

Circadian rhythm of body temperature and aging effects on visuospatial working memory

M. DOURTE^{1,2,3}, G. HAMMAD¹, C. SCHMIDT^{1,2}, P. PEIGNEUX^{1,3}

¹GIGA-CRC In Vivo Imaging, Sleep and Chronobiology Lab, University of Liège

²Psychology and Cognitive Neuroscience Research Unit (PsyNCog), University of Liège

³UR2NF, Neuropsychology and Functional Neuroimaging Research Unit at CRCN – Center for Research in Cognition and Neurosciences and UNI – ULB Neurosciences Institute, Université Libre de Bruxelles

Introduction

Circadian rhythms (CR) modulate human cognition. Aging is linked to reduced CR amplitude and advanced CR phase.

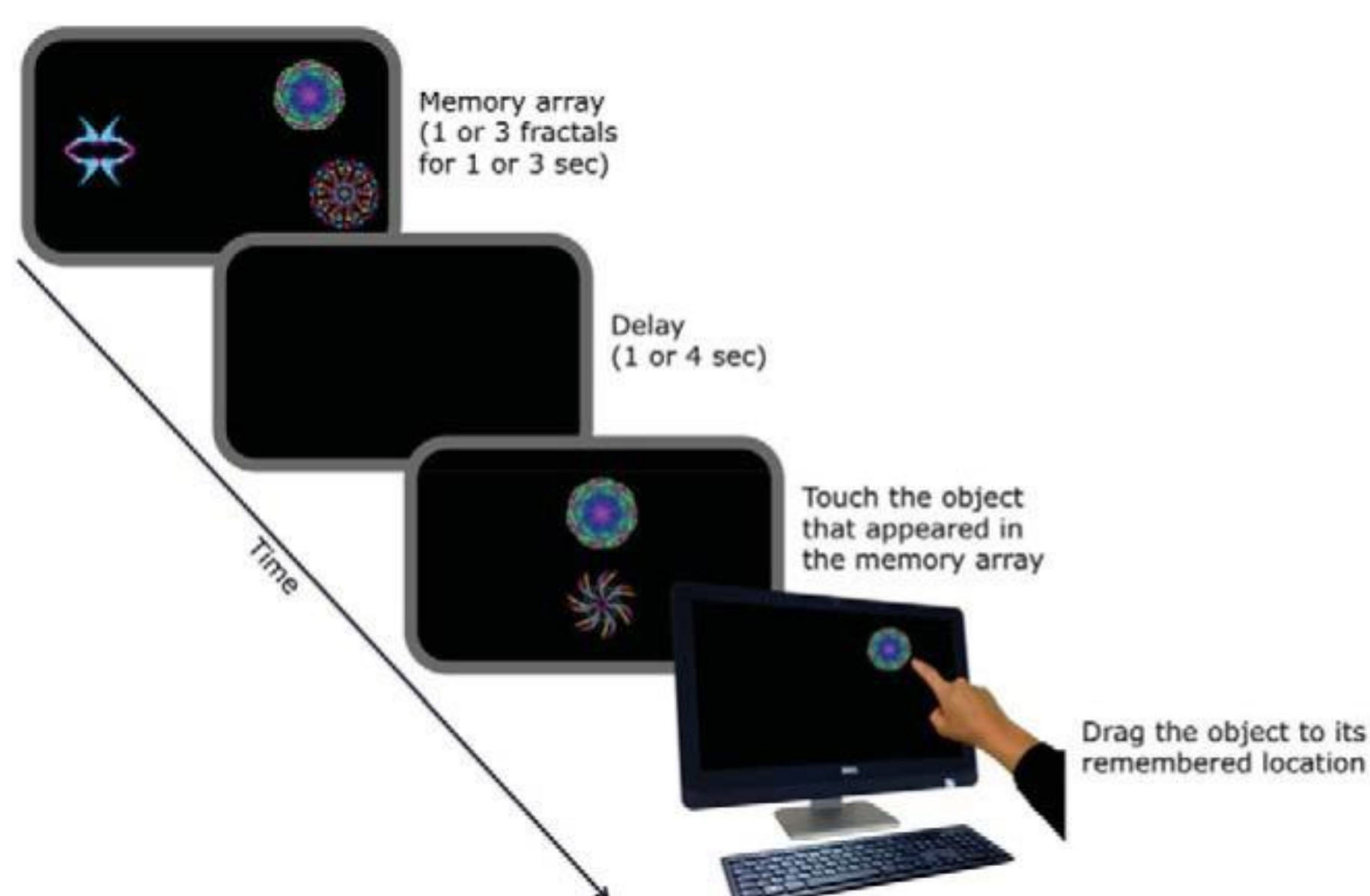
Hypothesis: Working memory (WM) performance is modulated by age and testing time-of-day and is further associated with 24-h distal-proximal body temperature gradient (DPG) modulation.

