Related Cognitive Decline.**

In our sample, 53% of symptomatic and 30% of asymptomatic HIV-infected patients showed significant cognitive abnormalities. They were particularly impaired on timed psychomotor tasks, tasks involving sequencing and set-shifting, memory tasks stressing attention, learning, active monitoring and retrieval of information. Their memory impairment was also characterized by a remarkable flattening of the 'primacy effect', a preservation of the 'recency effect' and a significant increase of the 'amnesic decay', suggesting a prevalent damage to 'secondary memory'. Among all the considered memory measures, those concerned with the most 'active' components of memory processes were able to discriminate between the two subgroups 'with' and 'without' cognitive abnormalities at the highest degree of confidence.

## Paper Session 3

## LANGUAGE

**F. VARGHA-KHADEM, K. WATKINS, R. PASSINGHAM, & P. FLETCHER.** Cognitive and Praxic Deficits in a Large Family With a Genetically Transmitted Speech and Language Disorder.

A pronounced developmental dysphasia in half of the 30 members of a three-generational family has been attributed by Gopnik (1990) to a deficit of feature-blindness affecting grammatical morphology. Our own investigation of the affected family members indicates a more extensive impairment in the processing of grammar, as well as grossly impaired expressive phonology and a severe extralinguistic oral apraxia. Furthermore, the affected family members have an average IQ in the borderline range, falling 20 points below that of the unaffected members, the difference being the same for performance and verbal IQ. The genetically transmitted disorder is therefore not exclusively related to the brain mechanisms that underlie syntactical processing but also affects cognitive, linguistic and oral praxic functions.

**J.H. RICKER & S.R. MILLIS.** Language Impairment Following Subcortical Infarction.

Language functioning was studied in patients with recent left hemisphere infarction in the basal ganglia (BG;  $n = 8$ ), frontal white matter (FR;  $n = 9$ ), or thalamus ( $n = 8$ ). Groups did not differ in age, days since onset, education, or overall level of dementia. Patient groups were equivalent on tasks of repetition and naming. BG and FR patients performed within normal limits, except on language tasks with a significant "frontal" component. Thalamic patients performed lower than BG and FR on all other tasks, particularly those with an emphasis on semantic processing. Findings are explained in terms of cortical-subcortical pathways and suggest differential mediation of language by certain subcortical structures.

**S. VALDOIS, S. CARBONNEL, D. DAVID, S. ROUSSET, & J. PELLAT.** Confrontation of PDP-Connectionist Models and Dual-Route Models Through the Investigation of a Case Study of Deep Dysphasia. We present the case study of a patient, E.A., who demonstrated all the defining features of deep dysphasia. His repetition disorder was further associated to a surface dyslexia and deep dysgraphia. E.A. also showed a severely restricted phonological STM. His performance in both picture confrontation naming and writing-to-dictation paralleled his performance in repetition, whereas reading aloud and oral lexical decision were not influenced by the imageability of the word input. The exhaustive investigation of EA's cognitive functioning was first conducted by reference to Morton and Patterson's model (1980). We demonstrate that such a triple-route model cannot easily account for EA's overall performance. In contrast, EA's language profile can be better understood within an interactive PDP model of language processing. Within such a model, deep dysphasia, surface dyslexia and deep dysgraphia will be interpreted as originating from a single functional deficit.

**K. ITO, N. YAMADA, M. HASHIMOTO, Y. NAKAGAWA, M. IKEDA, & H. TANABE.** Category-Specific Word-Meaning Impairments. The present preliminary study was conducted to determine whether category specific impairments would be present in the naming and comprehension performances of Gogi aphasic patients. Five Gogi aphasic patients participated in the first experiment which consisted of naming and pointing tests, using ninety pictures of well-known objects, divided into nine categories. Four were lobar atrophy cases with temporal predominance. The other was a herpes simplex encephalitis case with left anterior temporal lobe damage. Three of the original four patients with lobar atrophy participated in the second follow-up experiment consisting of the same tests as the first experiment. The results of two experi-

ments revealed the selective preservation of semantic categories of colors and body parts. The results are discussed in relation to Damasio et al's proposition.

**B. STEMMER, Y. JOANETTE, C.H. FREDERIKSEN, & N. MARCIHAND.** Investigating Discourse Processing of Brain-Damaged Individuals: The Use of a Stratified Model of Discourse Processing.

Numerous studies have been performed on discourse processing in brain-damaged individuals without, however, employing a well-defined, explicit and stratified discourse model. As a consequence, no clear picture of the discourse abilities of brain-damaged individuals has emerged and current teaching is diverse. The objective of our study was thus to demonstrate the necessity and usefulness of employing such a model in order to characterize the exact nature of the discourse abilities of individuals with different brain lesions and the specific discourse profile of a given patient. The narrative discourse of two right-hemisphere damaged individuals, one left-hemisphere damaged aphasic subject, one patient with dementia of the Alzheimer type and three patients with Asperger syndrome were investigated on the basis of an explicit, stratified model of discourse representation and processing. The results showed that the use of such a model could provide information on specific patterns of discourse abilities and impairments of the subjects investigated. The results are discussed in relation to previous findings.

**P.M. PEDERSEN, H.S. JØRGENSEN, H. NAKAYAMA, H.O. RAASCOU, & T.S. OLSEN.** Aphasia in Stroke: Incidence, Time Course and Prognosis. A Community Based Study.

In a prospective and community based study, 831 acute stroke points were assessed for aphasia on admission and once a week during hospital stay using the aphasia subscore from the Scandinavian Stroke Scale. Stroke severity was assessed using the Barthel Index (BI). Results: Aphasia was found in 40% of the points on admission. Twenty-four percent had severe aphasia, 6% moderate, and 10% had slight aphasia. At discharge 28% had aphasia. Ninety percent of the aphasic points obtained their maximal aphasia score during hospital stay within the first two weeks after admission. Multiple logistic regression analysis showed that the aphasia score had no significant independent influence on the points' ability to return to their own home. Conclusion: Aphasia in stroke is common. The spontaneous recovery curve for aphasia is steeper than generally assumed. Aphasia itself is not a limitation for home discharge.

## Symposium 3

## COGNITIVE &amp; BEHAVIOURAL CONSEQUENCES OF TRAUMATIC BRAIN INJURY

**J. PONSFORD.** Cognitive-Behavioural Sequelae and Outcome Following Traumatic Brain Injury.

Traumatic brain injury (TBI) poses many challenges to those involved in its assessment and rehabilitation. There are a number of unique difficulties in the domain of neuropsychological assessment. This symposium will attempt to address some of these difficulties, namely: the identification of cognitive behaviours following very severe injury, where deficits in motor, sensory or communication function preclude traditional assessment; the delineation of deficits in speed of information processing; assessment of executive function; and evaluation of aspects of memory. A second challenge is that of evaluating outcome following TBI and exploring factors which predict outcome. There is significant evidence that older subjects have a poorer outcome. The nature of cognitive-behavioural sequelae in older adults sustaining TBI will be the subject of a final paper in this symposium.

**A. SHIEL, B.A. WILSON, S. HORN, M. WATSON, & D.L. McLELLAN.** A Scale to Identify and Evaluate Cognitive Behaviours After Severe Head Injury.

Assessment of cognitive function following severe head injury may be problematic due to deficits in motor, sensory and/or communicative function. Such deficits may preclude use of traditional assessment tools. Assessment of behaviour however, is possible regardless of deficits. A survey of 88 severely head injured patients resulted in a list of 147 items of behaviour. Of these, 62 have been combined into a single scale of cognition, communication and social behaviour. The order of the items on the scale was determined by means of a paired preference analysis. The scale is a useful clinical tool which documents behaviours occurring from the time of injury, is appropriate to use with a variety of patients and provides useful information which can be used to formulate goals with slow to recover patients.

**A. CANTAGALLO, S. DELLA SALA, & N. BASAGLIA.** Cognitive Functions and Reaction Times: Performance Dissociation in Severe Head Injured Patients With Good Recovery Outcome.

The aim of this study was to investigate a common and debilitating sequela of severe head injury: generalized slowness in performing everyday activities. Twenty-four severe head injured patients showing good clinical recovery scoring above cut-off on ad hoc scales, were selected from a consecutive series of 176 patients. At least one year after trauma they were submitted to motor velocity, reaction times, and neuropsychological assessment. They performed motor velocity and reaction time tasks more slowly than matched controls. Furthermore, the patients group has been divided in "good" (< median score) and "poor" (> or = median score) performers in one motor velocity task. The two subgroups differed significantly in reaction times, whereas no difference emerged in any neuropsychological measure. In conclusion the study demonstrated the existence of subclinical movement slowness not associated with neuropsychological deficits. We discuss the different hypotheses as to mechanism underlying this motor slowness (or bradykinesia) without slowness of thought (or bradyphrenia).

**W.H. BROUWER, I. SCHMIDT, M. VANIER, J.C. VELTMAN, A.M.E. WEVER, & A.H. VAN ZOMEREN.** The Relation Between Severity of Closed Head Injury (CHI) and Executive Function: An Inverse U-Shaped Function?

In recent publications on late sequelae of CHI, impaired executive function is found to be related to poor social outcome, suggesting executive function is sensitive to CHI. However, in 4 separate studies where patient samples with a wide range of severity were compared with healthy control groups, CHI patients on average scored as good as controls on tests of executive functions requiring planning, inhibition, cognitive flexibility and divided attention (using test procedures which control for slow processing speed). In spite of this, within the CHI samples, moderate correlations were observed between severity (PTA-duration) and indexes

of executive function: mildly to moderately impaired patients score better than healthy controls while severely impaired patients perform worse. These findings and their possible explanations (e.g., coping-hypotheses) will be discussed.

**S.R. MILLIS & J.H. RICKER.** Verbal Learning Impairment in Adult Civilians Following Penetrating Missile Wounds: Performance Patterns on the California Verbal Learning Test.

Verbal learning patterns following penetrating head injury (PHI) from gunshot wounds were studied in 10 acutely injured patients (mean age 25.3 years; 8 males) 2.1 months post injury. Significant impairment was found on measures of free recall of new verbal information from a list learning task (CVLT). Subjects' mean learning pattern was described as slowed, passive, disorganized, and remarkable for deficits in retrieval. Encoding and consolidation (storage) appeared to be less impaired. Implications for rehabilitation are discussed.

**J. PONSFORD, J. OLVER, C. CURRAN, & K. NG.** Predicting Employment Two Years After Traumatic Brain Injury.

A multivariate approach was used to investigate which of a range of variables were the best predictors of employment status two years after traumatic brain injury (TBI). Subjects were 74 TBI patients employed at the time of injury. Following preliminary analysis four input variables were selected: age, Glasgow Coma Scale score (GCS), post-traumatic amnesia duration and Disability Rating Scale score (DRS) on admission to rehabilitation. Stepwise discriminant function analysis gave a discriminant function including three variables, DRS score, GCS score and age, correctly classifying 74 percent of cases. A second analysis using the original discriminant function classified 68 percent of a cross-validation sample of 50 TBI subjects, thus confirming these variables, in combination, as predictors of employment status two years after TBI.

**F.C. GOLDSTEIN, H.S. LEVIN, & A.D. KALECHSTEIN.** Cognitive and Behavioral Sequelae of Closed Head Injury in Older Adults According to Their Significant Others.

The present study examined postinjury changes in cognition, mood, and social functioning of older adults sustaining moderate and severe closed head injury. The significant others of patients who were 50 years and older at the time of their injuries completed the Geriatric Evaluation of Relative's Rating Instrument, a questionnaire inquiring about the patient's thinking abilities, affect and interpersonal relations, as well as performance of everyday activities. The significant others provided ratings of preinjury functioning and then completed the ratings up to eight months postinjury. Compared to premorbid abilities, patients were described as exhibiting significant declines in all domains, with cognitive abilities particularly vulnerable. These results indicate that head injury in older adults produces behavioral alterations which likely disrupt their quality of life.

## FRIDAY MORNING, JUNE 24, 1994

### Paper Session 4

#### DISORDERS OF EXECUTIVE FUNCTIONING AFTER FRONTAL LOBE DAMAGE

**H. KASHIMA & M. KATO.** Impaired Verbal Regulation on Behavior at Higher Conceptual Level.

In this study, impaired verbal regulation on behavior (IVR) was evaluated during tasks of higher conceptual level (manipulation of classification categories) by using the Wisconsin Card Sorting Test. Seventy subjects including 36 frontal damaged patients were asked to voice in words the classification category before placing the response card. The

inconsistency between the classification category used on actually placing the cards and the words pronounced, which were judged as correct, was defined as IVR. IVR at higher conceptual level most frequently appeared in left frontal lesions especially in left dorso-lateral lesions of the frontal lobe. In the left dorso-lateral lesions of the frontal lobe there was significant relation between the extent of the lesion on CT and the frequency of appearance of IVR.

**A. SIRIGU, T. ZALLA, B. PILLON, J. GRAFMAN, B. DUBOIS, & Y. AGID.** The Planning of Actions After Frontal Lobe Lesions: An Analysis of Script Generation.

We compared script generation in patients with lesions in the prefrontal cortex (N = 9), in the retrorolandic area (N = 4) and in healthy con-

rol subjects (N = 16) matched for age and educational level. Subjects were requested to verbally evoke actions on three different types of activity: (1) Routine, (2) Non-routine, (3) Novel. There were no differences among the three groups in the total number of actions generated, action evocation time and action estimation of duration. Frontal patients were significantly impaired compared to patients with retrorolandic lesions and controls, for script syntax rules (action sequence, goal attainment, script boundaries) and for judgements of importance of each action. These differences were observed for the three types of scripts though frequency of sequence errors and errors of script closure were most frequent for non-routine and novel activities. These results suggest that access to the information content of scripts is preserved in prefrontal patients and that the main impairment is in the capacity to evaluate and organize action units into a coherent, goal-directed framework.

**L. FASOTTI & P. ELING. Impaired Encoding of Problem-Text in Arithmetical Word Problem-Solving After Frontal Lobe Damage.** Patients with frontal lobe lesions have severe difficulties in arithmetical word problem-solving. In the present study the origin of these difficulties is investigated from an information-processing perspective. Following this perspective, the first stage in arithmetical word problem-solving is encoding of the problem-text. This encoding consists of two processes: the transformation of each sentence of the problem into an internal representation and the integration of all the sentences in a coherent problem-schema. The sentence translation process is studied with a recognition and a sentence-picture matching task, whereas the formation of problem-schemata is examined with a sorting task. Subjects are patients with left, right and bilateral frontal damage. Control groups consist of healthy subjects and subjects with left posterior lesions. The results suggest that both the translation of sentences and their integration into a problem-schema are significantly impaired in frontal as well as left posterior-injured patients. A relationship between sentence translation-integration ability and arithmetical word problem-solving skill is also found.

**O. SURMA-AHO & J. VILKKI. Successful Psychosocial Recovery After Large Right Prefrontal Ablation.** A 42-year-old physician, FJ, who had a large right frontal astrocytoma (grade II/III), has been followed-up for one year. His right prefrontal structures were almost completely removed. A left hemiparesis and general slowness disappeared soon. Visuospatial impairment (PIQ = 104; VIQ = 130) improved in four months (PIQ = 120). Very slight deficits were observed in one of the "frontal" tests. FJ started to work in his previous position as a physician in an emergency medical unit about nine months after surgery. He is more withdrawn and inflexible in social interactions than before illness but skillful and dependable in first aid situations. He is very self-critical, controlled and polite. Contrary to the prevailing "frontal pessimism" excellent psychosocial recovery is possible after large right frontal lobe removal.

**J. HENDY. Development, Pathology and the Frontal Lobes.** This paper seeks to broaden theoretical discussion in pediatric neuropsychology by drawing on knowledge in the fields of adult neuropsychology, developmental psychology and neuroanatomical theories of cerebral development, and in terms of a three-way axis (left/right, front/back and cortical/subcortical). The paper will discuss models of frontal lobe functioning, emphasising the notion of the posterior brain subserving routine, and the frontal lobes subserving novel behaviour. Various clinical conditions (head injury, hydrocephalus, learning difficulties) will be reviewed in these terms. The paper will also place significant emphasis on developmental issues and the importance of frontal lobe functions to normal cognitive development. A program of research will be outlined.

