

## THE EFFECT OF PARKINSON'S DISEASE AND FRONTAL LOBE LESIONS ON SERIAL LEARNING

In Parkinson's disease (PD) the motor component is the prevalent but usually not isolated symptomatology. Basal ganglia and frontal cortex participate in a partially closed feedback loop system which could explain the occurrence in PD of neuropsychological deficits more closely related to frontal dysfunction.

Learning is a complex function. that depends on the contribution of different brain areas and its measures through a single index gives us very low information on how this function works. The ability of learning a series of elements is normally described by the number of repetitions need to learn them or the total number of recalled elements (Lezak, 1983; Spreen et al. 1991).

Analysis of serial learning (following the order of the given elements) must take into consideration both the information to be learnt and their order. The frontal lobe seems to be involved in serial memory and in particular patients with frontal lesions although not amnesic. show difficulties on temporal elaboration of informations.

Performance was evaluated by means of two different analyses. The first considered the number of repetitions needed to learn the correct sequence, while the second was based on two separate indices: index A referring to the number of correct elements recalled for each repetition independently of their order, and index ITR (see Sternberg, Tulving, 1977) based on the sum of pairs of correct elements present in two adjacent repetitions.

The present study was designed to compare the performance of PD patients and frontal lobe patients (FL) in a serial learning paradigm aimed at exploring different organizational mnemonic processing.

Moreover, the rate of presentation (slow or normal) and the type of material (words or figures) were manipulated to obtain information on their role on rehabilitation processes.

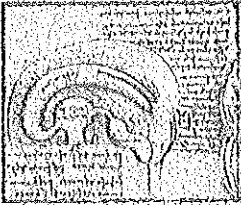
We tested 21 FL. patients (8 left, 9 right, 4 bilateral). 21 PD patients with Parkinson's disease and 42 healthy controls matched for age and school level. They underwent a standard neuropsychological examination and an experimental test for serial memory. It consists of seven unrelated, high-frequency words or equivalent figures displayed for 200 msec on a videoscreen at a rate of one every two seconds (normal presentation) or every five seconds (slow presentation).

Subjects were invited to recall as many words or figures as possible in the same order they appeared until the criterion or at the end of 12 trials. Four lists were presented on a balanced order: two word and two figure lists for both normal and slow presentation rate.

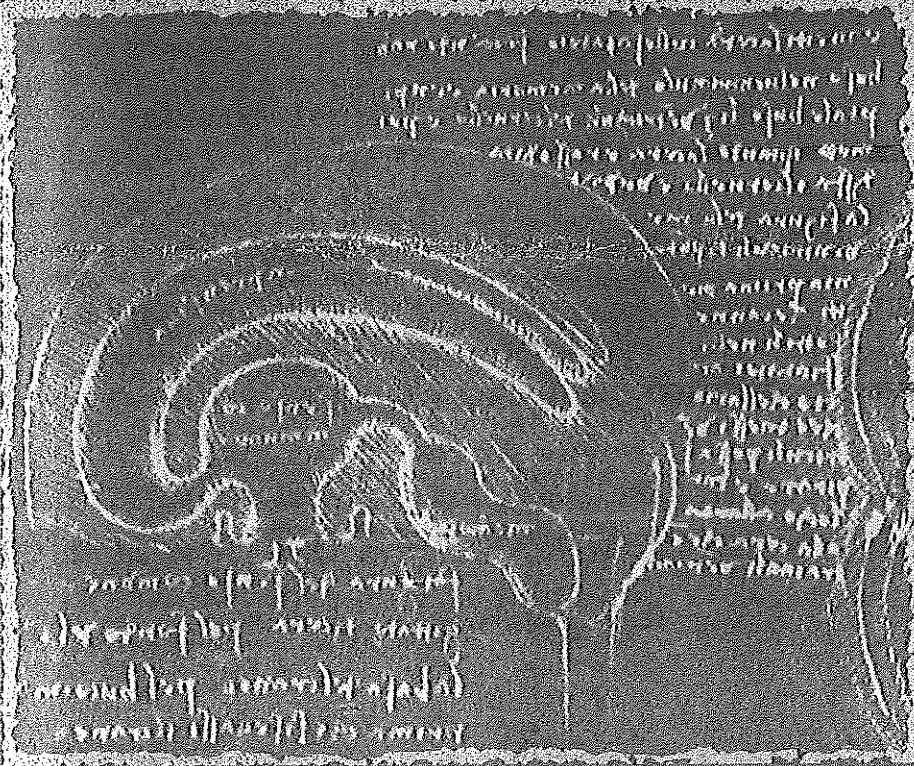
Patients need more trials to reach the criterion than controls ( $p=.000$ ). More trials are also necessary for words than for figures ( $p=.000$ ) and for normal rate of item presentation than for slow rate ( $p=.000$ ). Overall FL and PD patients are inferior to controls both for index A and ITR ( $F(1,82)=57.26$ ,  $p=.000$ ). While FL and PD do not show any difference. However, as revealed by the measure\*group interaction, patients performance decreases more for items organization (ITR) than for storage (A) but such impairment is attenuated when figures are presented (instead of word) ( $F(1,82)=14.3$ ,  $p=0.000$ ). When list items are displayed at a slow frequency rate there is an overall increase of performance ( $F(1,82)=115.5$ ,  $p=.000$ ).

