

# The role of spatial and temporal dimensions in working memory for serial order: An fMRI study

REMOUCHAMPS Robin <sup>a</sup>, MAJERUS Steve <sup>a,b,c</sup> and ATTOUT Lucie <sup>a,b,c</sup>

<sup>a</sup> Uliège, Belgium

<sup>b</sup> Neuroscience of Cognition Research Unit (PsyNCog), Belgium

<sup>c</sup> Psychology and c Fund for Scientific Research (FNRS), Belgium

## Introduction

The representation and maintenance of serial order information is a fundamental aspect of working memory (WM). However, the way serial order information is represented remains unknown. Two hypotheses have been proposed: the spatial hypothesis, considering that serial order is represented using left-to-right spatial codes; the temporal hypothesis, considering time-based coding, each successive item in WM being associated with a different temporal context signal.

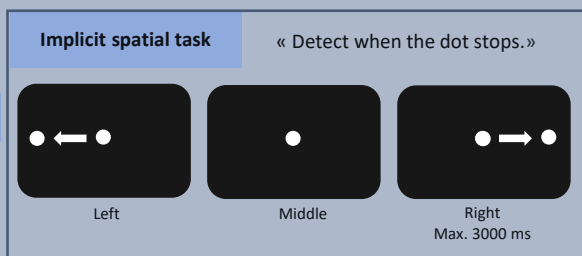
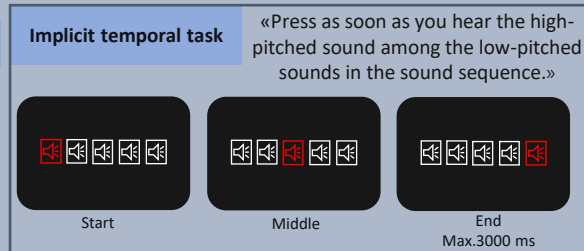
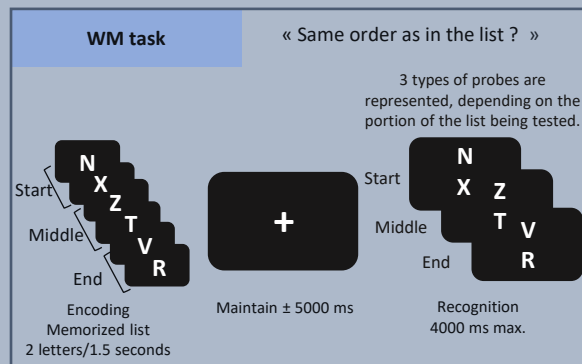
## Aim

This fMRI study determined the role of temporal and spatial neural codes in serial order WM via multivoxel pattern analyses. We examined whether implicit left/right discrimination in a spatial task or implicit early/late discrimination in a temporal event task predicts start-of-list/end-of-list serial position of items in a WM task.

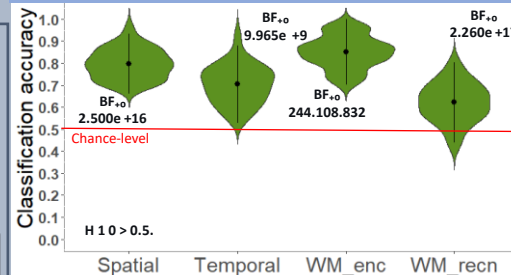
## Participants

28 healthy adults aged 18-30 years (22,35 ± 3,10).

## Method



## Multivariate decoding results

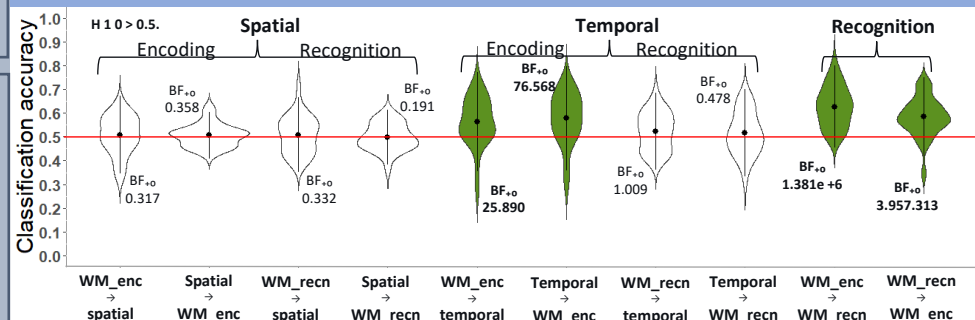


### Within task

Classification accuracy of start-of-list/left VS end-of-list/right items as a function of task.

WM\_enc : Working memory encoding  
WM\_recn : Working memory recognition

### Between task



Prediction between spatial & temporal tasks with the WM task (for encoding and recognition) for the classification between start-of-list/left VS end-of-list/right.

## Discussion

These results are in favor of the temporal hypothesis, showing that serial order information uses time-based coding where each successive item in working memory is associated with a different temporal context signal.