

THE ROLE OF SEMANTIC CODES IN VERBAL WORKING MEMORY MAINTENANCE : AN fMRI INVESTIGATION

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INTRODUCTION

Although the impact of long-term memory (LTM) knowledge on working memory (WM) performance has been well demonstrated, the nature of the interactions between WM and semantic LTM remains poorly understood.

While some theoretical models consider that this intervention indicates a temporary and direct activation of LTM during WM maintenance, others consider that LTM only intervenes during recall, in order to reconstruct degraded memory traces.

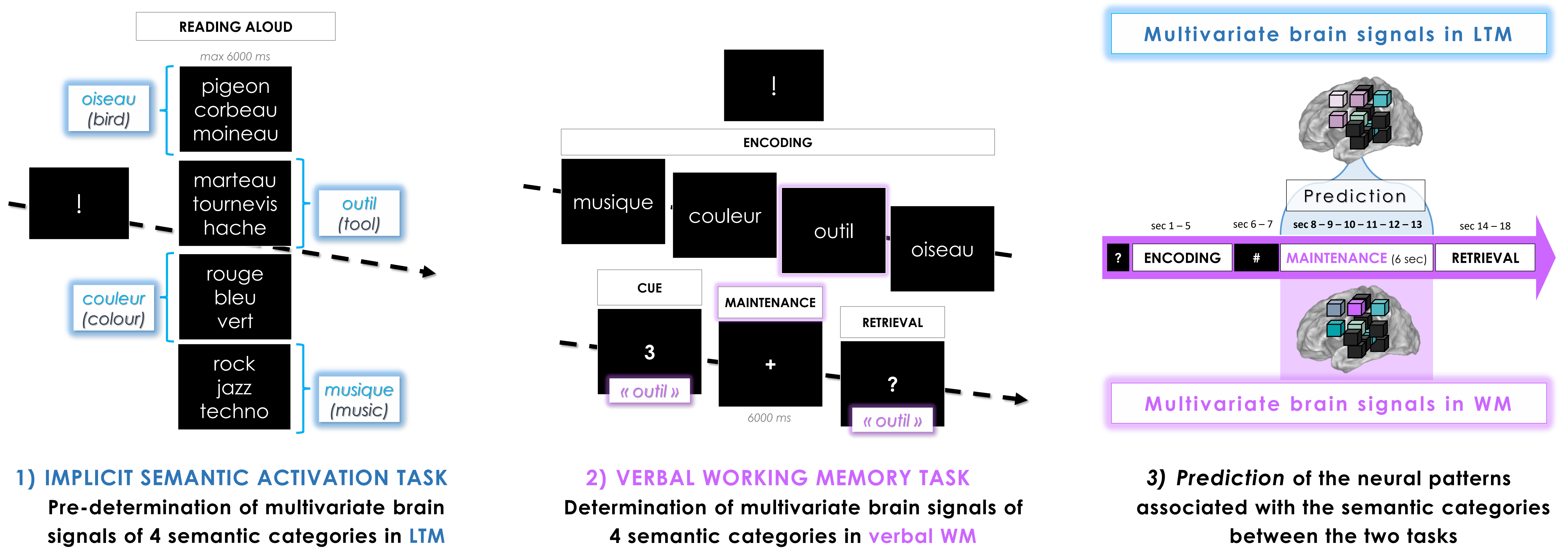
AIM

To examine the extent to which **semantic knowledge in LTM** is temporarily activated during the **maintenance phase in WM**.

How ?

By determining, via fMRI, whether brain markers of semantic knowledge are observable during the maintenance phase in verbal WM.