We hypothesised that frontal lobe and for the subcortical frontal circuit, is involved in serial memory, due to the absence of cognitive difference in this type of paradigm between FL and PD patients. Number of repetitions or number of element reported are supposed not to be valid in understanding the nature of different processes involved in learning. The ability to organise items in serial order result to be a good index of mnemonic efficiency which may prove useful in monitoring the disease progression or the effect of rehabilitation processes.

# Neurological Sciences



Founded by  
Renato Boeri  
Official Journal  
of the Italian  
Neurological  
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SUPPLEMENT

XXXII Congress of the  
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ABSTRACTS



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# Clinical Neuropsychology

## ORAL COMMUNICATIONS

### NOUNS/VERBS LEXICAL RECALL AND POSTURAL DISTURBANCES IN PARKINSON'S DISEASE

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Aim of this study is to evaluate lexical abilities concerning nouns and verbs denomination in parkinsonian with and without postural disturbances. Difficulties in denomination of nouns or verbs have been attributed to different cerebral areas [1]. Recent studies concerning verbal fluency considered the verbal naming defect as a criterion to distinguish Parkinson's disease (PD) patients with mild cognitive impairment from those who had not [2]. This deficit could suggest an impairment of different executive systems. Postural disturbance in PD is characterized by some clinical features, such as infrequent presence of tremor, poor L-dopa response, rapid evolution of symptoms, cognitive impairment.

A general exam of cognitive functions was performed by means of MMSE and Raven test (PM 38, set A-D). The lexical test was represented by two parts: 1) denomination of 52 pictures with object-nouns and 50 pictures with actions-verbs within 1 minute; 2) repetition of 25 nouns and 25 verbs within 10 seconds (necessary for counting down from predefined numbers) starting from the denomination performed by the examiner.

In agreement with some PET studies [3,4], our results suggest a different degree of involvement of cortical areas according to the severity and type of clinical picture in PD.

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### THE EFFECT OF PARKINSON'S DISEASE AND FRONTAL LOBE LESIONS ON SERIAL LEARNING

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Learning is a complex function, that depends on the contribution of different brain areas and its measures through a single index gives us very few information on how this function works. The ability of learning a series of elements is normally described by the number of repetitions need to learn them, or the total number of recalled elements (Lezak M.D., 1983; Spreen O. et al. 1991).

Analysis of serial learning (following the order of the given elements) must take into consideration both the information to be learnt and their order. The frontal lobe seems to be involved in serial memory and in particular patients with frontal

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### COGNITIVE FUNCTIONS AND OSTRUCTIVE SLEEP APNEA

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**Objective.** Obstructive sleep apnea syndrome (OSAS) is among the most common sleep disorders occurring in 4% of the general adult population. It occurs more frequently in men than in women. The syndrome is characterised by the frequent cessation of airflow through the nose and mouth during nocturnal sleep. Patients with sleep apnea are typically hypersomnolent during the daytime and may demonstrate higher order cognitive dysfunction. In order to investigate the early components of cognitive functioning in these patients we evaluated the P300 wave of Event Related Potentials (ERPs) and the Reaction Time (RT).

**Materials and methods.** Neurophysiological testing was performed in 7 consecutive sleep apnea (confirmed by polysomnography) patients before starting nasal continuous positive airway pressure (nCPAP) therapy (group A) and in 5 patients, well sleeping and without sleep apnea (group B), matched for age and body mass index (BMI). All patients were evaluated immediately after morning awakening in the sleep lab.

**Results.** The groups were comparable for age (A:  $48.2 \pm 7.2$  and B:  $46.5 \pm 3.5$  yrs), sex (A: 4/3 and B: 3/2 m/f) and BMI (A:  $41.2 \pm 7.7$  and B:  $40.8 \pm 6.9$  kg/m<sup>2</sup>). In group A, the Apnea-Hypopnea Index (AHI) was  $43.0 \pm 17.8$ , SaO<sub>2</sub> nadir was  $59.3 \pm 11.6$  % and percentage of time with SaO<sub>2</sub> below 90% was  $78.2 \pm 18.3$  %. P300 latency was significantly prolonged in group A when compared with group B ( $348.5 \pm 15.4$  vs  $297.3 \pm 15.8$  ms;  $p<0.02$ ); P300 amplitude and RT did not show significant differences.

**Discussion and conclusions.** Among patients with OSAS, impairment of higher cognitive function, i.e. deficits in memory, attention, and visuoconstructive abilities are common. Our study, in agreement with literature data, shows that even the early components of cognitive processes (stimulus evaluation) seem to be affected by OSAS.