Methods

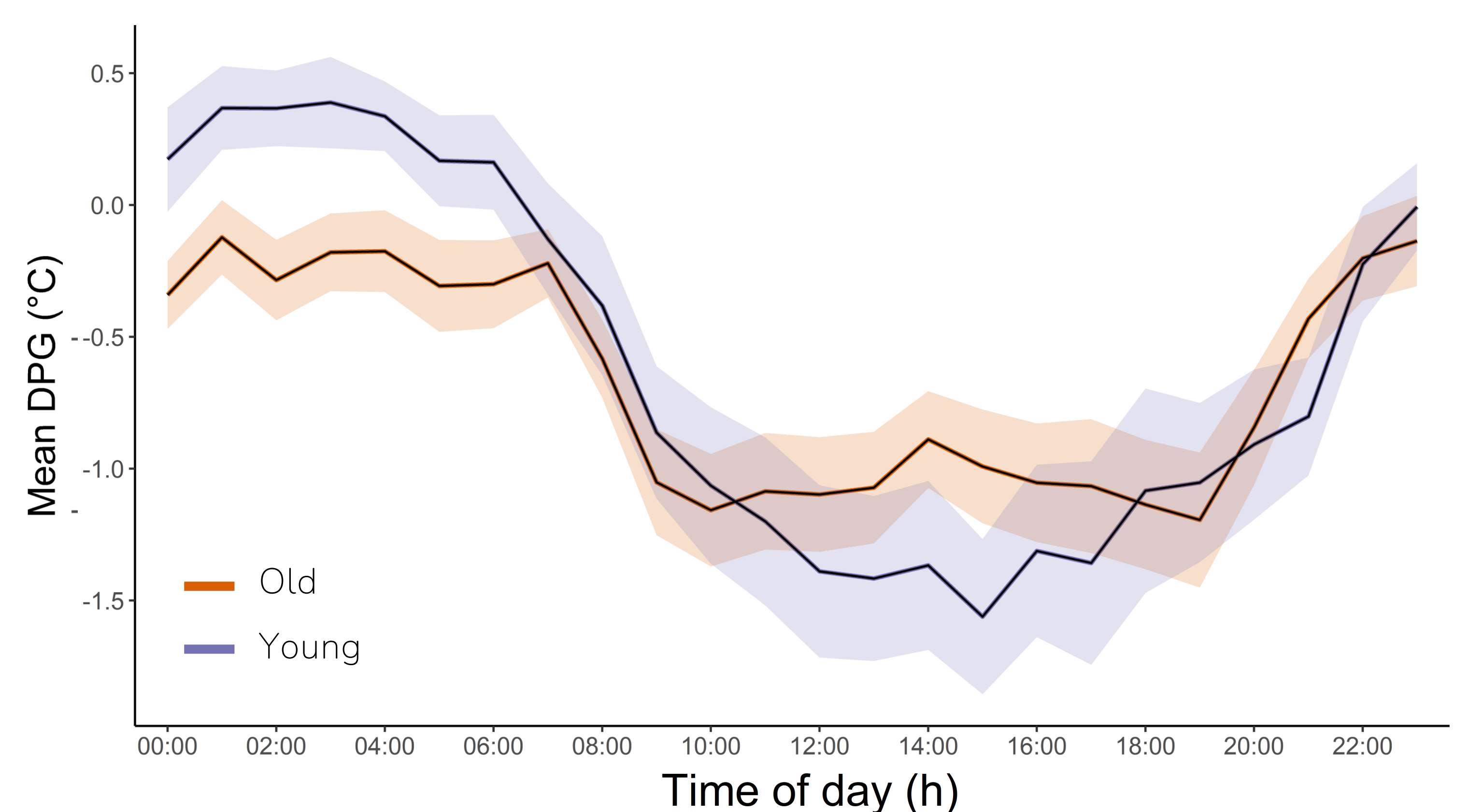
Participants. 20 young (18-35 years) and 16 older (>65 years) healthy volunteers.