METHOD



RESULTS

MVPA analysis : 6 models comparing the four categories 2 by 2 (n=27)

IMPLICIT SEMANTIC ACTIVATION TASK

Multivariate brain signals in LTM

$BF_{10} > 1,078^{e+7}$

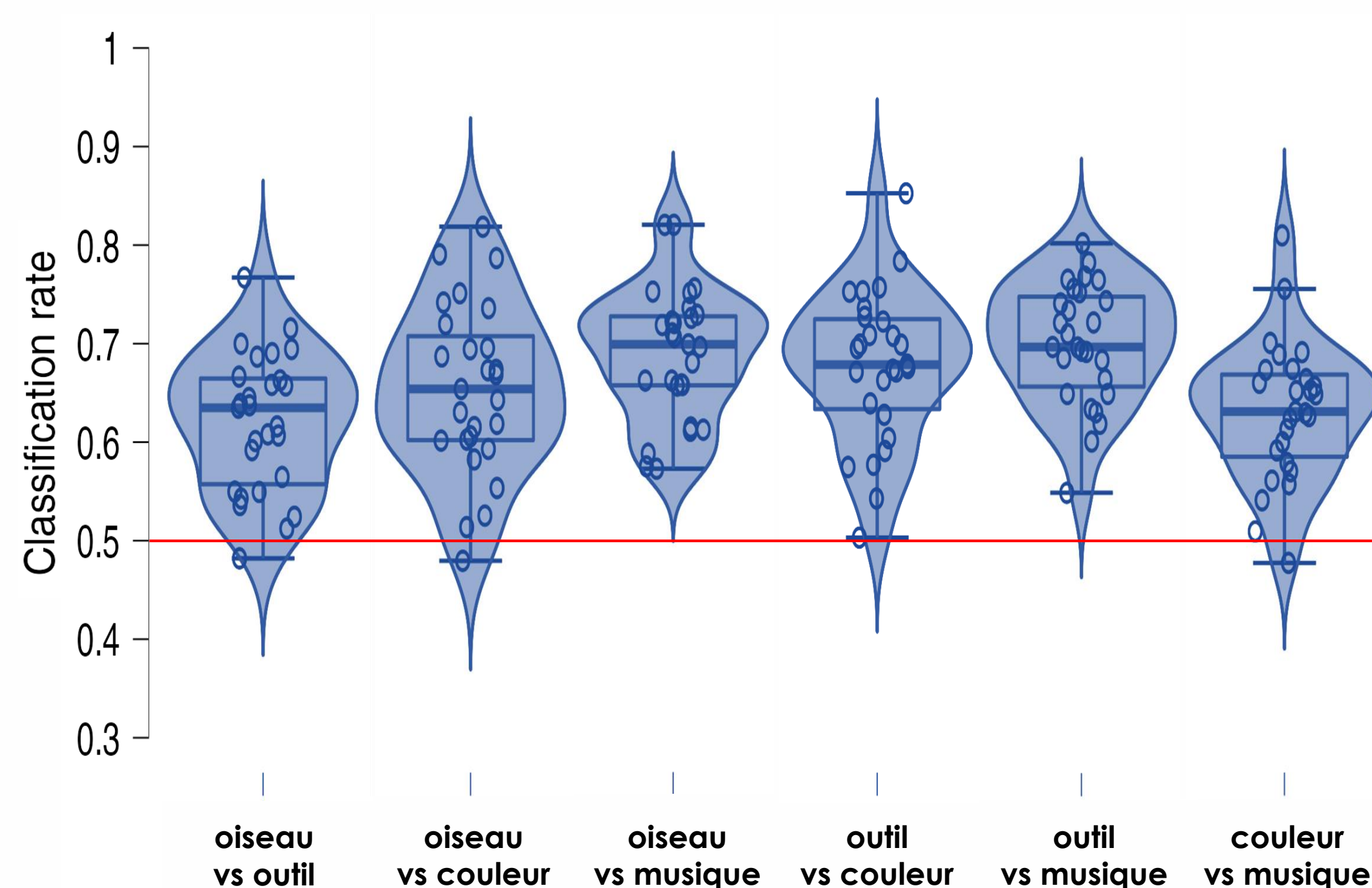


Figure 1 Distribution of whole-brain classification rates of the 6 models compared to the chance level (0.5)

VERBAL WORKING MEMORY TASK

Multivariate brain signals in WM

$2,058 < BF_{10} < 1960,212$ (outil_musique $BF_{01} = 0,167$) (sec 8-9)