## Paper Session 5

## MEMORY 1

**E. VAKIL, M. MELAMED, & N. EVEN. Implicit and Explicit Measures of Contextual Information: Elderly vs. Young Adult Subjects.** There are several reports in the literature suggesting that the elderly have impaired memory for contextual information. Support for this approach was derived from studies that tested the recall or recognition of different aspects of contextual information. The purpose of the present study is to test the possibility that contextual information, although inaccessible via direct-explicit measures, may be evident via implicit measures of memory. Two groups of subjects participated in the present study, 35 younger and 30 older subjects. When contextual information was tested directly, the younger group outperformed the older group. However, both groups benefited from the contextual cues. Thus, these findings argue against the context-memory deficit hypothesis in the elderly. Results are interpreted in terms of the theoretical framework of distinction between implicit and explicit memory applied to contextual information, in which the former is found to be preserved in patients with memory impairment.

**C. ROHRENBACH, M. REGARD, & T. LANDIS. "No Future" During Transient Global Amnesia (TGA).** TGA is characterized by anterograde and partial retrograde amnesia disrupting the sense of time, lasting only a few hours. We were interested in prospective thinking during such an amnesic episode and introduced a 3 min. fluency task, where Ss. have to name events that either had happened or will happen. None of the 4 patients we examined during TGA and after the episode was able to name any future event while past events were available. Twenty-four hrs. later, performance normalized, i.e., half of the namings were future events. We conclude from this finding and from other results obtained that during TGA the ability to use stored information in order to develop prospective thinking is impaired. Thus, lack of future is a reliable marker of global amnesic state.

**D. CAPARROS-LEFEBVRE, M. CABARET, B. DEBACHY, F. LEBERT, M. STEINLING, J.P. PRUVO, & H. PETIT. Long-Term Cognitive Sequelae in Herpes Simplex Virus (HSV) Encephalitis. Imaging Correlations.**

In nine patients, HSV encephalitis had been proven with positive HSV polymerase chain reaction, and early treated. Cognitive sequelae were studied during the acute stage and one year later. This included language, memory and behavior evaluation. SPECT and MRI have been performed in all patients. The neuropsychological findings have been correlated to location and size of lesions, to hippocampic and amygdaloid corpus atrophy. There was predominant involvement of one temporal lobe. Lesions were associated with predominant unilateral atrophy of the amygdaloid corpus. Memory and language deficits were moderate and improved later. Behavior disorders were commonly observed, with marked increase of emotional reactions. These troubles occurred in patients with unilateral amygdaloid corpus atrophy. Unilateral temporal involvement in HSV encephalitis seemed to be responsible for predominant behavioral disorders.

**H. KAZUI, H. TANABE, M. IKEDA, Y. NAKAGAWA, N. YAMADA, M. HASHIMOTO, J. SHIRAIISHI, & K. HASHIKAWA. Slowly Progressive Amnesia Without Other Cognitive Deficits.** We followed up seven patients diagnosed as having possible Alzheimer's disease according to criteria of the NINCDS-ADRDA for several years. At the first examinations comprehensive neuropsychological assessments

demonstrated severe amnesia without apparent other cognitive deficits in all the cases. In all the cases CT and MRI scans including slices which run parallel with the long axis of the hippocampus (hippocampal image) revealed atrophy at the hippocampus and parahippocampal gyrus. Hippocampal SPECT images disclosed a hypoperfusion in the bilateral medial aspects of the temporal lobes. Except for one case, cognitive deficits have been limited to progressive memory disturbance for several years. Constantinidis (1978) proposed "simple senile dementia (SSD)" as a variant of dementia of Alzheimer type characterized by selective amnesia without other cognitive deficits such as visuospatial disturbance, apraxia and aphasia. Our patients might be cases of SSD.

**R.M. MARI, F. DAUVILLIER, F. EUSTACHE, B. LANDEAU, B. LECHEVALIER, & C. CHAVOIX.** Recognition Memory in Parkinson's Disease (PD) as Assessed by the Delayed Nonmatching-To-Sample (DNMS) Task.

To improve our understanding of PD dementia, we used an automated version of the visual DNMS task, a recognition memory task known to be subserved by an amnesic limbic circuit. To provide qualitative analysis of the DNMS performance, other cognitive-motor processes were investigated. In this preliminary study, there was no significant difference in a DNMS performance between controls ( $n = 10$ ) and non-demented PD (ndPD) patients ( $n = 6$ ) but a delay X group interaction. DNMS performance was significantly correlated with long-term memory and discrimination performance in controls, but mostly with frontal tasks performance in ndPD patients. Frontal lobe dysfunction could be responsible for the use of a strategy different from controls in ndPD patients performing the DNMS task. Similar neuropsychological approach in patients with PD dementia is in progress.

### Poster Session 3

#### MEDICAL ILLNESS/PSYCHOPATHOLOGY/ HEMISPHERIC ASYMMETRY

**R.J. PETRUCCI.** Heart Failure/Transplant: Consultation by Neuropsychology.

This paper describes a model for the consulting neuropsychologist within cardiac transplant services. Using this model within the scientist/practitioner framework the neuropsychology service has been consulted ( $N = 839$ ) for initial evaluations, decisions regarding candidacy, and continued management for in/out-patients, pre/peri- and post-transplant. This model and population have served as a training and research opportunity for graduate students, interns, and residents. The cognitive consequences of heart failure/transplant, a useful brief bedside mental status examination, the behaviors and characteristics associated with major cardiac etiologies will be presented. Familiarity with medications, medical procedures, the course for acute and chronic illnesses, metabolic changes, cardiac parameters, surgical and neurologic consequences are essential. Students learn the role of the consulting neuropsychologist in a growing medical setting.

**G. VINGERHOETS, G. VAN NOOTEN, & C. JANNES.** Early Neuropsychological Consequences of Cardiopulmonary Bypass.

We investigated the neuropsychological consequences of cardiopulmonary bypass in 109 randomly selected patients scheduled for cardiac surgery. Patients were tested with a comprehensive neuropsychological

battery both one day before and seven days after surgery. When a deficit is defined as a postoperative decrease in test performance of more than one preoperative standard deviation for at least two tests, 45% of our sample showed evidence of cognitive deficits in the early postoperative period. Attention, memory and functions requiring visuospatial performance seemed to be the most vulnerable. A significant number of patients expressed clinical levels of depression and anxiety preoperatively and before hospital discharge. We did not find an association between neuropsychological deficit and the duration of extracorporeal circulation or the mean arterial pressure during bypass. Implications of these findings are discussed.

**M. SHINEDLING, G. AWERBUCH, & J. NATOLE.** Intermediate vs. Late Stage Central Nervous System Effects of Chronic Lyme Disease. Chronic Lyme Disease, caused by a spirochetal organism which can invade the central nervous system, is both difficult to diagnose and to treat. As a result, patients are often misdiagnosed and can go for many years without treatment. Two groups of untreated Lyme Disease patients were evaluated. Since Lyme Disease is caused by a slow growing spirochetal organism, it was predicted that there would be few differences between a group which had been infected for an average of 2.65 years vs. a group which had been infected for an average of 16 years. Comparison of the two groups revealed that patients from the two groups reported essentially identical neurobehavioral complaints and scored similarly on the MMPI-2. The late stage group demonstrated increased problems with cognitive efficiency.

**S. RASKIN, E. REARICK, & R. DENNEHY.** Effect of IV Immunoglobulin on Cognitive Aspects of Chronic Fatigue Immunodeficiency Syndrome.

ES is a 33-year-old woman who had been diagnosed with chronic fatigue immunodeficiency syndrome (CFIDS) for one year at the time of her initial evaluation. She exhibited slow speed of motor movements and information processing, poor sustained attention, poor planning, and low average reading comprehension. She underwent further evaluation pre- and post-treatment of intravenous immunoglobulin (IVIG). Before treatment, she was impaired on tests of attention and long-term memory storage. Post-treatment, ES was impaired only on measures of long-term storage. Significant differences were obtained on measures of complex attention. This suggests that cognitive impairments secondary to CFIDS include deficits in attention and long-term memory storage and that treatment with IVIG significantly improved performance on attention measures but not on measures of long-term memory storage.

**R. CLUYDTS, B. FISCHLER, & V. MICHIELS.** An Explorative Neuropsychological Study of Patients with Chronic Fatigue Syndrome.

A comprehensive battery of neuropsychological tests was administered to 36 outpatients (29 female and 7 male, aged 23-57) suffering from Chronic Fatigue Syndrome (CFS). They were all screened using a structured interview and met the C.D.C. criteria for CFS. They were compared to an age, gender and education matched group of 20 normal controls. A Mann-Whitney analysis revealed significant differences between the CFS group and normal controls on the Finger Tapping Test ( $p > .001$ ), as well as on the second, last and delayed recall trial of the Selective Reminding Test ( $p > .01$ ). Modest but still statistically significant differences were found on the Trail Making Test, WAIS Digit Span Backward and the Digit Symbol Substitution Test. A Principal Component Analysis (PCA) identified six principal factors accounting for 80.5% of the variance: Verbal Learning/Memory; Fine Motor Speed; Visual Learning/Memory; Intellectual Ability; Attention (Digit Span Backward), Attention and Tracking. A Stepwise Discriminant Analysis with two main factors, Verbal Learning/Memory and Fine Motor Speed correctly classified 80.36% of all cases. These results indicate some

selective dysfunctions in these patients that however need to be further validated using active controls such as depressive patients.

**I. BERNARD, D. LE GALL, J.L. TRUELLE, P.A. JOSEPH, & J. EMILE.** Cognitive Disturbances in Multiple Sclerosis: A Ten Year Follow-up Study.

Cognitive impairment in multiple sclerosis (MS) had been ranged from thirty percent in relapsing remitting MS to seventy percent in chronic progressive MS, in previous studies. The specific pattern of intellectual abnormalities is now well documented, but not their natural history. In this follow-up study, 20 patients meeting Poser et al. criteria for definite MS underwent neuropsychological assessment over a 10 year period. Forty percent have widespread cognitive deficits and thirty percent were only impaired on memory tests. While comparing performances between the two assessments over this 10 year test-retest interval no significant deterioration occurred. Two patients showed signs of global impairment on the first test as they were relapsing, in 1993 they performed better and exhibited isolated memory disturbances. These data suggested that reversible deterioration of intellectual efficiency may occur during clinical exacerbation.

**A. BARTFAI, V. MURRAY, B. STEGMANN ET AL.** Poststroke Depression-Cognitive Effects Related to Depressive Symptoms, Antidepressant Treatment and Neuroradiological Findings.

The influence of poststroke depression on cognitive performance during treatment was studied in 11 patients with major depressive disorder (MDD) and compared to 7 stroke patients with minor depression and 23 without depression. Neuropsychological testing was carried out 3-6 weeks after stroke vs. one week before antidepressive treatment and at 9-10 months. Depressive symptoms improved significantly. At follow-up all patients improved in orientation, receptive and expressive language functions, visuo-motor scanning and coordination and most aspects of memory. There was no significant change in abstract thinking and motor speed. The initially depressed and nondepressed patients did not differ except for incidental learning. MDD patients were significantly impaired at follow-up, nondepressed patients were improved, and patients with minor depression did not differ. Test results were related to CT scans and rCBF findings.

**J. BENNETT, J. JAMES, & R. EDELSON.** History of Depression, Lesion Site, and Demographics as Predictors of Post-Stroke Depression. This study examined depressive disorders in hospitalized stroke patients to evaluate whether the categorization of depression into major and minor syndromes could be supported by differences in selected correlates, including history of depression, lesion site, gender, and education. Sixty patients (35 with right and 25 with left hemisphere lesions) completed the Zung Self-Rating Depression Scale and a psychological diagnostic interview. Patients with a history of depression were more likely to experience an acute onset of depression following stroke than patients without prior depressive episodes, regardless of lesion location (right vs. left hemisphere) or site (frontal vs. nonfrontal). Subjects with lower levels of education were more likely to have experienced previous depressive episodes as well as post-stroke depression.

**B. OERBECK & A.K. SCHANKE.** Cognitive Function of Young Adults With Myelomeningocele: Consequences for Education and Working Ability.

Myelomeningocele is a congenital malformation of the spinal cord. Many newborn infants with myelomeningocele are likely to develop hydrocephalus. Over the last 25 years there is a wider use of shunting procedures for the control of hydrocephalus, but multiple disabilities make them in need of life-long medical care and rehabilitation. Seven-

teen young adults, 12 females and 5 males, mean age 22.5 years, were included. Thirteen of the subjects had shunted hydrocephalus. There is deviant performances in fine motor coordination, slight reduction in memory span, low speed of cognitive processing. Understanding of verbal similarities is approximately normal, a verbal memory test show a slow learning curve. Visual perception and visuomotor construction performances is slightly reduced. Further guidelines for neuropsychological assessment and consequences for education and working ability are suggested.

**H. OHKAWARA, M. MIZUNO, H. KASHIMA, & M. ASAI.** Impairment of Self-Evaluation Ability and Depression in Right Hemisphere Damage.

In this study, the relationship between impairment of self-evaluation ability and emotional disturbance (depression) in right hemisphere damage was investigated. Thirty-one right-handed patients with a localized lesion in the right cerebral hemisphere were studied with the neuropsychological tasks for attention and Hamilton Depression Scale (HDS). The audio-motor method (AMM), an auditory task for selective attention, was administered twice, and self-evaluation (SE) ability was then examined. The self-evaluated scores in AMM test were compared with the actual ones. Patients were considered to have poor SE when the self-evaluated values were more favourable than the actual values in both tests; otherwise they were considered to have good SE. There was no significant difference in total HDS score between patients with poor and good SE. No significant relationship was also shown between the self-evaluation ability and the score of depressive mood in HDS. Furthermore, the amount of brain damage had no relation to the total HDS score.

**G. SARTORY, R. ADAM, & J. JORG.** The Relationship Between Depression, Dexamethasone Suppression and Motor and Cognitive Ability in Parkinson's Disease.

The relationship was investigated between depression, motor impairment, dexamethasone suppression and cognitive ability in Parkinson's disease. Forty-one patients were assessed. Depression was evaluated with the Beck Depression Inventory and the Erlanger Depression Scale. Motor disability was assessed with the Webster Scale and cognitive ability with a conditional learning task, the Colour Word Association test. Blood samples were obtained twice before ingestion of dexamethasone and twice on the following day. Depression was related to poor performance in the conditional learning task, to heightened tremor and to a low level of plasma cortisol concentration in the evening before dexamethasone ingestion. Only one aspect of depression, lack of expansiveness, was related to rigidity and bradykinesia. The results suggest that depression in Parkinson's disease is not characterised by DST non-suppression but may have a common neuropsychological basis with cognitive dysfunction.

**E. KOZORA, L.J. JULIAN, & R.M. OROZCO.** Constructional and Learning Deficits of a Complex Figure in Older Patients Diagnosed With Chronic Obstructive Pulmonary Disorder.

Forty older COPD patients (mean age = 64) were compared to matched controls on measures of visuoconstructive ability, nonverbal learning, and nonverbal recall. Three scores were derived from the Complex Figure Test (CFT) using standardized administration and scoring procedures. The COPD patients were significantly impaired compared to matched controls on the CFT-Copy component ( $p = .001$ ) and CFT-Learning component ( $p > .001$ ). The COPD patients did not differ from matched controls on the CFT-Delayed component. The present findings indicate that COPD patients have graphomotor constructional impairment which may involve perceptual and/or motor deficits. This study also found that COPD patients had difficulty in the acquisition of visual information. In contrast to previous research, the COPD patients did not demonstrate decline in nonverbal recall compared to controls.

**M. MIZUNO, M. KATO, G. SARTORI, & H. KASHIMA.** *Neuropsychological Characteristics of Attention Deficits in Chronic Schizophrenia.* Attention deficits in chronic schizophrenic patients were investigated by using clinical neuropsychological tests. Subjects were 23 chronic schizophrenic patients (S-group) and 20 age- and education-matched normal controls (N-group). In the task, three attention tests with different test patterns (1. auditory cancellation test, 2. letter cancellation test, 3. set dependent activity test) were administered and each result was compared within two groups. Mental status of S-group subjects was evaluated by using Brief Psychiatric Rating Scale. Statistical analysis of results revealed that, in auditory cancellation test with the more passive stimuli in the three tests, number of correct response was decreased in S-group. In the letter cancellation test, the execution time was longer in S-group but the hit rate was not different. In set dependent activity test, number of errors was significantly increased in S-group. These results might suggest that in schizophrenic patients, suppression of habitual cognitive set is poor and attentional dysfunctions are easily revealed if the stimuli are given more passively.

