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Authors

Pomper, Ulrich

Ansorge, Ulrich

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Multiple items in working memory are cyclically activated at a theta-rhythm

Ulrich Pomper
University of Vienna, Vienna, Austria

Ulrich Ansorge
Faculty of Psychology, University of Vienna, Vienna, Austria

Abstract

Representations held in working memory (WM) are crucial in guiding human attention in a goal-directed fashion. Currently, it is debated whether only a single or several of these representations can be active and bias behaviour at any given moment. In our present study, 25 university students performed a behavioural dense-sampling experiment to produce an estimate of the temporal activation patterns of two simultaneously held visual templates. We report two key novel results. First, the performance related to both representations was not continuous, but fluctuated rhythmically at 6 Hz. This corresponds to neural oscillations in the theta-band, whose functional importance in WM is well established. Second, our findings suggest that two concurrently held representations may be prioritized in alternation, not simultaneously. Our data extend recent research on rhythmic sampling of external information by demonstrating an analogous mechanism in the cyclic activation of internal WM representations.