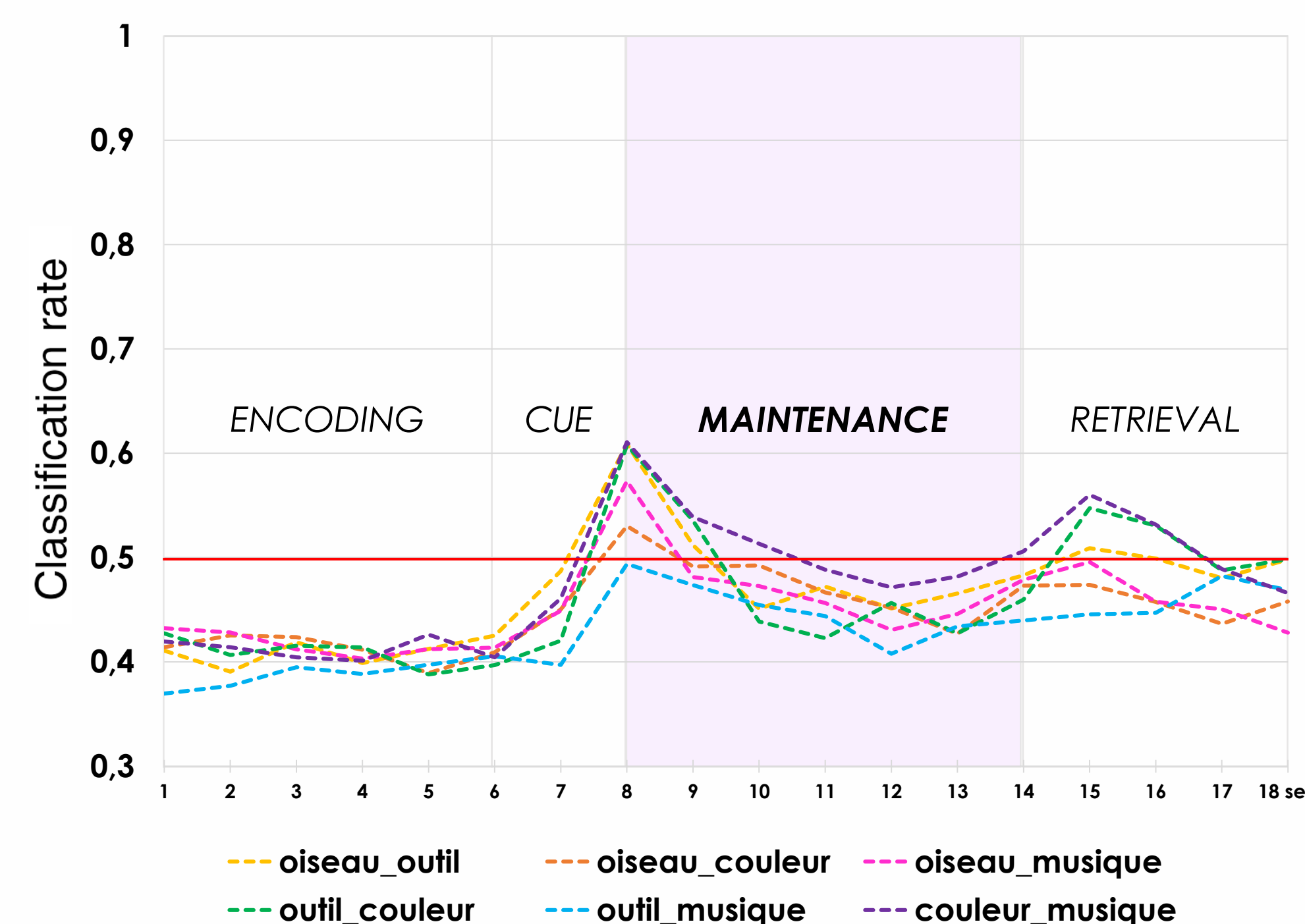


Figure 2 Time course of whole-brain classification rates of the 6 models compared to the chance level (0.5)

INTER-TASK PREDICTION (LTM-WM)

$3,681 > BF_{01} > 6,502$ (outil_musique $BF_{10} = 1,464$) (sec 8-9)