**L. WIART, J.F. DARTIGUES, J.M. MAZAUX, & M. BARAT.** *Minnesota Multiphasic Personality Inventory: Correlates of Neuropsychological Deficit in Left Hemiplegia.*

The hemiplegic's MMPI profile has a particular aspect called schizoaffective profile or psycho-organic syndrome (Dahlstrom 1972) associating "neurotic" and "psychotic" scales (e.g., 2-8). The aim of this study is to verify the association of this profile with the neuropsychological disorders of left hemiplegia. Thirty left vascular hemiplegia have been included. All of them completed the following evaluation in the first two months: motor index, MMS, bisection line test of schenkenberg, Barthel index, MMPI. Following MMPI results we considered two groups; group 1: patients with schizoaffective profile (N = 11), group 2: patients without schizoaffective profile (N = 19). Comparison with these two groups showed in group 1 a significant high level of age ( $p > 0.01$ ), left hemineglect ( $p > 0.05$ ) and impairment of mental status ( $p > 0.01$ ). Psycho-organic syndrome is associated with age, left hemineglect, and cognitive impairment in left hemiplegia.

**A. IAVARONE, S. CARLOMAGNO, M. PATRUNO, V. PARLATO, V. BLASI, & V. BONAVITA.** "Idiot Savant Calendarical Calculator": A Case Report.

A case of an Idiot Savant, 18-years-old, right-handed male, suffering from Autism, is reported. Patient's I.Q. was 45. Neuropsychological testing (included calculation assessment) of main cognitive domains showed a severe and generalised impairment. Assessment of calendar computation was performed on dates of the past and future decade. The patient scored 82/120 on past dates and 58/120 on future dates. Errors consisted in mistakes in which the patient gave the day before or after the date-stimulus. The pattern of errors (over or underestimation) was consistent within the year examined. These data and response latencies suggested strategies other than memory in calendar computation. Such a computation indeed could be aided by anchoring dates.

**J.A. LUCAS, M.H. RAPAPORT, & L.L. JUDD.** *Neurocognitive Functioning in Panic Disorder and Social Phobia.*

Learning and memory were assessed in subjects with panic disorder and social phobia. Patients with panic disorder demonstrated poorer visual learning compared to social phobic and normal control subjects. In contrast, patients with social phobia demonstrated significantly poorer verbal learning than normal controls. Groups did not differ in forgetting scores. Systematic review of additional neuropsychological test results revealed no differences among groups on measures of sustained attention, naming, or visuospatial ability. Results support previous findings of visual memory dysfunction in panic disorder and provide further evidence of temporal lobe involvement in the neurobiology of anxiety. Moreover, the dissociation of verbal and visual memory impairment

between patients with panic disorder and social phobia suggests a possible distinction in cerebral mechanisms underlying these phenomenologically distinct disorders.

**E. POUTIAINEN, I. ELOVAARA, & R. RAININKO.** *A Change in Cognitive Performance and Brain Atrophy in HIV-1 Infected Subjects During a One-Year Follow-up.*

Thirty-six HIV-1 infected individuals with various stages of infection were examined neuropsychologically two times within a year. Twenty-four subjects had early HIV-1 infection (CDC II, III) while 13 were at advanced stages of infection (CDC IV a, c, d). Initially subjects with any other possible causes of cognitive change than HIV-1 were excluded. Three cognitive functions, cognitive speed and flexibility, memory, and language, were followed neuropsychologically. In neuroradiological follow-up peripheral cerebral atrophy, central cerebral atrophy, infratentorial atrophy and parenchymal lesions were studied. Cognitive speed and flexibility declined in advanced infection ( $p > 0.05$ , MANOVA), while improvement was found when the patients at early infection were studied ( $p > 0.01$ , MANOVA). Furthermore, in patients with cerebral atrophy cognitive speed and flexibility declined during the follow-up ( $p > 0.05$ , MANOVA), while the performance improved in those without cerebral atrophy ( $p > 0.01$ , MANOVA). Five of seven subjects with cerebral atrophy had an advanced infection. No significant changes were found in memory or in language functions. Furthermore, cerebral, central cerebral, and infratentorial atrophy increased in patients at advanced infection during the follow-up ( $p > 0.0005$ , MANOVA). Thus, decrease in Cognitive Speed and Flexibility as well as increase of brain atrophy was observed only in patients at advanced HIV-1 infection during the follow-up.

**N.H. WALTON, S.C. BOWDEN, & J. BATCHELOR.** *Hemispheric Asymmetry of Spatial Maze Learning in Patients Undergoing Surgery for the Treatment of Intractable Epilepsy.*

Rapid growth in the surgical treatment of temporal lobe epilepsy has seen an increasing demand for pre-surgical neuropsychological assessment to provide information regarding laterality of the epileptogenic focus. We studied patients undergoing left and right temporal lobectomies on the Austin Maze test, a measure of spatial memory and learning. We predicted that those in the right temporal lobectomy (RTL) group would perform less well than those in the left temporal lobectomy group (LTL). Despite the small sample we found a large and significant difference between the groups in the expected direction at pre- and post-surgical assessment. Spatial maze learning promises to provide a valuable lateralising information and should be included in a comprehensive neuropsychological assessment of presurgical candidates.

**S.R. SCHWEINBERGER.** *Associative Priming of Person Name Recognition in Brain-Damaged Patients.*

This study investigated performance of left-brain-damaged (LBD) and RBD patients in recognizing person names under different conditions of associative priming. Subjects performed speeded familiarity decisions for names of famous and unfamiliar persons. These target names were preceded by face or name primes, which were related (e.g., Jelzin-Gorbachev), neutral (unfamiliar), or unrelated to the target (e.g., Bogart-Gorbachev). Overall performance deficits (RTs and errors) were observed in both patient groups but were largest for LBD patients. Only in the RBD group, which was impaired in other face recognition tests, priming was larger from name than face primes. However, this appeared not only due to reduced priming from faces but also enhanced priming from names. In sum, overall group differences contradict previous suggestions that person name processing is more dependent on right hemisphere functioning. Additionally, data suggest a relatively complex pattern of hemispheric differences in associative priming.



**G. THUT, N. COOK, M. REGARD, U. HALSBAND, K.L. LEENDERS, & T. LANDIS.** Evidence for Different Interhemispheric Transfer Mechanisms With Respect to Proximal and Distal Motor Information.

We investigated the influence of previously acquired upper extremity motor engrams on learning efficiency of the contralateral side in 26 right-handed, healthy subjects. Results showed that in transfer conditions, which were expected to be subserved by homotopic connections, the benefit from previously learned motor engrams was higher for right to left upper extremity direction of transfer than vice versa and for transfer between opposite proximal compared to opposite distal motor areas. Left arm movements benefited from the previously acquired motor engram, whereas right finger performance worsened. Inhibitory callosal effects between homotopic distal and facilitating effects between homotopic proximal motor areas in conjunction with cerebral asymmetry for motor skills may account for the results.

**H. FRUH, T. LANDIS, M. REGARD, & N.D. COOK.** Stimulus Dependent Inversion of Hemispheric Effects in a Bilaterally Conducted Tachistoscopic Experiment.

Twenty-four normal subjects were presented with two decision tasks, when shown 1) acute and obtuse angles and 2) words and nonwords. Both tests were conducted as go/no-go tasks, and each hand had to respond only to the ipsilateral presented stimulus. For accuracy, there was a significant interaction between visual field (VF) and experiment. The angle decision test revealed a significant LVF advantage, whereas the lexical decision test led to the expected RVF advantage. The clearest inversion of the VF superiority was obtained for the bilateral conditions. The results are contradictory to Efron's interpretation of the "bilateral advantage" as an attentional bias for the RVF stimulus, but support models which include changes in hemisphere interaction processes.

**F.F. LEFEVER & E.I. KUMKOVA.** Position Preferences in a Memory Test: Task Difficulty Due to Neglect or Vice Versa?

The forced-choice format of Warrington's Recognition Memory Test was used to detect lateral position preferences in normal volunteers and neurological patients, including some with verified lateral epileptogenic foci. Normal subjects tended to miss correct items on the right and patients on the left, but this did not clearly parallel lesion laterality or Word vs. Face deficits. Both patients and normals showed some evidence for Word vs. Face spatial biases of males to be the opposite of females. Amount, but not direction, of "neglect" was related to success. Epileptic patients had a paradoxical tendency to prefer items contralateral to their foci, but they and others (including normals) were more accurate on the non-preferred side, suggesting an explanation for previously reported increased neglect with increased task difficulty: idiosyncratic or systematic spatial biases influence choice mainly when one does not clearly see a basis for choice—i.e., with difficult items.

**P.E. ANDERSON, B.P. ROURKE, & B.R. BURKE.** Callosal Agenesis: A Longitudinal Investigation.

A complete neuropsychological assessment was conducted on a 23-year-old male with congenital callosal agenesis. This individual demonstrated impaired levels of psychometric intelligence and exhibited deficits on some measures of neuropsychological functioning (e.g., abstraction/concept-formation, visual-perceptual skills, motor skills). However, his performances on other measures were remarkably preserved, and in some cases, above age-expectations (e.g., verbal fluency, memory). In addition, his performance on measures of academic achievement demonstrated the expected deficiency in arithmetic skills in the presence of better developed abilities in reading and spelling. Examination of these results support the validity of Rourke's white-matter model of dysfunction (e.g., 1982, 1987, 1989) and its neuropsychological correlates. Examinations at the age of 12 years and 13 years, before his callosal agenesis

was discovered, were remarkably consistent with the results obtained at 23 years.

**K. FLEKKOY, R. BJØRKLUND, & I. BAKKE.** Brain Involvement in Chronic Whiplash: Indication of Cortical Deactivation.

Specific aspects of choice reaction time (CRT; visual stimulus field, performing hand, and test duration) was used in investigating neurobehavioral processes in 30 consecutively admitted chronic whiplash patients and 20 matched, normal controls. CRT was found to be significantly increased in the patients compared with the controls. The increased latency in patients could not be explained as an effect of education, depressed mood, medication or pain. Across 120 trials for each hand, CRT was found to increase significantly across trials in the patients, but not in the controls. The findings were interpreted as showing a cortical deactivation as a result of a right hemisphere activation deficit.

**I.A. VARTANIAN.** Distortion of Sound Movement Trajectory Perception in Patients With Unilateral Focal Brain Damage.

The method of dichotic stimulation was used to establish a number of characteristics of sound movement perception by man with focal damage of the temporal areas of the brain. It is well known that directional hearing can be studied with the help of dichotic presentation of sounds with interaural time or intensity differences. The following characteristics of sound movement perception in normal and brain damaged subjects have been studied: 1) direction, shape and length of sound movement trajectory; 2) subjective scale of sound movement perception. Patients with the right and left side hemispheric damage differed in above mentioned characteristics of perception. Significant differences concerned the perceptive characteristic of different types of acoustical models of sound movement (intensity- or time-induced). The data are discussed in connection with hemisphere specialization for sound parameters perception, directional hearing and space orientation.

**V. DEGLIN, A. PAKHOMOVA, & A. FILOVA.** Stereoscopic Vision and Cerebral Asymmetry (A Holographic Tachistoscopic Study).

The original method is used: hologram presentation in a tachistoscopic regime. Holograms of spherical surfaces of different curvatures were used as stimuli. In patients after unilateral left or right electroshock seizures (UES, followed by transient suppression of one hemisphere) the stimuli were presented to the central visual fields; in healthy subjects and depressive or manic patients the stimuli were presented to the right or to the left visual fields. It is shown that under the right hemisphere suppression and activation of the left one (right UES, manic patients) the vision stereoscopy decreases; under the left hemisphere suppression and activation of the right one (left UES, depressive patients) it increases. Two groups of healthy subjects are distinguished: 1) with the right hemisphere prevailing in visual stereoscopy and stereoscopic overestimation; 2) with the left hemisphere prevailing in visual stereoscopy and stereoscopic underestimation.

**T. CHERNIGOVSKAYA & V. ARSHAVSKY.** Hemispheric Asymmetry in Olfactory Processing: Neurophysiological and Cognitive Aspects. Most research on hemispheric mechanisms of cognitive functions outline specific types of mentality influencing all modalities of sensory perception. However, the role of individual hemispheric type in chemoreception is scantily known. This study investigates reactions for fragrances presented to adults in different psychosomatic conditions as well as their associations and memory for odors. Batteries of laterality and cognitive style tests were used. One group was examined as to space synchronization of biopotentials. The results indicate that RH— individuals show strong correlation of biopotentials in the RH when stimulated by preferable for them odors, while rejected odors cause strong correlations in the LH of the LH— subjects. RH— individuals demonstrate specific memory and verbalization of odors. Most of professional odor tasters tend to be RH— personalities. The choice of preferable odors and colors depends on the level of individual anxiety, while the choice of the rejected stimuli depends on the level of actual anxiety.

## FRIDAY AFTERNOON, JUNE 24, 1994

## Paper Session 6

## CHILD NEUROPSYCHOLOGY

**D.G. GADIAN, E. ISAACS, A. CONNELLY, J.H. CROSS, M.D. KING, G.D. JACKSON, & F. VARGHA-KHADEM.** Relationship of Verbal IQ and Performance IQ to Temporal Lobe Pathology as Assessed by Proton Magnetic Resonance Spectroscopy.

Proton magnetic resonance spectroscopy (1H MRS) was used for the assessment of focal brain abnormalities in children with intractable epilepsy. Spectra were obtained from the medial regions of the left and right temporal lobes, and the observed metabolite signals were correlated with performance and verbal IQ scores, which were assessed using the Wechsler tests of intelligence. Analysis of the data was carried out with step-wise multiple regression. It was concluded that right-sided damage is associated with a reduction in both PIQ and VIQ in this series of children, the reduction in VIQ being approximately half of the reduction in PIQ. In contrast, left-sided damage is accompanied by a reduction in VIQ with no significant change in PIQ.

**V. ANDERSON, T. GODBER, E. SMIBERT, & H. EKERT.** Declines in Neuropsychological Functions Following Cranial Irradiation Therapy (CRT) During Childhood.

Neurological and neuropsychological abnormalities are commonly reported following CRT during childhood. While some studies describe delayed onset of neuroanatomical and neurological symptoms, neuropsychological studies have not addressed possible declines in cognition. This study evaluated 30 children treated with CRT and 30 healthy controls, matched for age, sex and SES. Both groups were evaluated on two occasions (T1 and T2), with a two year interval between assessments. Initial evaluation occurred 2 years posttreatment for the CRT group. Neuropsychological evaluation included measures of intelligence, memory, executive ability and academic achievement. Results at T1 showed significantly poorer performances for the CRT group, with discrepancies increased by T2. For the CRT group a small, consistent decline in abilities was identified, supporting an interpretation of increasing deficits following CRT in childhood.

**G.A. STEFANATOS, W. GROVER, C. FOLEY, & J. SWANSON.** Corticosteroid Treatment of Idiopathic Language Regression.

Corticosteroid treatment has resulted in improvement of language abilities in children with acquired aphasia associated with seizures or an epileptiform disorder (Landau-Kleffner syndrome). In this report, we describe the results of corticosteroid treatment in a child with an acquired aphasia similar to Landau-Kleffner syndrome but without an epileptiform component. The child experienced an idiopathic regression of language at 1-1/2 years of age associated with symptoms of verbal auditory agnosia. At six years of age, he displayed a severe receptive-expressive aphasia, accompanied by behavioral disturbances. SPECT scan and steady state auditory evoked responses were abnormal. A 28 week course of corticosteroid treatment resulted in significant amelioration in language abilities and behavior and improvements of steady-state evoked responses. The results suggest a common etiological basis for these conditions.

**J. SCHWARTZ & L. JANNEN.** Acquired Aphasia: Landau-Kleffner Syndrome: A Case Report.

We report the case of a girl whose development was normal until the age of two years, eight months when general neurodevelopmental regression with behavioral disturbances and progressive loss of speech

appeared. Initial symptoms included increased separation anxiety, difficulty with ADL skills, episodic and unprovoked emotional dyscontrol and involuntary hand tremors. Her electroencephalogram was markedly abnormal due to bilateral spike and slow wave discharges, more prominently from the left cerebral hemisphere without associated clinical seizure activity. Criteria for the diagnosis of Epilepsy-Acquired Aphasia (Landau-Kleffner Syndrome) are defined. A detailed picture of this girl's pre- and post-morbid symptoms and behavior is presented to facilitate the early identification and treatment of this rare disease.

**T. NYBO, M.L. KOSKINIEMI, L. JARHO, & P. BACKLUND.** Late Neuropsychological Indicators of Long-Term Outcome After Severe Brain Injury at Preschool Age.

