

Nonverbal deficits in explicit and implicit memory of Parkinson's disease patients

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This study examined verbal and nonverbal aspects of explicit and implicit memory in a sample of 19 Parkinson's disease (PD) patients and 21 control subjects. For implicit memory evaluation, we used a Mirror Reading (MR) task employing verbal material as well as a nonverbal Serial Reaction Time (SRT) task. For explicit memory measurement we applied a word pairs task (verbal) and pairs of a Japanese ideograms task (nonverbal). The PD patients displayed impairments in the nonverbal tasks only, namely, in the SRT task and the pairs of Japanese ideograms task. No correlation between Wisconsin Card Sorting Test (WCST) scores and the results of tasks in which PD patients displayed deficits (SRT and pairs of Japanese ideograms) were discovered. Interestingly, such a correlation was found in the case of MR and words pairs tasks, which did not distinguish PD patients from control group.

Key words: Parkinson's disease, implicit memory, explicit memory, Serial Reaction Time, Mirror Reading

INTRODUCTION

Contemporary memory theories distinguish between explicit and implicit learning processes (Gabrieli 1998, Squire 2004). The explicit (declarative) learning system is responsible for conscious acquisition and retrieval of facts and events, and apparently depends mainly on the integrity of the temporal lobe and diencephalic brain structures. Implicit (nondeclarative) learning and memory involve acquisition and recollection not accompanied by awareness. Most of the data points out to the role of basal ganglia in at least some forms of implicit learning (Squire and Zola 1996, Packard and Knowlton 2002).

Parkinson's disease (PD) manifests itself in a triad of motor symptoms: tremor, bradykinesia and rigidity. PD depends on the progressive death of neurons in substantia nigra, what results in a loss of striatal dopamine and the subsequent dysfunction of basal

ganglia. Besides motor symptoms, neurocognitive abnormalities were repeatedly described in PD, among which those regarding executive functions and memory appear to be predominant (Owen 2004, Muslimovic et al. 2005). Deficits in executive functions emerge since basal ganglia dysfunction also affects the frontal lobes, including the prefrontal cortex, which is postulated to be pivotal for executive processing (Heyder et al. 2004). Previous studies have shown that PD patients suffer from both the implicit and explicit memory deficits. However, the obtained data are often contradictory (see, e.g., Bondi and Kaszniak 1991, Yamadori et al. 1996, Witt et al. 2002, Smith and McDowall 2006b).

One source of discrepancies in memory studies of PD is the possibility that verbal and nonverbal aspects are differentially affected. Unfortunately, concurrent evaluations of both verbal and nonverbal aspects of memory of PD patients have been not only rare but limited to explicit memory and furthermore, they have produced often contradictory results, either showing comparable impairments (Farina et al. 2000, Vingerhoets et al. 2005, Whittington et al. 2006) or

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