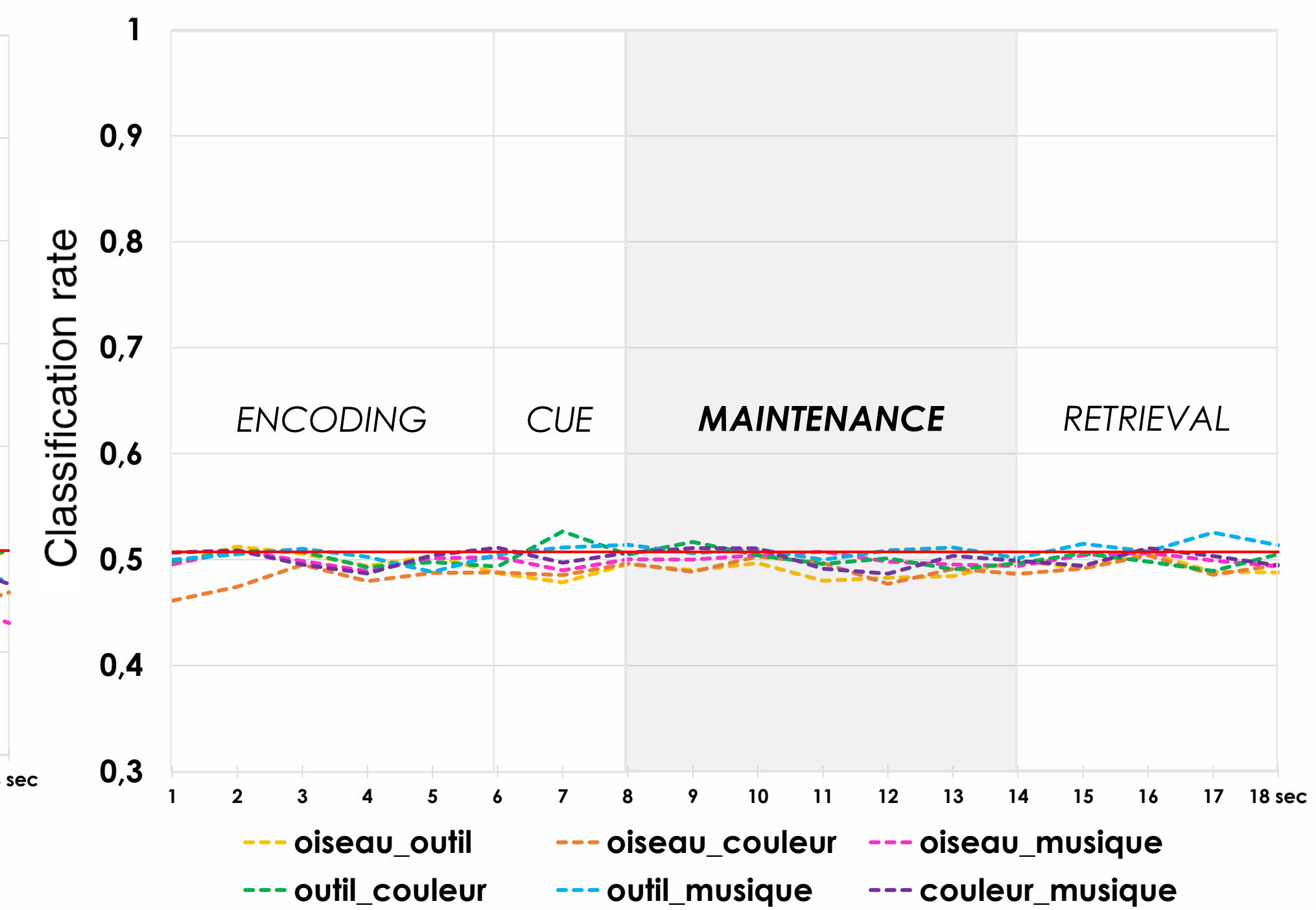


Figure 3 Time course of whole-brain classification rates of the 6 models compared to the chance level (0.5)

DISCUSSION

We found robust neural distinction between the 4 semantic categories in the LTM task, and during the first few seconds of maintenance in the verbal WM task (for all pairwise classifications except one) but there was no reliable prediction of multivariate brain signals for the 4 semantic categories between the LTM and verbal WM tasks. These results suggest that **deep semantic representations in LTM are not necessarily activated during maintenance in WM**.