The recovery from early childhood brain injuries is often considered favourable. However, evaluations of the prognosis in adulthood are not available. We conducted a long term follow-up study of 33 children with severe brain injuries at the age of  $\geq 7$  years. After the age of 18 years a thorough neurological and neuropsychological examination was performed and medical disability was evaluated. A re-evaluation using a questionnaire was made 3 to 8 years later, when the capability to work was considered as the final outcome. Of the 23 (61%) children who went to normal school only 9 (27%) were able to work full-time and 7 (21%) had part-time or sheltered work. According to preliminary results tests measuring executive functions and motor speed were the best indicators of the capability to work in adulthood. The role of memory will be analyzed further. These results indicate that the prognosis in adulthood after severe brain injury at preschool age is worse than expected on the basis of school performance.

## Symposium 4

## ASSESSMENT IN DEMENTIA

**T. WARD.** Symposium on Assessment of Dementia.

In recent years conditions such as Alzheimer's disease have been the focus of much research interest. With the change in demographics of Western Europe such conditions are also of increasing clinical significance. This symposium aims to present a broad outline of some current research on assessment of dementia, and will be of interest to both clinicians and researchers. Papers deal with computerised assessment, assessment of language deficits and assessment of patients in long-stay settings. A further paper illustrates how psychologists can have useful input into the management of long-stay patients.

**T. WARD & J. SEMPLE.** Assessment of Long-stay Patients With Dementia: A Review.

Despite the huge numbers of elderly patients resident in long-stay settings, this population has until recently been neglected by researchers. To a certain extent this can also be said of clinicians, where the attitude has been that any gains will be short lived. Recently a number of papers have appeared where researchers have developed assessment instruments to further their research goals. This paper outlines several such assessment instruments which have recently been developed specifically for this population, from structured interviews such as the Guy's Advanced

Dementia Schedule to rating scales such as the Echelle de Comportement et Adaption. The kinds of information such assessments yield are illustrated, and several possible uses suggested.

**A.J. ASTELL & T.A. HARLEY.** *Assessing the Language Disorder of Alzheimer's Disease.*

The language disorder of probable Alzheimer's disease (PRAD) was explored in the context of a two-stage model of lexicalization in speech production. Such a model helps to make sense of competing accounts of the disorder which predominantly focus on an underlying semantic disturbance. This is usually conceived of as either impairment of access to intact representations or actual impairment of representations. The two-stage model has separate levels of representation for semantic and lexical items. This enables discrimination between problems with the accessing and storage of concept knowledge and problems with the labels for such concepts. A battery of tasks was designed to distinguish between competing hypotheses derived from this model. The results suggest that the problem lies in accessing lexical items.

**J. SEMPLE.** *Outcome Measures for Clinical Trials of Cognition Enhancers in Patients With Dementia: The Validation of CANTAB.*

Clinical trials of compounds designed to enhance cognition in patients with dementia require outcome measures that are sensitive to change, tap core aspects of the condition and are reliable. In addition they must be acceptable to regulatory authorities and to the scientific and clinical communities. The Cambridge Neuropsychological Test Automated Batteries (CANTAB) has been successfully used with a variety of patient groups, including individuals with dementia, to elucidate the nature of their cognitive deficits. Tests included in the batteries tap aspects of memory, attention and planning as well as basic psychomotor skills. Progress towards the validation of CANTAB as an outcome measure for clinical trials of putative cognitive enhancers will be outlined.

**T. WARD.** *Identification of Patients at Risk From Relocation.*

The moves towards community care and away from isolated long-stay hospitals in the United Kingdom is a continuing phenomena. Such moves have also occurred elsewhere in Europe, most notably in Italy. This paper reports the results of a follow up study carried out during the relocation of patients from two long-stay wards to a community setting. The patients are compared with a control group of non movers, and factors associated with an increase in morbidity are identified. It is concluded that psychologists involved in such schemes should inform relevant policy makers of the risks of relocation for the very frail elderly, so that if possible the most frail of the patients can be spared the trauma of relocation.

Poster Session 4

**APHASIA AND LANGUAGE:  
ATTENTION AND EXECUTIVE FUNCTIONING;  
AGNOSIA, VISUAL DISORDER, AND NEGLECT**

**C. PICARD, P. GOULET, & Y. JOANETTE.** *Plausibility Judgment In Right-Brain-Damaged Patients.*

This study tested the hypothesis of Wapner, Hamby and Gardner (1981) claiming the presence of a deficit in the evaluation of the plausibility of events in right-brain-damaged patients (RBDs). In a first task, 13 RBDs and 13 normal controls had to indicate whether sentences varying in plausibility were stated in the same words used in short stories heard previously. In a second task, they had to point to the most plausible of two

events. In a last task, the subjects had to rate, on an 8-point scale, the plausibility of each event included in the second task. Results showed no plausibility effect in the first task, thus questioning the construct validity of this task. On the second task, the RBDs chose the most plausible sentence less often than the controls. In the third task, they attributed a significantly higher degree of plausibility to barely plausible sentences compared to normals. These results support the Wapner et al. hypothesis for tasks based on linguistic material.

**L. GAGNON, P. GOULET, & Y. JOANETTE.** *Semantic Processing of Polysemous Words After a Right Hemisphere Lesion.*

This study addressed the question of the contribution of the right hemisphere of right-handed adults to the semantic processing of the metaphoric meaning of words (cf. Brownell et al., 1984, 1990). Ten right-brain-damaged subjects (RBDs), 10 left-brain-damaged subjects (LBDs) and 20 normal controls were submitted to (1) a word-triad task in which they had to match words according to the secondary metaphorical or neutral meaning of polysemous target words, and to (2) a dyad task in which they had to detect the presence of semantic-neutral or metaphorical relationships within pairs of words. The results showed, in both tasks, that RBDs performed like LBDs but worse than normals regarding the metaphoric meanings, whereas they performed like normals but better than LBDs regarding the neutral meanings. This absence of a double dissociation does not support the hypothesis of a specific role of the right hemisphere in the processing of metaphoric meaning of polysemous words.

**S. FAURE & J. BLANC-GARIN.** *Profiles In Lexical-Semantic Disorders After Right Brain Damage.*

Right brain damaged (RBD) patients' lexical-semantic disorders may depend on difficulties in accessing the lexicon or on more general cognitive deterioration. Neither of these two hypotheses can account for impairment of all RBD. Taking a differential view, our aim was to look for various profiles of verbal dysfunctioning. Eighty-nine persons (59 RBD and 30 LBD) took three cognitive tests: Verbal Recall, Verbal Fluency (semantic criterion) and Verbal Fluency (letter criterion). Individual profiles showing relations between performance levels on the 3 tasks were obtained. Homogeneous and asymmetric profiles were contrasted with spatial analysis task data. There was no correlation between verbal and spatial performance for patients with isolated fluency difficulties. In contrast, this correlation was strong for homogeneous profile patients, supporting the hypothesis of deterioration for a subgroup of patients.

**M.L. BERTHIER, G. PORTA, A. POSADA, & C. PUENTES.** *Preserved Written Expression In Severe Nonfluent Aphasia.*

This paper describes a strongly right-handed nonfluent aphasic patient, ERC, with an unusual preservation of written expression. Patient ERC suffered a massive left hemisphere ischemic infarction and subsequently developed right hemiplegia, global aphasia, alexia and agraphia. Two years after onset, ERC showed mild right hemiparesis, transcortical motor aphasia, and phonological dyslexia. Written expression (spontaneous writing, copying and dictation) was relatively preserved. ERC was able to write letters, numbers, words and phrases with either hand. Written naming was mildly impaired; errors were mainly semantic. He was poor at writing nonwords. Computerised tomography and single photon emission computerised tomography with (99m TC)-HM-PAO revealed anatomic and/or functional involvement of the entire left hemisphere. These findings suggest a major contribution of the intact right hemisphere to writing processes.

**A. ARDILA & M. ROSSELLI.** *Spatial Alexia.*

Twenty-one right hemisphere damaged patients were selected and divided in two groups: pre-Rolandic (six patients) and retro-Rolandic (15 patients). A specially designed reading test was given to each patient.

Different types of reading errors were analyzed: literal errors (substitutions, additions, and omissions of letters), substitutions of syllables and pseudowords for meaningful words, left hemi-spatial neglect, confabulation, splitting of words, verbal errors (substitutions, additions, and omission of words, including semantic paralexias), grouping of letters belonging to two different words, misuse of punctuation marks, and errors in following lines. It is proposed that different defects can underlie reading errors observed in case of right hemisphere pathology: difficulties in the recognition of the spatial orientation in letters; left hemi-spatial neglect, tendency to "complete" the sense of words and sentences; inability to follow lines; and grouping and fragmentation of words.

**K. HADANO, J. TOMINO, M. INO, H. NAKAMURA, A. MATSUI, S. YOSHIDA, M. NAKANISHI, & T. HAMANAKA. Effortful Echolalia: Report of Two Cases.**

Echolalia is often observed in patients with transcortical sensory or mixed aphasia. Usually their speech is completely fluent. According to the definition of transcortical aphasia, their repetition ability must be preserved. We have observed nonfluent and effortful echolalia in two patients with cerebral infarction. The clinical picture in the patients represented a combination of echolalia and nonfluent speech with a short phrase length (agrammatism) and disordered articulation (anarthria). They repeated very laboriously the few words spoken by the conversation partner and could not stop this forced repetition in spite of complete awareness of their own echolalia. These cases suggest that both repetition ability and fluent speech are not always a necessary condition for echolalia.

**E. PARREIRA, L. ALBURQUERQUE, M. GUERREIRO, M.G. LEAL, L. FARRAJOTA, J. FONSECA, & A. CASTRO-CALDAS. Wernicke's Aphasia in Illiterate Subjects: CT Scan and Clinical Correlations.**

Five illiterate patients with Wernicke's Aphasia due to stroke were compared with 12 literate patients with similar clinical signs. The diagnosis of aphasia type was based on our current diagnostic criteria (fluency of speech, naming, comprehension and oral repetition). The comparison of the scores of the individual sub-tests of the Aphasia Battery revealed that illiterates scored worse in some of them, namely on comprehension and repetition. The comparison of the CT Scan ischemic areas revealed a similar distribution of the lesions in both literate and illiterate subjects. These results suggest that the cerebral areas involved in language processing are the same for both groups. However there are subtle differences in performance in some sub-tests which may reflect different strategies of information processing which are discussed in a model based on previous results obtained in non-brain damaged population.

**A.I. REIS & A. CASTRO-CALDAS. Lexical Processing in Illiterate.**

The hypothesis that learning to read and to write may influence the processing of oral speaking had support on previous studies on illiterate populations. This study addresses the question of lexical processing by illiterate subjects. The performance of a group 24 completely illiterate adult subjects on two tasks of lexical processing was compared to the results obtained by literate subjects. Results showed that adult illiterate non-brain damaged patients performed worse on repetition of non-words, and on tasks of association of pairs of words. This last task was designed taking in consideration morphological and semantic variables. Illiterate subjects had a very poor performance on pair association related to the morphological characteristics of the words. These results suggest that the absence of reading and writing skills influences the way in which oral language is processed at the lexical level.

**A.I. REIS, M. GUERREIRO, C. GARCIA, & A. CASTRO-CALDAS. How Does an Illiterate Subject Process the Lexical Component of Arithmetics?**

Most of the the illiterate subjects can perform simple arithmetic operations without any scholar knowledge of the rules and no experience in manipulating of symbolic material. On standardizing tests for illiterate

populations we found that the digit span was significantly lower when we compared the performance of these subjects with literate ones. Two parallel digit span tasks were designed: Task A: series of digits lower than 5. Task B: series of digits higher than 5. Results revealed that illiterate subjects were worse on task B than in task A. It is suggested that the memorization of digits by illiterate subjects carries the information of quantity and not exclusively the name of the digit.

**A. RUIZ, C. CID, & S. RECALDE. Self-Dictation in a Surface Dysgraphic Patient: A Case Study.**

Mr. R.C., a 50 year-old right-handed Spanish speaking dentist, who presented with a mild fluent aphasia, dyslexia and dysgraphia, showed a pattern of surface dysgraphia, a quite unfrequent entity in Spanish, a very regular language. Mr. R.C.'s writing was assessed by means of a list of words. The analysis of the results of this test and a sample of his spontaneous writing confirmed that he could not use a lexical route for writing. In all tasks, he self-dictated the stimuli, making literal substitutions and transcribing the allophonic variations of his oral productions. The writing pattern of R.C. was analyzed according to a classical two-route cognitive writing model, in order to discuss the implications of the use of this strategy in a model of this type.

**A.I. ANSALDO, C. CID, F. GARDYE, & J.L. NESPOULOUS. Anomia in a Case of Bilingual Aphasia: Spanish and English Compared at the Level of the Phonological Output Lexicon.**

Studies on lexical organization have focused on normal and brain damaged populations. The study of anomia in bilingual aphasia allows to see the interaction between both languages at the lexical level and to compare the type of lexical organization found in this population with the one observed in bilingual normal subjects. We present the case of a bilingual Spanish-English anomic patient who mixed both languages during naming tasks. The type of anomia in each language is described. Factors such as type of word and type of naming task are manipulated and results obtained are analysed intra and inter language. Finally, some of the characteristics of the lexical organization observed in this bilingual aphasic are compared with descriptions of lexical organization in normal bilingual subjects.

**H. KREMIN. Naming and Reading Without Semantic Comprehension.**

Two cases with preservation of the ability to name despite major disturbances of the comprehension of pictures have been described in the literature (Kremin, 1986). We newly present a case with such a dissociation. MA, a patient with progressive brain disease, shows close to normal naming performance on the French Naming Test (Deloche et al., 1990) and scores 33/52 on the 'Pyramids and Palm Trees' test (Howard & Patterson, 1992) with, however, a response consistency of only 13 items correct across sessions. In spite of her severe semantic comprehension deficit MA flawlessly reads words, regular and irregular ones, and non words. These findings confirm the notion of a direct lexical (non semantic) pathway not only for reading but also for naming familiar object pictures.

**H. KREMIN, A. BASSO, J. DAVIDOFF, P. KITZING, M.N. METZ-LUTZ, M. VAN DE SANDT-KOENDERMAN, J. VENDRELL, & D. WENIGER. European Standardization of Oral Picture Naming.**

Defining normal performance is one of the prerequisites of clinical research. We thus standardized the oral naming of 391 black and white drawings by native speakers of Dutch, English, French, German, Italian, Spanish and Swedish in a total of 1040 normal subjects. The individual factors controlled were sex (2) age (3: 18-39; 40-59; 60-75) education (2 or 3 levels). Name agreement with respect to the dominant response was established for every language. The results show: (i) more than 200 pictures obtain <70% name agreement in each individual language, (ii) 100 of these pictures also obtain <70% agreement in all studied languages, (iii) less than 10% of the pictures obtain no dominant response in any language.

**M. LAIACONA, C. STANGALINO, L. LORENZI, & E. CAPITANI.** *Association Between Deep Crossed Aphasia and Unilateral Neglect: Do Deep Nuclei Play a Role?*

We describe a right-handed patient affected by language disturbances and unilateral neglect following right thalamic haemorrhage. Cases of deep crossed aphasia from the literature are reviewed and the role of deep nuclei in producing cognitive deficits is discussed. A review of the literature reveals a higher incidence of deep lesion in crossed aphasics than in standard aphasics. To explain this finding, we suggest a hypothesis of functional integration between cortical and subcortical areas that takes into account the degree of redundancy of the cerebral structures.

**J. BATCHELOR, A. NISBET, & R. BRYANT.** *Attentional Deficits Following Minor Head Injury.*

The incidence of focused attentional deficits (FAD's) following minor head injury (MHI) was investigated. Although the modified Stroop Reading Test (MSRT) is reportedly more sensitive than the original to FAD's in this population, the influence of emotional disturbance has not been evaluated. Thirty-five MHI patients assessed on the MSRT >14 days of trauma were compared with a non head injured group matched for age, sex, IQ and education. State-trait anxiety was measured. Results revealed the MHI group to be slower on 3 of the 4 conditions of the MSRT. The FAD existed only when anxiety was controlled. Results suggested that: 1) the MSRT is more sensitive than the original to FAD's following MHI; 2) this deficit is not explained by anxiety, and 3) anxiety may influence neuropsychological results.

