

## Memory systems and Neurofibromatosis type 1 (NF1): what is impaired, what is spared?

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**Background:** Previous studies focusing on the cognitive profile of children with Neurofibromatosis type 1 (NF1) have shown difficulties regarding visuo-perceptive capacities, executive functions and attention, motor coordination, as well as linguistic abilities. Few studies have investigated memory function of this population. A working memory deficits is frequently reported. However, results concerning semantic memory, verbal and non-verbal episodic memory and procedural memory, are contradictory (Lehtonen et al., 2012). Our main objective is to evaluate the different memory components according to the model proposed by Eustache and Desgranges, 2008 (NÉoStructural InterSystemic Model), in a population of NF1 children of school age. We hypothesize a working memory deficit. We also assume a procedural memory deficit because of the usual brain alteration observed in this population. However, we expect a preservation of their declarative memory capacities.

**Methods:** 18 children with NF1 were recruited in the local NF1 referral center. They were examined by a neuropediatrician and the neuropsychological assessment of memory was administered by a neuropsychologist. We compared them to 18 typically developing children (TD) of same age (8-12 years) using a t-test and repeated measures ANOVA. The study was approved by the local ethics committee and conducted in accordance with the Declaration of Helsinki. We obtained written informed consent from the parents and their children.

**Results:** We observe a significant difference between NF1 and TD children in verbal working memory but not for the visuospatial sketchpad. We also found a significant difference concerning verbal anterograde memory (encoding process) but not for the visual anterograde memory. Regarding semantic memory, we showed a significant difference for general knowledge. Contradictory with our expectations, the children with NF1 experienced difficulties evoking personal memories but were improved by cueing. No difference was found regarding procedural memory.

**Conclusions:** These results support a dissociation between memory systems in children with NF1. These alterations may have an impact on the acquisition of academic knowledge. Moreover, attentional and executive abilities could explain children with NF1's memory profile. The specificities of their memory profile must be taken into account in the clinical follow-up of these children for the understanding of their learning disorders and their care.