

# Impaired verbal short-term memory for serial order information in dyslexic adults

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## INTRODUCTION

Verbal short-term memory (STM) impairments in dyslexic individuals are typically interpreted as the consequence of poor phonological representation (see Snowling, 2000). However, this does not prevent the existence of a more basic deficit of STM.

Traditionally, STM capacities are assessed by tasks (such as digit span) which confound the storage of the identity of items (« item » information, which has been shown to depend on the quality of underlying phonological representations) and the storage of the order of presentation of these items (« serial order » information). Retention of serial order information is a fundamental aspect of the STM and has been shown to be independent of the quality of phonological representations (Majerus et al., 2006).

If there is a fundamental STM impairment in dyslexia, then especially STM for order should be impaired, in addition to STM for item information.

## AIM

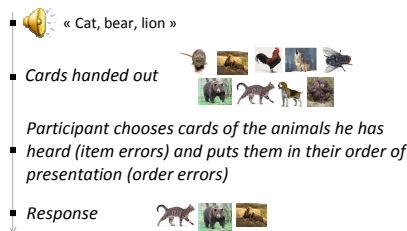
Do dyslexic adults present with specific difficulties for STM for serial order information?

## METHODS

### Material

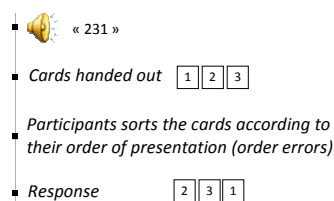
#### 1. STM task for item and order information

- Auditory lists of animal names (5 to 9 items) - 6 trials per length
- Assessment of item and order STM capacities on the basis of error types



#### 2. STM task for order information

- Auditory lists of digits (5 to 9 items) - 6 trials per length



### Participants

#### 20 « high achieving » dyslexic adults

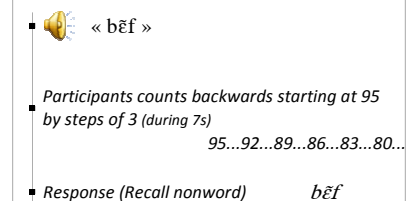
- Mean age : 24,1
- Min. 1 year of higher education
- Diagnosis of dyslexia in primary school
- Irregular word spelling : -2 SD below controls

#### 20 control adults

- Matched to the dyslexics for age, academic background, vocabulary, nonverbal IQ
- No history of dyslexia
- Irregular word spelling : normal range

#### 3. STM task for item information

- 60 monosyllabic nonwords (high or low phonotactic frequency)
- Single nonword delayed repetition

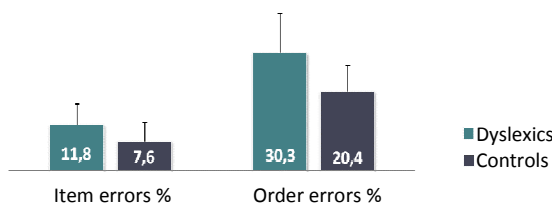


## RESULTS

#### 1. STM task for item and order information



Main effect of group -  $F(1,38)=16.2, p<.001$   
Main effect of error type -  $F(1,38)=163.1, p<.001$   
Interaction effect -  $F(1,38)=4.1, p<.05$

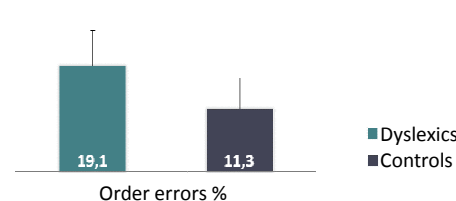


More important difficulties in dyslexics for recalling order information

#### 2. STM task for order information



Effect of group -  $t(1,38)=4.7, p<.001$

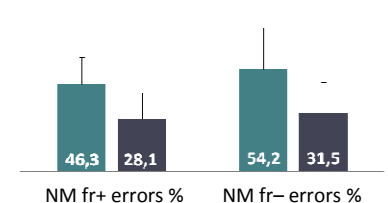


Inferior performances in dyslexics for both order and item retention

#### 3. STM task for item information



Main effect of group -  $F(1,38)=24.1, p<.001$   
Main effect of nonword type -  $F(1,38)=6.8, p<.05$   
No interaction effect -  $F(1,38)=1.2, p=0.26$



## DISCUSSION

Dyslexics do not only present poor STM for item information, as would be expected given their difficulties at the level of processing phonological item information, but also more fundamental impairments for the storage of order information.

STM for order information could be especially important for the acquisition of new long-term orthographic representations, as has been shown for the acquisition of new phonological representations (Majerus et al., 2008).

The distinction between short-term storage for item and order information is essential in order to gain a clearer understanding of the relationships between STM and reading acquisition (see also Nithart et al., in press).

6th International  
Conference on  
Language Acquisition  
Barcelona  
September 2010

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