**Y. OE, M. KATO, & H. KASHIMA.** *Motor Impersistence, Perseveration and Attention Disorder.*

We conducted motor impersistence (MI) tests, perseveration tests and attention tests in 10 patients with left-sided damage and 26 patients with right-sided damage. Patients with aphasia were excluded. MI was much more common in patients with right-sided damage than patients with left-sided damage, and was also more common with tasks involving two simultaneous actions and tasks requiring stimulus inhibition. There was no left-right difference in the occurrence of perseveration. In patients with right-sided damage whose damage was in the fore-brain, a correlation was found between MI in tasks which required stimulus inhibition and perseveration symptoms, which are thought to depend on impairment of response inhibition. A correlation was found between reduction in correct responses in the audio-motor method, performed as a test of attention, and MI in patients with right-sided damage, but not in patients with left-sided damage. These findings suggested that MI may be a non-specific sign reflecting impaired attention in right-sided damage.

**H.J. BARNES, D.A. ROSENBAUM, & R.A. COHEN.** *The Influence of Attention on Sequential Motor Timing.*

The influence of attention in motor timing was studied. In three experiments, normal subjects produced sequences of finger taps to generate two successive intervals of different tapping rates. Visual targets served as models for the required interval in Experiment 1, while auditory stimuli served as interval models for Experiments 2 and 3. Across experiments, tapping performance not only became more variable, but virtually came to a halt when a shift in tapping rate was required. During the auditory experiments, subjects failed to shift at the correct serial position, regardless of whether the sequences could be hierarchically organized (Experiment 2 vs. 3). This increased variability was associated with increased demand for attentional allocation associated with response selection. A model that specifies an intimate relationship between attention and timing control is presented.

**C. AVILA.** *Facilitation and Inhibition of Visual Attention in Neurotic Personalities.*

This study is aimed to test over-focusing hypothesis in neurotic personalities. A computerized version of Posner's non-invasive behavioral par-

adigms to study visuo-spatial attention was used (Posner, Rafal, Choate, & Vaughan, 1985). We measured exogenous facilitation and inhibition of return in 61 subjects. Personality was measured using the EPQ. No differences were found for exogenous facilitation in personality groups, but neurotics showed greater inhibition of return than stables. These findings are consistent with over-focusing hypothesis suggesting the existence of a mechanism to screen out irrelevant information in neurotics. The hippocampus-colliculus pathway may play a significant role in over-focusing.

**E. VAKIL, H. WEISZ, L. JEDWAB, Z. GROSWASSER, & S. ABERBUCH.** *The Stroop Color-Word Task as a Measure of Selective Attention: Efficiency in Closed-Head-Injured Patients.*

Deficits in attention are reported to be among the most common symptoms following head-injury. Various underlying mechanisms of selective attention such as excitation, inhibition, and habituation have been isolated in recent studies. In the present study 17 control and 17 closed-head-injured (CHI) subjects were compared on four conditions based on the Stroop task (neutral, habituation, Stroop, and negative priming). Comparison of the different tasks enables examination of the various components of selective attention. The hypothesis that the control group's overall reading time would be faster than that of the CHI group was confirmed. Also confirmed was the hypothesis that the overall reading time pattern between task conditions would be neutral > habituation > Stroop > negative priming. The prediction that the CHI patients, due to their impaired inhibitory mechanism, would not show a slower reading time on the negative priming as compared to the Stroop condition, was confirmed as well.

**L. WEYANDT, I. LINTERMAN, & M. SHEA.** *Prevalence of ADHD Symptoms Among College Students and Performance on Executive Function Tasks.*

The present epidemiological study investigated the prevalence of symptoms of ADHD and psychopathology in 770 college students as measured by self-report rating scales. The study also explored the performance of two groups; those with and without attention/impulsivity problems on a battery of neuropsychological tasks (WCST, Stroop Screening, VSAT, Ravens Progressive Matrices). Results revealed that 8% of students reported ADHD symptoms as a child, 7% as adults, and 9% reported symptoms of psychopathology. Results of Analysis of Variance (ANOVA) indicated significant differences between groups on the Ravens Progressive Matrices. Differences were not found on the remaining neuropsychological tasks. Interpretations and theoretical implications are advanced.

**C. MALAPANI, B. RAKITIN, B. DEWEER, W. MECK, J. GIBBON, B. PILLON, B. DEFONTAINES, B. DUBOIS, & Y. AGID.** *Segregation of Timing Processes Within the Basal Ganglia.*

Experimental data in animals suggest functional dissociations in temporal processing within the striato-frontal circuitry. To investigate the neural mechanisms involved in temporal processing in humans, patients with focal lesions in the basal ganglia were assessed with Peak Interval (PI) timing procedures in which durations of 8s and 21s were reproduced. Experiments were designed as single and compound in order to provide information on distinct modules of temporal information processing, based on the framework of scalar timing theory. Visual or auditory (single) and visual/auditory (compound) signals of different durations were delivered by a computer and feedback concerning the temporal accuracy and precision of responding was provided for a fixed percentage of PI trials. Single and compound PI timing procedures were differentially affected by basal ganglia lesions, compared to controls. Lesions in the putamen impaired both accuracy and precision of single signals timing. In contrast, lesions in the pallidum and the caudate interfered with timing of compound signals without interfering with the timing of single continuous signals. These results are discussed in relation with previously obtained data in Parkinson's disease patients, suggesting a seg-

regation of timing processes within the striatum and its efferent pathways via globus pallidus to the frontal cortex.

**B. LEVINE, D.T. STUSS, & W.P. MILBERG.** *Conditional Associative Learning: Validation of a New Clinical Measure in Normal Subjects.* Conditional Associative Learning (CAL) has been validated in the experimental neuropsychological literature as a task sensitive to deficiencies in the executive control of memory. Although it has potential for use in clinical populations, it is not routinely used in neuropsychological assessment. In this study, an easily administered CAL task was given to neurologically normal young, middle-aged, and elderly subjects. Performance was related to both age and scores on other tests. Twenty-five percent of the variance in WCST categories was accounted for by CAL performance. Additionally, there was evidence to suggest that CAL performance was independent from simple item recall. The findings indicated that this CAL task has potential for dissociating specific memory and executive processes.

**V. QUAGLINO, O. KOENIG, B. NAEGELE, & J. PELLAT.** *Intact Priming for New Associations in Parkinson's Disease Patients.* Parkinson's disease patients and control subjects were administered a test of priming for new associations. Subjects were first presented 24 pairs of unrelated words (a cue and a target) in a sentence generation study task. In the test task, subjects were shown word stems corresponding to the target-word, which were presented either with the same cue-word as the one used in the study task, or with a new one. The subjects were asked to complete the stem with the first word that came to mind. Although it has been suggested that normal frontal system functioning is critical for the priming of new associations, the present study shows that Parkinson's patients, who are known to present frontal-like behaviour, seem to exhibit normal priming for new associations.

**M.A. JURADO, J. DEUS, M. MATARO, J. PUJOL, P. VENDRELL, M. JODAR, C. GARCIA, & C. JUNQU.** *Incidental Memory for Frequency in Frontal Lobe Patients.* Fronto-subcortical system have been related to automatic memory. Frequency memory may be considered as an automatic or incidental process when it occurs without intention or effort. This kind of frequency memory has been studied in a sample of 42 patients with frontal lobe damage. We used a modified version of the Brown-Peterson task for this purpose. Subjects were not informed they would have to estimate the frequency of appearance of several words that they had to remember previously. Frontal group showed an impairment of frequency estimation. This result suggests that automatic memory for frequency may be a frontal lobe function.

**H. SAITOU, M. KATO, & H. KASHIMA.** *An Evaluation of the Fluency of Idea in Frontal Damaged Patients Using the Test for Creative Thinking (TCT).* The Uses Test, a task in TCT, the Word Fluency Test (WFT), and the Modified Stroop Test (MST) were administered to 11 patients with frontal lesions (Frontal Group), 22 patients with non-frontal lesions (Non-Frontal Group) and 10 normal controls. In the Uses Test, for the criteria to evaluate answers from not only a quantitative but also a qualitative aspect, the answers were classified as task dependence and task modification. The performance on the Uses Test was not significantly different between Frontal and Non-Frontal Groups. As to the relationship between the Uses Test and MST, only in Frontal Group, we found a significant negative correlation between the number of answers of task modification and a variable of the disinhibition of stereotypes using the performance on MST. A participation of more general disinhibition of stereotypes not limited to words is suggested in the disturbance of fluency in Frontal Group.

**J. VILKKI & S. VIRTANEN.** *Impairment on Dual Task Performance After Closed-Head Injury (CHI).*

The hypothesis that CHI causes a disproportionate impairment of dual task performance was studied. Twenty CHI patients and 16 non-brain-damaged patients counted backward and canceled visual targets on separate one minute trials as quickly and accurately as possible. After these single tasks they were requested to do both tasks simultaneously taking care that the performance on neither task would be much more impaired than on the other task, because only the performance that showed bigger percentage impairment from the corresponding single task performance was considered as the result of the test. After two one minute dual task trials the single task trials were performed again. As hypothesized, the percentage impairment of performance on the dual task was bigger in the CHI group than in the control group. The groups did not differ significantly on the single task performances.

**R.V. WILKINSON & H. TUOKKO.** *Detection of Impairment in Severe TBI Patients With Good Cognitive Recovery.*

The neuropsychologic test profiles of 6 severely head injured subjects with frontal involvement, whose scores gave the impression of good recovery, were examined. All had good pre-injury and post-injury intellect. Category Test and WCST performance was intact in all subjects. None therefore showed the classic deficits expected, suggesting a ceiling effect on those tests for the very bright. Lowest scores were Stroop Color and Stroop Word, but not to the cutting score criterion. Results suggest a ceiling effect for certain tests for the very bright, with a need for profile interpretation rather than reliance on the "frontal" tests. Review of general functioning showed personality and executive function problems in five of the six.

**M. REGARD, C. ROHRENBACH, & G. THUT.** *Hand Differences in Non-Verbal Fluency.*

Intraindividual left- and right-hand performance in non-verbal fluency was investigated in right-handed patients with unilateral or bilateral frontal lesions, the latter displaying partial anterior split-brain symptoms. Split-brain patients produced more items with their left hand. Patients with unilateral frontal lesions produced slightly more with the hand ipsilateral to the lesion. However, split-brain patients made the most errors (repetitions and rule breaks) and more with their left hand, whereas the other patients showed no hand differences. Thus, in unilateral frontal lesions error control of both hands can still be maintained, but an additional frontal lesion and/or defective interhemispheric transfer results in a breakdown of left hand performance, as has previously been suggested for alien hand.

**I. RORSMAN, R.W. BUTLER, & M.-E. MEADOWS.** *Family Members' Assessment of Behavioral Alterations in Frontal Brain Disease.* The present study involved the development of a family inventory to assess behavioral symptoms associated with frontal lobe impairment. Inventory data were obtained from a family member of 25 adult subjects with discrete brain tumors (15 frontal and 10 posterior lesions). The informant first completed the inventory on the subject prior to any behavioral symptoms associated with tumor diagnosis and then rated each item on the subject's functioning at the time of assessment. The frontal group demonstrated a significant ( $p > .01$ ) increase on the following scales: Forgetfulness; Planning deficits; Imitation; and Apathy. Subjects with posterior lesions demonstrated a significant increase on the Apathy scale. The present study supports previous reports of imitation behavior in frontal lobe injury and demonstrates the efficacy in using family members' reports on behavioral indices.

**Y. SAKAMURA, M. KATO, Y. SOMEYA, & H. KASHIMA.** *Disorder of Concept Formation in Schizophrenia.*

To compare concept formation disorder in schizophrenia with that in frontal damaged patient, the Vygotsky test was performed in 28 patients

with schizophrenia, 20 patients with frontal lesions and 21 normal control. In the presence of similar decrease in quantitative evaluations shown by the number of clues required for the completion of classification, the pattern of concept formation was clearly different. The "impaired concept formation type" due to difficulty of establishment of a new combined concept frequently seen in the frontal group was not observed in schizophrenic group. On the contrary, the "random type" due to random sorting by illogical principles frequently seen in schizophrenic group was not observed so often in frontal group. A high correlation between the number of clues and SANS score in schizophrenic group, suggested a close relationship between the concept formation disorder and negative schizophrenic symptoms. In order to detect characteristics of concept formation disorder in schizophrenia, it is important to evaluate the qualitative aspect of the neuropsychological performances.

**S. McDONALD & S. PEARCE. How Is Sarcasm Understood? Clues From Studies of Frontal Lobe Damage.**

There are currently two theoretical explanations regarding the perception of sarcasm. In one, the listener sees that the sarcastic remark is contrary to known facts and the literal meaning is rejected for an alternative inferential meaning. In the second the literal meaning of the sarcastic remark is accepted but seen as a scornful echo of some previous assertion. These two models lead to different predictions about how frontal injuries will affect the ability to understand sarcasm. In order to investigate these the performance of frontally injured patients and matched controls were compared on a sarcasm task using written (i.e., without intonation) versus audio (i.e., with intonation) presentations. Their ability to recognise emotion in voice was also explored. The results are discussed in terms of these two models.

**P. D'ERME, P. BARTOLOMEO, & G. GAINOTTI. Difference in Recovering Rate between Visuospatial and Representational Neglect.** We describe two right brain-damaged patients presenting with left neglect for visual stimuli and for internally generated images. On subsequent testing, recovery from visuospatial neglect occurred, but both patients still showed representational neglect. A difference in recovering rate between the two forms of neglect was thus observed. This difference is interpreted as the result of a compensatory strategy used in visuospatial tasks only, rather than a dissociation between different deficits. If one accepts that one underlying mechanism of neglect is a defective automatic orienting of attention toward the left, this compensatory strategy might be an intentional orienting of attention toward this side. Probably, patients use this strategy in visuospatial, but not in imaginal tasks, because the former are closer to everyday life than the latter.

**T. KASHIWAGI, A. KASHIWAGI, H. TANABE, J. OKUDA, J. SHIRAIISHI, & T. NISHIMURA. Neglect Signs in Split-Brain Patients: Reappraisal of the Literature.**

Patients with callosal lesions due to cerebrovascular diseases may exhibit left hemispatial neglect confined to right-hand and verbal responses with little or no right hemispatial neglect in tasks performed with the left hand (Kashiwagi et al., 1990). We consider the asymmetry model of directed attention postulated by Mesulam (1981) to be cogent for explaining asymmetric phenomena of the neglect syndromes. However, the absence of salient neglect in split-brain patients (Plourde and Sperry, 1984) has been an obstacle in the acceptance of this model. Recently, we noticed descriptions suggesting left hemispatial neglect confined to right-hand performances in split-brain patients, W.J. and R.Y. (Bogen, 1969), 2-C (Joseph, 1988), and J.M. (Loring et al., 1989). The results of the reappraisal are discussed.

**G. RODE & M.T. PERENIN. Unilateral Misrepresentation of Space and Vestibular Stimulation.**

In a previous study, we have shown a unilateral neglect of representational space in patients asked to evoke mentally the map of France and to name as many towns as possible successively on each half of the map.

Interestingly, the right-left asymmetry temporarily disappeared through vestibular stimulation (Rode and Perenin, 1990). As it could be seen in this "cued" condition, we have supposed that representational neglect could a fortiori appear in a "non-cued" condition and, in addition, qualitatively different effects of the vestibular stimulation could be expected. These points have been examined in 4 groups of 8 subjects (NS, LHN-, RHN-, RHN+). In the RHN+ group, the same procedure was applied before and after caloric vestibular stimulation (cold left ear caloric stimulation). As expected, a very marked representational neglect could be demonstrated in this "non-cued" experiment. This significant asymmetry seems to reflect both a degraded or absent representation of the left side of the map and a deviation to this representation to the rightmost part of the map. This would support the idea of a steeper ipsi-contra-lateral gradient of space representation in the left hemisphere.

**M.A. HÉNAFF & F. MICHEL. Two Different Cortical Lesions, Two Different Achromatopsia.**

Two patients suffering from lesions of their right and left infero-temporo-occipital regions keep good visual acuity and contrast perception. Both are reporting to live "in a black and white movie". They are unable to point to named colors. They can order achromatic stimuli by brightness but randomly order the isoluminant colored caps of the Farnsworth test. However, in a forced choice task patient A is able to point to a colored stimulus among different grey ones, while patient B performs at chance level. Patient A has an unconscious access to color, B has not. The implicit treatment of color could be attributed to the fusiform gyrus preserved in patient A.

**O. BRUNA, C. ROIG, C. JUNQUE, P. VENDRELL, & J.M. GRAU-VECIANA. Can Visuospatial Impairment Be Explained by Oculomotor Abnormalities in Parkinson's Disease?**

Visuospatial functions and oculomotor parameters were studied in a sample of 96 patients with Parkinson's disease (PD). Visuospatial deficits correlated with motor impairment and severity of the disease and also with oculomotor abnormalities. In order to find out if visuospatial impairment was secondary to oculomotor disturbances we performed partial correlations. After controlling gaze pursuit and saccadic variables, Block Design (WAIS) and Line Orientation Test maintained their correlations with motor impairment and severity of the disease. In conclusion, the results of the present study showed that visuospatial deficits can not be explained by oculomotor abnormalities in PD patients.