Measurement. CR was quantified by the 24-h modulation of DPG, recorded during 5 days using iButtons.

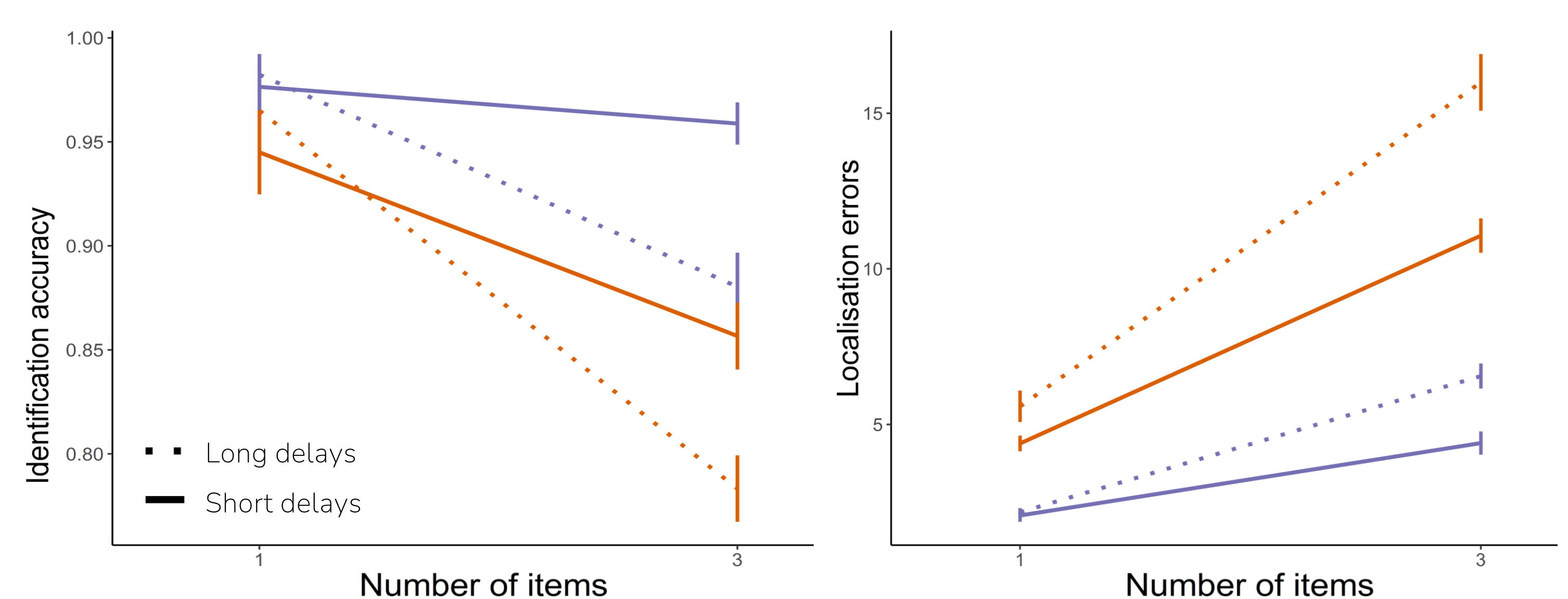
Task. Visuospatial WM was assessed in the morning and evening on separate days using an object-location visuospatial binding task, distinguishing identification and localisation performance at low vs. high WM load levels, and short vs. long retention delays.



Results



DPG shows a circadian modulation over the 24-h cycle rest-activity cycle ($p < .001$). Older participants displayed a significantly reduced DPG amplitude ($p = .001$) over the course of the 24-h cycle.



Both identification and localisation performances suffered from longer retention delay and higher WM load ($p < .001$).

Overall, younger participants performed better than their older counterparts ($p < .001$).

However, no link between DPG amplitude and localisation ($p = .59$) nor identification ($p = .35$) performances was found.

Conclusion

Our results show that age is associated with both a reduced CR amplitude, as shown by DPG modulation across the 24-h cycle, and an overall decreased WM performance. We found no link between the two and there were no correlations with testing time-of-day.