**C. BERGEGO, M.C. MASURE, P. PRADAT-DIEHL, M.C. LAURIOT-PREVOST, & G. DELOCHE. Visual Recognition Disorders Following Post-Traumatic Cerebral Blindness.**

Recovery from post-traumatic cerebral blindness was studied in two patients. At the acute phase both fulfilled the neurological diagnosis of blindness due to bilateral mainly occipital lesions. In both cases the improvement allowed obstacles avoidance, itineraries learning, objects recognition and functional independancy. Pictures recognition disorders, colour deficit, letter by letter dyslexia, prosopagnosia still remained two and three years later. However recovery and neuropsychological data were quite different. In case SA attentional visual impairment was the prominent feature with a visuo-motor incoordination impairing copy tasks, drawing but mental imagery was preserved. In case BA copy tasks were nearly perfect; besides a perceptual deficit several tasks suggested a partial impairment of the structural visual store.

**M. SADEH, R. ARIEL, R. WEITZ, & D. INBAR. Rey-Osterrieth and Taylor Complex Figures: Equivalent Measures for Children.**

The Rey-Osterrieth and Taylor complex figures are considered equivalent measures of visual construction and memory. Some investigators have recently questioned this equivalence in adults. The present investigation addresses the question of equivalence of the figures for children. Thirty mentally normal hyperactive children were administered the two complex designs. Scoring was performed using the standard itemized

procedure (Lezak, 1983) and Waber and Holmes's (1985) organizational scoring system. A two-way analysis of variance was conducted on the mean accuracy scores of the designs. The results demonstrate no difference between the designs. This suggests that children perceive them as equally difficult.

### Paper Session 7

#### IMAGING

**L.H. GOLDSTEIN, J.J.M. KEW, P.N. LEIGH, & D.J. BROOKS.** *Neuropsychological and Cerebral Activation Abnormalities in Amyotrophic Lateral Sclerosis (ALS).*

Significant impairments of verbal fluency and picture recall were detected in a group of 16 clinically nondemented patients with ALS compared with 16 controls. On the basis of their verbal fluency scores two subgroups of ALS patients (one high, one low mean score) and age matched controls underwent Positron Emission Tomographic (PET) measurement of rCBF at rest and while performing freely selected or stereotyped right-handed movements of a joystick. Patterns of cerebral activation differed between the two ALS subgroups and controls during joystick movement selection. Abnormalities of rCBF suggest impaired function in ALS patients of a neural pathway projecting from hippocampus to medial prefrontal cortex via anterior thalamic nuclei, with degree of functional abnormality related to neuropsychological deficit. Ongoing studies will also be outlined.

**J. DECETY, D. PERANI, & F. FAZIO.** *Mental Representations Related to Actions: Functional Anatomy with PET.*

Regional cerebral blood flow was measured in normal subjects while they observed a virtual hand grasping visually presented objects (movement observation: MO) and while they imagined grasping objects (motor imagery: MI). EMG recorded simultaneously showed absence of muscular activity. MO was associated with strong bilateral rCBF increases in the cerebellum, the putamen, the cingulate cortex in the gyrus occipitalis medialis, and in the gyrus occipitalis lingualis and the putamen in the right hemisphere. During MI, increases were localized bilaterally in the anterior cingulate, in the caudate nucleus, the gyrus precentralis inferior and in the primary motor cortex on the left side. These data localize cerebral areas engaged in the representation of action and support the notion of separate neural pathways for external versus internal movement imagery.

**K. WATKINS, D. HEWES, J. EVANS, F. KIRKHAM, B. KENDALL, D. KINGSLEY, A. CONNELLY, & F. VARGHA-KHADEM.** *A Neuropsychological Study of Sickle Cell Disease in Children.*

Children with Sickle Cell Disease (SCD) were assessed with Magnetic Resonance Imaging (MRI), Angiography (MRA), Transcranial Doppler Ultrasound (TCD) and psychometric tests. Compared with sibling controls, the children with SCD were significantly impaired in IQ and in story recall on the Wechsler Memory Scale, reflecting the high incidence of cerebral infarction, revealed on MRI. Of the 15 children with infarcts, 6 also had arterial disease, revealed by MRA and TCD. These 6 were significantly impaired on the Wisconsin Card Sorting Test compared to the 9 without arterial disease. This was due to ischaemic infarction of frontal lobe tissue, in the former subgroup, presumably as a result of stenoses or occlusions of the middle cerebral, anterior cerebral or internal carotid arteries.

**D. LACROIX, V. FRAILE, M. TREMBLAY, Y. CHAPUT, & R. LAMER.** *Computerized EEG Coherence Analysis: A Brain Imaging Technique to Study Cognition.*

To explore the potential use of EEG coherence analysis in cognitive research, EEGs were obtained from 6 right-handed healthy subjects at rest (eyes closed and open) and during four cognitive tasks using 19 electrodes according to the 10-20 system. The results show distinct regional changes according to the task executed: 1) when listening to a text, changes of local coherence (LC) are mainly localized in the left temporal region; 2) when silently reading, changes involve mainly the left posterior and the frontal regions of both hemispheres; 3) when visually discriminating forms, LC is increased in posterior regions mostly on the right hemisphere; 4) when doing a maze task, changes are present in the right posterior regions extending towards the right central regions and involve also the frontal regions. These results show that EEG coherence analysis can detect brain changes in areas recognized by neuropsychological sciences and functional imaging techniques as being involved in auditory comprehension of language, in reading functions, in visuo-perceptual and executive functions.

**F. HENRY-LEBRAS, F. TRANQUART, V. COLOMBO-LABECCA, B. GAYMARD, D. BEAUCHAMP, J. ROLLAND, B. DE TOFFOL, E. DEGIOVANNI, J. L. BAULIEU, & A. AUTRET.** *Effects of a Linguistic Activation Task on Cerebral Blood Flow Asymmetry in the Course of Aphasia Recovery.*

A study of cerebral blood flow asymmetry with a linguistic activation task in the course of aphasia recovery was made in seventeen aphasic patients and five control subjects. All were dextral. The evaluations were performed during the first (M1), third (M3) and sixth (M6) months after the stroke. These evaluations included clinical examinations of aphasia with the Boston Aphasia Examination test (BDAE) and cerebral blood flow measures by Spectral Photonic Emission Cerebral Tomography (SPECT) with 99mTc.HMPAO. A method for relative asymmetry quantification of cerebral perfusion was established: The two SPECT concerned: 1) a control situation where the subjects had to listen to a list of foreign words during three minutes; 2) a linguistic activation task where the subjects had to listen during three minutes a list of words where they had to count animal names. The results at M1, M3 and M6 show several patterns of cerebral perfusion asymmetry with the Linguistic Activation Task (L.A.T.). They confirm the right hemispheric activation during aphasia recovery and they show that, for several patients, left hemispheric activation also plays a role. Comparisons with literature data are made. Heterogeneous pattern of cerebral blood flow perfusion during aphasia recovery may be an argument for the variability of functional cerebral plasticity. The methodology and the possible implications for aphasia rehabilitation are discussed.

### Paper Session 8

#### MEMORY 2

**A.I.T. THOENE & E.L. GLISKY.** *Learning of Names and Faces in Memory Impaired Patients: A Comparison of Different Training Procedures.*

The purpose of this study was to compare a mnemonic strategy based on concept-driven processing and explicit memory (i.e., verbal elaboration and imagery) to one based on data-driven processing and implicit memory (the method of vanishing cues developed by Glisky and Schacter) in a names and faces learning task. A third condition (video pre-



sentation) was also introduced. Seven American and six German patients with memory impairment due to brain injuries of different etiologies were trained to learn 12 ordinary first and last names, four in each condition. The mnemonic strategy proved to be the most effective and vanishing cues the least effective. Discussion will focus on the characteristics of the materials as critical determinants of the effectiveness of different training techniques.

**D.G. ANDREWES, G. KINSELLA, M. MURPHY, & K. ALDER-TON. The Effect of Memory Handbook Training on Memory Complaints of the Elderly.**

Community dwelling non-demented elderly people (60–70 years) with reported memory complaints were randomly assigned to either a memory-handbook training group ( $n = 20$ ) or a placebo training control group ( $n = 20$ ). Subjects were tested before and after the intervention. The memory-handbook significantly improved performance on a face-naming task, an everyday memory diary which was filled out by groups for one week prior to the second assessment and a "strategy use" questionnaire, but not on the prospective memory measures. A four month questionnaire follow-up suggested that the handbook group had maintained gains. The use of the handbook was further supported by the variety of techniques used to achieve the same remembering goal. A finding which supports the handbook's flexible approach to everyday memory remediation.

**J.H. RICKER & S.R. MILLIS. Differential Verbal Memory Impairment as a Function of Subcortical Infarction Location.**

Individuals with subcortical lesions are often expected to exhibit a classical retrieval deficit on measures of verbal learning. Multiple verbal learning measures were administered to patients with recent left hemisphere infarction in the basal ganglia (BG;  $n = 8$ ), frontal white matter (FR;  $n = 9$ ), or thalamus ( $n = 8$ ). Groups did not differ in age, days since onset, education, or overall level of dementia. The thalamic group exhibited greatest impairment in encoding and storage of information. BG and FR groups performed within normal limits on measures of encod-

ing and storage of information, but recall performance suggested deficits in retrieval. Results suggest that the unitary expectation of a retrieval deficit across various subcortical lesion sites may be limited.

**F. LUCHELLI, S. MUGGIA, & H. SPINLER. Selective Proper Name Anomia.**

Following a left thalamic stroke, G.R., a 67-year-old patient, presented with a complex neuropsychological picture of global amnesia with marked retrograde (autobiographical) impairment and difficulty to generate people's proper names. Extensive testing demonstrated fine-grained, selective involvement of people's proper names. The defect involved names (and not person knowledge) of contemporary personalities and spared historical or school-learned people. As for autobiographical people, knowledge of both person and name was unrecollectable. About one year after the stroke, the patient recovered from autobiographical amnesia. At this point, autobiographical proper names (and persons) were shown to be recollectable, while the deficit remained unchanged for the names of contemporary personalities. The nature of G.R.'s complex proper name deficit is interpreted in the light of current cognitive models of knowledge and recognition of people. Recovery from autobiographical amnesia offers a unique opportunity to get insight into the relationship between memory and proper names.

**D.G. ANDREWES, B. HASTE, & J. PONSFORD. Memory for Temporal Order in Closed Head Injury Patients.**

Twelve closed head injury (CHI) patients with evidence of frontal lobe damage on CT scan were compared with 12 orthopaedic controls on tasks assessing the memory for the presentation order of a list of words. The CHI patients were significantly lower in accuracy on this task even when the level of recognition for the words was used as covariate. By repeating half the list over three of the four trials the memory trace strength hypothesis was also tested as an indication of CHI groups temporal encoding limitations. This hypothesis was not supported since there was no extra tendency for the CHI patients to place repeated words as if they occurred more recently in the list.

## SATURDAY MORNING, JUNE 25, 1994

### Paper Session 9

#### DEMENTIA 1

**J.S. SNOWDEN, D. CRAUFURD, & D. NEARY. Loss of Awareness of Involuntary Movements in Huntington's Disease.**

Huntington's disease (HD) sufferers rarely complain of abnormal movements. The study sought to distinguish between three possible explanations for this phenomenon: psychodynamic (illness denial), cognitive (accompanying dementia) or physiological (faulty feedback). Forty HD patients were administered a subjective report questionnaire, containing questions about direct experience of buccofacial and limb movements and questions about the consequences of those movements (e.g., dropping things). There was a disparity between report of consequences and direct experience of movement. The former correlated with objective measures of movement disorder, whereas the latter did not. There was no relationship with severity of dementia. It is argued that HD patients' failure to report chorea relates to faulty physiological feedback and is not secondary to 'denial of illness,' nor to accompanying dementia.

**J.M. GRAY, W.A. BARKER, S. DAY, & C.A. HEY. Differential Decline Across Memory Processes In Huntington's Disease.**

The memory impairment of HD was investigated by examining 18 early symptomatic HD patients on a range of neuropsychological tests tapping different aspects of learning, memory and retrieval. Test scores were compared to the appropriate standardisation samples. Discrepancy scores between tests were calculated and compared to their theoretical distributions as derived from the standardisation samples. The scores providing the least overlap between patient and normals were the discrepancy between list learning over 5 trials and recognition memory for words, and between recognition memory for words and for faces. When 20 asymptomatic at risk subjects were examined in a double blind study, these two scores taken together were very highly predictive of gene status. The nature of the differential impairment was further investigated using a variety of recognition memory tasks.

**Y. JOANETTE, B. SKA, A. POISSANT, & F. GIROUX. Recurrent and Nonrecurrent Cognitive Profiles in Early Demented Patients of the Alzheimer Type.**

This research was meant to explore the number of cognitively-determined sub-groups among patients with early signs of dementia of the Alzhei-

mer type (DAT). Indeed, the literature suggests that there would be 3 or 4 such sub-groups. However, studies were based on a limited number of DAT patients and the neuropsychological examination was very limited. Thus, 81 NINCDS-ADRDA-defined early DAT-subjects were submitted to a comprehensive protocol incorporating theoretically-motivated tasks meant to document specific components of cognition's main domains. Fourteen sub-groups were defined: 3 containing a large number of subjects, 4 with a limited number and 7 corresponding to single subjects. These results suggest the existence of recurrent and non-recurrent cognitive profiles in DAT. The former could express different forms of the disease, while the latter would correspond to its interaction with individual factors known to modulate a given subject's functional organization for cognition.

**M.H. MILLER & D. EPSTEIN. Frontal Systems Involvement in Alzheimer's Disease.**

As part of the validation procedure for a dementia assessment battery, items have been chosen for their reported value indicating frontal systems dysfunction. Patient performance on the test battery as a whole was compared to purported involvement of frontal lobe dysfunction. These findings were then compared with neuroimaging obtained on subjects diagnosed with probable Alzheimer's disease in an outpatient clinic. Other components of the subjects' neuropsychological profiles were compared to frontal systems performance, clinical presentation and levels of functional independence. The extent of frontal systems involvement were related to the pathophysiology of Alzheimer's disease and the implications for the course of disease progression.

**E.J.A. SCHERDER, A. BOUMA, & A.M. STEEN. The Effects of Short-Duration Transcutaneous Electrical Nerve Stimulation (TENS) on Memory and Affective Behaviour in Patients With Alzheimer's Disease (AD).**

In the present study, it was hypothesized that AD-patients treated with TENS for 30 minutes per day during a six-week period (short-duration TENS) would improve in memory and affective behaviour. The results revealed that TENS improved some aspects of the verbal and visual long-term memory. Moreover, the patients of the treatment group compared with those of the placebo group felt less depressive, less irritated, more well tempered, more alert, and more active. The present findings lend support for the more global concept that activation of neurons might lead to beneficial effects in AD. This concept has been paraphrased as "use it or lose it."

**Paper Session 10**

**ASSESSMENT PROCEDURES**

**S. AURIACOMBE, H. JACQMIN, C. FABRIGOULE, & J.-F. DARTIGUES. Correlates of Verbal Fluency in Normal Aging: A Population-Based Study.**

Correlates of performance at a category naming task using four semantic categories (Isaacs' Set test), were sought by transversal assessment in a random sample of 3675 elderly subjects aged 65 and older of South-West France, participating in the PAQUID study, an epidemiological study of normal and pathological aging. It was found that advancing age, lower educational level, lower socio-economic status and presence

of a depressive symptomatology all had adverse effects on category naming performance, while gender had variable effects depending on the semantic category.

**I.H. ROBERTSON, A. WARD, & V. RIDGEWAY. The Test of Everyday Attention: Factor Structure and Predictive Validity.**

A new test of attention based on ecologically-valid materials such as reading maps, looking up telephone directories and listening to lottery number announcements is described in its final form. A factor structure is reported which is compatible with the latest theories of differential anatomically-based attentional circuits in the brain, namely separate factors for selective attention, sustained attention and attentional switching respectively. The test is reliable, and there are three parallel forms. The validity of this test in a number of different research contexts is described. Firstly, the effects of drugs for Alzheimer disease in an early Alzheimer population, secondly, a predictive study of recovery from stroke, and thirdly a study of attentional deficits in closed head injury. The validity of the test in these contexts is described, leading to a conclusion that the Test of Everyday Attention is a reliable and valid battery of tests which allows measurement of theoretically distinct aspects of attention.

**J.J. EVANS, P.J. MCKENNA, B.A. WILSON, & S. CHUA. Assessment of the Dysexecutive Syndrome in Schizophrenia.**

A number of lines of evidence suggest a role for a frontal lobe deficit in producing schizophrenic symptoms. In this study the performance of a group of schizophrenic subjects was compared with that of a group of brain injured patients and a normal control group on a battery of tests previously demonstrated to predict relative ratings of deficits in everyday executive skills of brain injured patients. The Schizophrenic subjects' performance closely matched that of the brain injured patients, with both groups showing deficits on many of the tests. Further analysis demonstrated that the deficit shown by schizophrenic subjects is over and above a general cognitive decline and that performance on the Modified Six Elements Test was predictive of everyday executive impairments as rated by relatives.

**D. MADDOCKS, J. PONSFORD, & T. WARDILL. Rey's 15 Item Task as a Test for Malingering.**

The 15 Item Test has been widely cited as a test for malingering. There is little published data, however, on performance by neurological and pseudo-neurological patients. This paper presents data collected on a range of patient groups including traumatically brain injured seeking compensation or facing criminal charges and cases of psychogenic amnesia. In all groups, high scores were common notwithstanding significant memory impairments on other tasks. This finding lends support to the contention that the test is not heavily loaded on new learning capacity. However, no patients seeking compensation performed poorly on this task, and some cases of psychogenic amnesia also performed this task adequately. While the 15 Item Test may be a useful screening device, other clinical information should be incorporated in order to validly assess for malingering.

**J. BRUINS & A. ROZEMAN. Neuropsychological Impairments After Whiplash Injury, Fact or Fiction.**

Many studies with so-called whiplash patients have been unable to distinguish this group from control groups. This study with 50 whiplash-patients showed that this group is not homogenous. Three groups can be distinguished based on the presence of neurological damage, neuropsychological dysfunctions and psychological problems. Also within the group with neurological damage locations of lesions differed. Results will be presented and implications for further research discussed.

## Poster Session 5

**TRAUMATIC BRAIN INJURY/  
REHABILITATION/CHILDREN  
AND SPECIAL POSTER SYMPOSIUM  
ON READING DISORDERS IN  
NEUROPSYCHOLOGICAL TREATMENT**

**J. RATTOK, B. ROSS, & A. OHRY.** *The Use of SCL-90-R With the Traumatically Head Injured.*

Incorporating an evaluation of personality and or clinical status in addition to the neuropsychological test battery has become a common practice. Numerous publications suggest the use of Symptom Check List-90 (SCL-90-R) and indicate a predictive validity to head trauma outcome. Three groups of traumatic head injured adults (mild, moderate, and severe) were compared on neuropsychological measures, and on published norms of the SCL-90-R. The results suggest a cautious casuists approach to the use and interpretation of the check list. Patterns of symptoms in head injured may relate more of the nature to the head injury and the functional status rather than to psychiatric syndrome suggested by the SCL-90-R profile.

**J.F. FAGAN, III & B.S. LAYTON.** *Selective Attention as a Measure of Implicit and Explicit Memory in Patients With Closed Head Injury.*

We used naturally occurring attention to novelty to test implicit and explicit memory for nonverbal information on the part of normal adults and adults with closed head injury (CHI). New and previously seen pictures were paired either immediately after study or after a delay. To test implicit memory, participants were told to "look at the pictures". To test explicit memory, participants were told to "look at the new picture". Normals devoted more fixation to novel targets than did CHI adults and this advantage was greater under explicit than implicit instructions. A decline from immediate to delayed testing occurred only for CHI patients. Dissociations between implicit and explicit memory due to CHI hold when both kinds of memory are measured in the same manner.

**P. AZOUVI, I. DUFOSS, Z. ABOUSSAID, N. MARLIER, & B. BUSSEL.** *Attention and Processing Resources After Severe Closed Head Injury (CHI): A Random Letter Generation Task.*

The aim of this study was to assess the central processing resources after severe CHI, within Norman and Shallice's model (1980). Eleven patients and 11 controls were included. The basic task was Random Letter Generation (RLG), which has been shown (Baddeley, 1986) to rely heavily on the Supervisory Attentional System (SAS). Firstly, we evaluated the effect on RLG of randomly varying the imposed generation rate; secondly, we assessed the effect of an interfering sorting card task, with 4 different complexity levels. Results: Patients could achieve a good quality of performance in RLG task but they could not keep in pace at fastest rates. In the dual task, as the sorting task difficulty increased, patients maintained their performance in RLG only by sacrificing the realization of the secondary task. These results are consistent with the hypothesis of a reduction of available resources of the SAS after severe CHI.

**S. DIKMEN, J. MACHAMER, D. DONOVAN, & N. TEMKIN.** *Alcohol Use in Traumatic Head Injury.*

The present study examined habitual alcohol use in head-injured patients pre- and post-injury and the significance of blood alcohol level in the emergency room in identifying patients with a history of alcohol abuse. This study is based on 410 hospitalized adult patients who were prospectively studied over 1 year post-injury. The results indicate that acute intoxication at the time of the accident and pre-injury alcohol abuse are frequent among head-injured patients. Blood alcohol level is a good indi-

cator of pre-injury problem drinking and should serve as a basis for treatment referral. Alcohol consumption decreased soon after injury followed by an increase but not to the same levels by 1 year. The first few weeks following injury appears to represent a window of opportunity for initiating interventions.

**S. ANDERSSON, M. WEST, J. BERSTAD, & A. FINSET.** *Dopamine Agonist Treatment in Rehabilitation of Neuropsychological Sequelae in Traumatic Brain Injury Patients. A Report of Four Cases.*

Deficits in attention, speed of information processing, initiative and fatigue often represent major obstacles in cognitive and physical rehabilitation of traumatic brain injury (TBI) patients. Earlier case studies have shown that some TBI-patients can benefit from treatment with the dopamine agonist Amantadine or related neuropharmacological agents. In this preliminary report we present neuropsychological test-data of five TBI-patients in a double-blind study using Amantadine. All patients improved under Amantadine condition. The results are discussed in relation to what kind of cognitive deficits are improved by Amantadine, and the neurophysiological and neurochemical mechanisms underlying attentional deficits, fatigue and lack of initiative in TBI-patients.

**A.D. WATTS RUNGE & S.G. TOLLMAN.** *Neuropsychological Rehabilitation: Vocational Outcomes.*

Despite the fact that South Africa has one of the highest incidences of traumatic brain injury in the world, neuropsychological rehabilitation resources are limited. The pioneering Durban Head Trauma Programme (DHTP) evolved from the programme at the Rusk Institute, New York University Medical Centre. Vocational outcomes of the first 16 brain-injured individuals to complete the DHTP are consistent with reports in the literature that a holistic rehabilitation programme is effective in restoring a significant number of brain-injured individuals to some form of productive employment, although at a lower level than prior to the injury. In addition, employer cooperation and adaptation of tasks emerged as an important factor for vocational adjustment. These findings, together with the type of maintenance interventions required to maintain the vocational gains, will be discussed.

**P. LARMANDE, D. PERRIER, C. BUQUET, M.-P. DELPLACE, & C. BELIN.** *Paradoxical Pseudo-Neglect.*

We studied a 31-year-old woman suffering from stroke in the posterior cerebral artery and now stabilized since of 6 years. She had yet a right HLH. This patient showed two contradictory behaviours during spatial exploration: during elementary ocular searching of a red spot, it was noticed a systematical attraction of the gaze towards the left side, suggesting a right neglect. During spontaneous exploration of a panorama, it is on the contrary, the right side of the space that is the first and the most systematically seen, suggesting a "left-paradoxal-neglect." This dissociation shows the persistence of an imbalance in the spontaneous eye movements, directed towards the safe space, and the result of rehabilitation, intensified by the lack of anosognosia, with an excessive exploration of the blind space.

**D. RIPICHI & P. BRENNAN.** *Discourse Analysis of Computer Message of Persons Living With Aids: An Intervention Method.*

This study of a novel computer network for PLWA's explores the nature of client-clinician interaction through a discourse analysis of the structure, content, and process of PLWA's computer network communication. Elements of written language that are indicative of discourse abilities, and mental status are identified. The results can serve to guide the development of assessment and intervention strategies that incorporate existing clinical models for use on computer networks. Results show patterns of PLWA's that indicate differences with clinician partners and further show early signs of discourse disruption.

**M.-S. HUA, Y.-J. YANG, & C.-C. HUANG.** Neuropsychological Follow-up Study of Chronic Elemental Mercury Intoxication.

In this follow-up study, we investigated neuropsychological function in a patient with elemental mercury intoxication in comparison with a group of normal control subjects matched for sex, age and education. Each subject received a comprehensive neuropsychological examination including a personality inventory. On the first examination, the results indicate that the patient had a significant depression of performance intellectual functioning, impairment of non-verbal short-term memory, and defects of uni- and bi-manual dexterity. In addition, personality changes including depression, anxiety, desire to be alone, lack of interest and sensitivity to physical problems were evident. The impairment picture is compatible with the previous observations in individuals chronically exposed to elemental, organic and inorganic mercury. About 2 years later the patient received a follow-up study, normal cognitive and personality functions were noted. Our findings, thus, may suggest a reversibility of neuropsychological function in persons with such a type of mercury poisoning and also indicate a need for further study of this issue on a large scale.

**R. KASCHEL, D. REVENSTORF, K. ACKERMANN, & K. MAYER.** Behaviour Therapy for Posttraumatic Headache—A Controlled Single Case Study.

Posttraumatic headache is a frequent consequence of head injury. It may reduce cognitive functioning and hinder vocational re-integration. We report on a young man, whose professional education was at risk of failure because of posttraumatic headache. For treatment of both types of headache we used a variety of behavioral strategies which had been shown previously to be effective in primary headache. As a controlled single-case design and time-series analysis for evaluation of treatment were used, non-specific effects could be ruled out. There was a reduction of frequency, intensity and duration of headache. Though these results cannot be generalized to other cases, they demonstrate that behavioral strategies may also be effective in the treatment of secondary (post-traumatic) headache.

**M.G. BAKKER.** Behaviour Modification in the Neuropsychological Treatment of Severe Dyslexia.

A treatment procedure for cases with severe dyslexia was developed on a neuro-psychological basis. Empirical evidence is available to show, that a significant number of dyslexic children can be classified as L- or P-type. L-dyslexics read in a hurried, inaccurate fashion. P-dyslexics read slowly with many time-consuming errors. Both types have been found to benefit from hemisphere specific stimulation. However, it may happen that a serious lack of motivation prevents the students to profit from this type of treatment. Behaviour modification procedures and techniques can create the necessary conditions for the neuropsychological treatment of reading problems to be successful.

**J.W. VAN STRIEN & D.J. BAKKER.** Hemisphere-Specific Treatment of P-Type and L-Type Dyslexic Children With Threatening and Neutral Words.

P-type and L-type dyslexic children were treated with the remedial HEMSTIM computer program. This program stimulates the left-hemisphere in P-children and the right hemisphere in L-children. Because threatening stimuli, such as negative emotional words, prime the right hemisphere, we expected that threatening words may have a hemisphere-alluding effect that is advantageous for L-dyslexic children. To investigate this hypothesis, we employed HEMSTIM with threatening words in the experimental condition and with neutral words in the control condition. After treatment, L-children in the experimental group made fewer substantive errors on a text-reading task than did L-children in the control group. In addition, L-children made more corrections and repetitions. It is concluded therefore, that for L-dyslexic children, who are inaccurate, hurried readers, treatment with threatening words results in a better outcome than treatment with neutral words.

**H. SHURTLEFF, S. CLARREN, S. CLARREN, S. ASTLEY, E. WEINBERGER, & A. UNIS.** Profiles of Children With Fetal Alcohol Syndrome: MRI, Intellectual, Neuropsychological, Academic, and Behavioral Descriptive Data.

Children diagnosed with FAS clinically show deficits in cognitive, behavioral, and academic functioning, but appropriate diagnostic procedures to determine their needs have not been described. This study attempted to outline the profiles of children with FAS by obtaining a full spectrum of diagnostic information—including MRI scans and intellectual, neuropsychological, academic, and behavioral assessments on nine males, ages seven to fourteen. Results extend other research indicating that children with FAS show impairment in most areas. Despite these impairments, only one child had an abnormal MRI. However, all subjects showed impairment in many areas. They were remarkable for the idiosyncrasy of their deficits, which suggests the need to fully evaluate each individual child. However, specific methods of assessment as well as general areas of deficit were identified.

**F. CURT, M. DeAGOSTINI, J. MACCARIO, & G. DELLATOLAS.** Development of Manual Laterality in Preschool Children and Its Relation to Parental Handedness.

Manual preference and hand skill asymmetry at a computerized version of peg-moving task were examined in 1200 children aged 3–6. Thirty per cent of these children were reexamined one year later. Maternal and paternal manual preferences were assessed by questionnaire. (1) Children's manual preference was weaker in the younger children and stronger in the older, with an overall evolution towards the right-hand preference one year later; (2) Parental manual preference was related to children's manual preference and to its evolution; (3) Paternal and maternal effects were not significantly different; (4) Asymmetry at the computerized peg-moving was related to parental handedness even among strong right-handed children. These results are discussed in relation to the genetic/environmental debate on human handedness.

**B. TUBYLEWICZ-OLSNES, B.-A. ANDREASSEN, & P. JANSEN.** Neuropsychological Sequelae of Low Birth Weight LBW at Preschool Children.

Thirty children born with LBW below 2000 gr and above 1500 gr were at age 5–6 years tested with the abbreviated version of McCarthy's Scales of Children abilities and with five verbal variables of Korkmans Neuropsychological Assessment for Children—NEPSY. LBW children were matched with a control group of children with normal birth-weight NBW on the variables of sex, age and kindergarten. Comparison of LBW and NBW children on general intelligence test showed poorer performance of LBW group, but the differences were not significant. Comparison of the proportion of scores below the standardized mean between the two groups showed again no significant differences on general intellectual performance, while the same comparison for neuropsychological language variables showed that LBW children performed significantly lower than NBW.

**J. MONTECILLO, A. WILBOURN, & S.A. WINGENFELD.** Developmental Aspects of Verbal Fluency and Confrontation Naming in Elementary School Children.

Developmental changes in children's verbal fluency and confrontation naming were explored in this study. One hundred twenty children completed two verbal fluency tasks (FAS; Animals, Foods, Sh-Words [AFSH]) and the Boston Naming Test (BNT). There were significant age effects for the AFSH and the BNT, but not for the FAS. There were no gender effects. Correlations between tests were in the moderate range. The results suggest that both types of verbal fluency tasks should be administered to yield adequate inferences about children's verbal productions.

**M. LEVAV, A.F. MIRSKY, S. CASTRO, & M.E. CRUZ.** Parasitic Infection in Malnourished School Children: Effects on Neuropsychological Performance and EEG.

We studied 194 children (ages 9–13) from a mountain village in Ecuador who were infected with one or more varieties of intestinal parasites. In addition to parasite load, the assessment consisted of a battery of neuropsychological tests, an EEG examination, measures of iodine level and degrees of goiter and malnutrition. Unlike previous studies we found that, in general, parasite infection was not consistently associated with cognitive impairment. The intensity of infection with specific species, however, was related to sustained attention and inhibition-control aspects of cognitive behavior. Malnutrition was a significant predictor of level of performance in some tests. EEG abnormality, also associated with degree of malnutrition, was significantly related to the ability to inhibit and control behavior.

**A.N. SHEPOVALNIKOV.** Comparative Evaluation of Criteria Reliability in Defining Normative EEG Data for Children.

Revealing early indications of pathology using EEG data in children needs most important quantitative clear definition of age normatives. In cases when system organization activity of the entire brain is disturbed we often observe interrelations of distant and separated cortical zones. The effect is seen in reorganization of biopotential brain field. Our methods of general evaluation of EEG correlation are based on the evaluation of EEG waves' half periods concurrence. The summarizing EEG coefficient reflects fluctuations taking place in a given area or cerebral hemispheres that influence the organization of general field pattern in space that is covered by all other electrode locations. This index increases from +0.7 in newborns up to 0.95 in adults. Average dispersion of EEG correlation coefficients decreases with age. Most evident results are seen however, in three dimensional factor space of EEG correlation matrix.

**K. APPELQVIST, M. KORKMAN, T.A. LARSEN, E. LINDAHL, & M.-L. GRANSTROM.** The Effect of Subclinical EEG Discharges on Reaction Time in a Heterogenous Group of Children With and Without Epilepsy.

Forty children, ages 5–16 years, with EEG discharges and developmental or learning disabilities were assessed in order to determine the effect of subclinical EEG discharges on performance (transitory cognitive impairment, TCI). At group level, there was a statistically significant adverse effect of subclinical EEG activity on performance. At individual level, the difference in performance during and between discharges reached statistical significance in 4 cases. Nine children had EEG discharges, but had never had clinical seizures. In 4 of them, performance during discharges was worse than between discharges, although the differences were not statistically significant. This finding suggests that TCI may contribute to learning disabilities by causing fluctuation in performance both in persons with and without epileptic seizures.

**M. KORKMAN & A.-E. PESONEN.** Comparison of Test Profiles of Children With Attention Disorder and/or Learning Disorder.

The study compared eight-year-old children with attention deficit hyperactivity disorder (ADHD) ( $n = 21$ ), learning disorder (LD) ( $n = 12$ ), and both (ADHD+LD) ( $n = 27$ ) on a comprehensive set of neuropsychological measures. The tests were mainly derived from a new neuropsychological instrument, NEPSY (NEUROPSYCHOLOGICAL ASSESSMENT OF CHILDREN). Children with ADHD were specifically impaired in the control and inhibition of impulses, children with LD in phonological awareness, verbal memory span, and story-telling, as well as in verbal IQ. Children with ADHD+LD showed all of these deficiencies. They also had more pervasive attention problems and more visual-motor problems than the two other groups. All groups exhibited impaired performance in tasks of visual-motor precision and name retrieval.

**N. MILANI, C. ZORZI, & D. RIVA.** Naming Deficits in a Child With a Left Basal Temporal Lesion and a Left Hemispheric Cerebellar Lesion. We report the case of an 8-year-old boy with two distinct brain lesions probably hamartomas or low grade gliomas: one in the left temporobasal region, with involvement of the fusiform gyrus; the other in the white matter of the left cerebellar hemisphere. Both lesions were diagnosed at 7 when NMR was performed because of partial complex seizures. A mild delay in first language acquisitions and a long lasting difficulty in word retrieval were reported. At neuropsychological testing, language was impaired, more in production tasks than in comprehension ones. Word finding was particularly defective, with many semantic paraphasias, both in spontaneous language and under test conditions. The role of the two different lesions in producing language deficits is discussed, particularly referring to experimental evidence of the existence of a distinct language area in the basal temporal area (fusiform gyrus).

**N.E.V. MAROSSZEKY, P.P. FAHEY, E.A. SHORES, R. McCARTER, J. BATCHELOR, M. KLEIN-BOONSCHITE, & J.E. MAROSSZEKY.** The Development of the Westmead PTA Scale for Children. Stage 2 and 3: Inter-rater Reliability and Predictive Validity Data.

The Westmead PTA Scale was designed to objectively measure the period of post-traumatic amnesia (PTA) in head-injured adults. Marosszeky et al (1993) found that the Westmead PTA Scale may be considered suitable for further investigation with head-injured children over the age of seven years. This paper will present data on the next two stages of our research aimed at adapting the Westmead PTA Scale for children. The second stage of this research was a video inter-rater reliability study involving 80 health care professionals. In the third stage, a consecutive series of 33 head-injured children were assessed 12 months post-trauma on a range of outcome measures (including the WISC-R, WRAML, SRT and Conners) in order to compare the predictive validity of the Westmead PTA Scale with other acute neuro-trauma indices.

**A. WIRSN, K.O. GOTESTAM, S. LEVANDER, & P.H. VENABLES.** No Neuropsychological Differences Between Ethnic Groups in a Socio-Economically Homogeneous Multi-Ethnic Society.

In a prospective study of 795 teenagers in Mauritius neuropsychological data were gathered on two occasions. First, the subjects performed the WISC-R at age 10–11, and then a computerized test battery (APT, Levander & Elithorn, 1987) at age 14–16. Behavioural and social ratings (hyperactivity, detachment, etc.) were performed in all subjects. The study group comprised 209 (26.3%) from the general population, 340 (43.0%) Hindus, 161 (20.3%) Moslems, and 71 (8.9%) Tamils. These proportions are the same as in the total population on Mauritius. The sex distribution in all groups were 50/50, and the groups did not differ in age at test or socioeconomic variables. In two-way ANOVAs with factors Ethnic group  $\times$  Sex, very few significant differences between ethnic groups were found. In most cases the actual differences between groups had little clinical significance. However, there were large sex differences in almost all tests. In some tests significant interactions between ethnic group and sex were found. Most test results in all subgroups were inferior to European standards. A small group of Chinese subjects ( $n = 12$ ; not included in the ANOVAs) had test results similar to European norms. The results contradict earlier findings on cognitive differences between subjects of different ethnic origin.

**E.J. KAPPERS.** Reading Disorders in Neuropsychological Treatment. Reading disorders are frequently occurring learning disorders. Moreover, people suffering from reading disorders have often proven to have secondary disorders. This symposium aims to present the results of recent research carried out on the effects of neuropsychological treatments of reading disorders. The papers presented deal with different aspects of treatment, but have one theme in common: Do neuropsychological methods improve reading development and what differential effects do these methods produce? Where one paper presents a comparison between

different methods, another deals with long-term efficacy. A third paper reports on the application of the methods on young, left-handed low achieving readers, and the last paper presents the results of a pilot study on the bi-lingual effects in a uni-lingual treatment. The discussant will give a critical comment on the papers and will signal questions for further research.

**G. SPYER & D.J. BAKKER.** Effects of Visual Hemisphere-Specific Stimulation (HSSv) vs. Tactile Hemisphere-Specific Stimulation (HSSt) in P- and L-Type Dyslexic Children.

The present study was carried out in order to investigate possible differential effects of visual HSS and tactile HSS in P- and L-type dyslexics (as distinguished by Bakker in the balance model). Previous research results suggest that HSSt might be more effective in P-types, and HSSv in L-types. Fourteen L-dyslexics and 17 P-dyslexics, 8–13 years of age, were randomly assigned to receive 14 treatments of either visual or tactile HSS. Word and sentence reading were measured at pretesting, halfway through the study, and at posttesting. The Stroop test was administered at pre- and posttesting. Predictions were formulated on the basis of the balance model and previous research results. Results obtained on the above-mentioned tasks will be presented in the light of these predictions.

**M. DEKKER & E.J. KAPPERS.** Dyslexic Adolescents in Neuropsychological Treatment: Bi-Lingual Effects of Uni-Lingual Training.

The purpose of this pilot study was to determine if a short term neuropsychological treatment in one language (Dutch or English) would: (1) enhance the reading of the language that was treated and (2) transfer to enhance the reading of the language not treated. Ten 14-year-old dyslexic children, enrolled in secondary education for the second year, were treated in an outpatient setting. Half of the group was treated in their mother tongue (Dutch), the other half in a second language (English). The effects on the reading in the first and second language, including the maintenance measures three months and six months post-treatment, will be presented.

**A.E. RUSSO.** Effects of the Pathological Left Handedness Indicators on the Efficacy of a Neuropsychological Intervention With Low Achieving Readers.

This study examined second and third grade left handed boys and girls who are low achieving readers who demonstrated a pattern of reading errors characteristic of L-type dyslexia (substantive errors). Because of the reading error pattern, it was expected that a number of symptoms related to pathological left handedness (PLH) would also be present. The procedure was a pre-post control-placebo group design. The independent variable was the number and degree of PLH symptoms. Improved reading achievement as a result of the intervention treatment (hemispheric specific stimulation, HSS) was the dependent variable. Assessment was made through neuropsychological, intelligence, and achievement testing, and developmental surveys. Treatment included the HEMSTIM computer program and the Tactile Training Box. The results showed that PLH symptoms influenced the degree of lateral dominance. At post-testing, the experimental group made significantly fewer reading errors than the other groups suggesting that HSS interventions reflecting behaviorally manifested cerebral development are effective teaching strategies for sub-groups of left handed children.

**E.J. KAPPERS.** Differential Effects of Neuropsychological Treatment of Dyslexic Children.

A clinical group of 50 severely dyslexic children was treated in an outpatient setting, using neuropsychological methods. Individual treatment sessions occurred on a weekly basis. The treatment period varied from 6 months to 2 years. Measures of reading development were taken approximately every eight treatments. Maintenance measures were taken 6 months and 18 months post-treatment. We will present our findings

on the differential effects of neuropsychological treatment methods on the reading of this clinical group, including maintenance measures. The data were analyzed using the TIDA-program: a program for multiple time series analysis based on the MANOVA and mixed ANOVA models: a program specifically designed to meet the needs of intervention research.

## Paper Session 11

### DEMENTIA 2

**P. MONTANES & M.C. GOLDBLUM.** Naming Color and Black-White Pictures From Living and Non-Living Categories in Patients With Alzheimer's Disease.

Several studies of semantic abilities in SDAT suggest that their semantic disorders may affect specific categories of knowledge. In particular, the existence of a category specific semantic impairment affecting selectively living things has frequently been reported in association with SDAT (Warrington, 1975; Silveri, 1991; Basso, 1988; Chertkow, 1992). We report here results of AD patients from two different naming tests. On one test, AD patients exhibit a neat deficit affecting living things, whereas in the other test living and non living things are equally affected. The observed difference is apparently due to the absence vs. presence of color in pictures to be named in the two tests. Twenty five patients were studied. Their mean age was 75 years and they averaged 6 years of education. A control group of 11 normal elderly persons comparable to the group of patients was also studied. The naming task consisted of 44 colored pictures and 48 black-white pictures. The comparisons between patients and controls, are all statistically significant. Within the colored set, pictures corresponding to high frequency words gave rise to significantly higher scores than pictures corresponding to low frequency words only in AD patients. No significant difference emerged between living versus non-living, of high or low frequency pictures either in AD patients or in Controls. Within the set of (Snodgrass and Vandervort) black & white pictures, both groups obtained significantly lower scores on high visual complexity stimuli than on low visual complexity stimuli. A clear effect of semantic category emerged for AD patients, with a lower performance on the living category. In the control group, a non-significant trend in the same direction was found. As color constitutes the main difference between the two sets of pictures, our results point to the relevance of this cue in the processing of semantic information, even though visual complexity and frequency were also very relevant.

**D. MARSON, K. INGRAM, & L. HARRELL.** Neuropsychological Correlates of Competency Loss in Dementia Using a Rational Reasons Legal Standard.

Neuropsychological criteria for loss of competency are needed to assist physician decision makers who currently lack objective measures for competency assessment. The investigators developed two clinical vignettes which reliably and validly test subject competency (medical treatment decision capacity) under a specific legal standard (capacity to provide "rational reasons" for treatment choice) ("LS4"). Thirty-one subjects (10 normal elderly and 21 AD patients (10 mild and 11 moderate)) were administered the vignettes, and also neuropsychological measures theoretically linked to competency function. On a univariate level, measures of word fluency ( $r = .59, p > .01$ ) and auditory verbal attention ( $r = .47, p > .05$ ) correlated significantly with LS4 scores of the AD patients, but not older controls. Using stepwise multivariate regression, word fluency emerged as the only significant predictor of LS4 for AD

patients as a group (mult  $r^2 = .34, p > .01$ ) and for the moderate AD subsample (mult  $r^2 = .56, p > .02$ ). No significant predictor emerged for the mild AD subsample. Verbal fluency appears to be closely associated with declining capacity of moderate AD patients to furnish rational reasons for a choice of medical treatment. Neuropsychological models of competency loss have promise as objective guides for competency assessment in dementia.

**D. RIPICH & S. PETRILL. Gender Differences in Language of AD Patients.**

That language dissolves in Alzheimer's Disease (AD) is well documented, how this differs between gender groups is less well understood. This investigation examined gender differences in language abilities of 60 (29 males, 31 females) early (CDR I & II) AD subjects assessed at entry into the study and of the 23 (11 males, 12 females) who completed longitudinal testing at six month intervals for 18 months (four data points). Results of MANOVAs showed significant effects for gender on the Boston Naming Test and the Peabody Picture Vocabulary Test and for time on these measures plus the Token Test, Reporter's Test and Word Fluency Test. The trends were uniformly downward and linear. The results suggest that language abilities of females may be more severely affected overall in AD but that both males and females decline at similar rates across time.

**J.S. SNOWDEN & H. GRIFFITHS. Episodic Memory Function in Semantic Dementia.**

A progressive and selective semantic disorder occurs in association with focal degeneration of the temporal lobes. Patients have profound loss of word and object meaning, in the context of preserved phonology, syntax and apperception. Episodic memory function is difficult to determine, since performance on traditional memory tests is compounded by patients' lack of understanding of stimulus material. We sought to evaluate episodic memory using a "location memory" task in which objects, recognized and not recognized, were hidden in the patient's home. Recall of object locations was comparable to that of an aged-matched control group. The findings support the view that episodic memory function is intact in semantic dementia and reinforce the theoretical dissociation between autobiographical event memory and semantic knowledge.

ceptual categorization tasks appears to be highly dependent upon the effectiveness of the visual sensory system. Neglect seems to be a less important determinant of perceptual categorization deficits. We could not find support for the view that perceptual categorization deficits are particularly related to lesions in the parietal lobe of the RH. The present findings are discussed in the light of Warrington's model of object agnosia.

**R. WARD & S. GOODRICH. Anti-Extinction: A Benefit of Ipsilesional Items on Contralateral Detection.**

We report a patient with damage extending to right parietal cortex who demonstrates the opposite of the typical visual extinction pattern. His detection and identification performance for objects in the left visual field is better when there is another object simultaneously in the right field, relative to conditions in which the left object appears alone. We find this 'anti-extinction' effect depends crucially on the tasks being performed in the left and right fields, such that the effect is strongest when the patient is doing the same task in both. That is, unless the left and right items are part of a common plan for action, processing on the left side can be very limited. We suggest that parietal damage may result in deficits to processing an integrated pairing of stimulus and action plan.

**L.X. BLONDER & J.D. RANSEEN. Awareness of Deficit Following Right Hemisphere Stroke.**

Lack of awareness of deficits is often reported to accompany right hemisphere damage (RHD). However, few systematic studies have been conducted. We compared awareness of abilities in 10 RHD stroke patients and 10 normal controls (NC). Participants rated their performance on a ten-point scale after completing the Mini-Mental Status Examination, the Line Bisection Test, and facial, prosodic, and cross-modal subtests of the Florida Affect Battery. They also completed the Zung Depression Scale and participants and caregivers completed an awareness questionnaire. RHD subjects performed significantly worse than controls on all measures except the Zung. RHD patients also rated their performance on each measure significantly lower than NC subjects rated their own performance. RHD patients were not depressed according to the Zung. These findings suggest that RHD patients are aware of their deficits, but are indifferent to them.

**S.R. SCHWEINBERGER, E.-M. PFUTZE, & W. SOMMER. Repetition Priming and Associative Priming of Face Recognition and Event-Related Potentials (ERPs).**

We investigated effects of face repetition and associative priming on ERPs. Subjects performed speeded familiarity decisions for familiar and unfamiliar target faces following a prime, either the same face, a related face or a neutral face. Repetition affected both early (230-290 ms) and late (after 310 ms) ERP components. Associative priming yielded a topographically equivalent late ERP modulation, but no early effects. The late ERP modulation common to repetition and associative priming was ascribed to activation of face-independent identity information within person memory. The early ERP effect specific to repetition was interpreted as indicating activation of face representations. Similar early repetition effects for familiar and unfamiliar faces suggest that these representations are available for both face types. In a second experiment, associative facilitation (related prime) and inhibition (unrelated) were investigated. Whereas no inhibition effects were found, facilitation effects in ERPs resembled those in Experiment 1. Since associative facilitation in RTs appeared only in Experiment 2, effects in RTs may dissociate from those in ERPs, which appear less subject to strategic variations.

**Paper Session 12**

**VISUOSPATIAL DISORDERS**

**A. BOUMA & J. MULDER. Perceptual Categorization Deficits Related to Visual Sensory Impairments and Neglect in Patients With Unilateral Brain Disease.**

The present study was designed to investigate the contribution of sensory deficits to perceptual categorization deficits in a group of right hemisphere (RH) and left hemisphere (LH) damaged patients. As expected, perceptual categorization deficits were related to RH lesions, regardless of the nature of the task (verbal vs. nonverbal). Contrary to our expectations, perceptual categorization deficits were also observed in LH damaged patients, especially for nonverbal stimuli, and in a lesser degree for verbal stimuli. Moreover, in both patient groups, performance on per-