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Proceedings of the Annual Meeting of the Cognitive Science Society

Title

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Permalink

<https://escholarship.org/uc/item/4w1613t4>

Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 43(43)

ISSN

1069-7977

Authors

Schmid, Rebecca R
Pomper, Ulrich
Ansorge, Ulrich

Publication Date

2021

Peer reviewed

Cyclic reactivation of internal working memory representations of distinct feature dimensions

Rebecca Schmid

University of Vienna, Vienna, Austria

Ulrich Pomper

University of Vienna, Vienna, Austria

Ulrich Ansorge

University of Vienna, Vienna, Austria

Abstract

Recently, several behavioral studies have demonstrated 4-10 Hz rhythmic fluctuations in attention. So far, this attentional sampling has only been demonstrated with regards to external stimuli. Attention, however, is often directed towards internal working memory representations. We conducted a human behavioral dense-sampling experiment on whether simultaneously held representations of two distinct feature dimensions (color and orientation) also exhibit a rhythmic temporal profile. We found an oscillatory component at 9.4 Hz in the joint time-courses of both representations, presumably reflecting a common early perceptual sampling process in the alpha-frequency range. Further, we observed an oscillatory component at 3.5 Hz with a significant phase-difference between feature dimensions. This likely corresponds to a later attentional sampling process, indicating that internal representations of distinct features are activated in alternation. In summary, we demonstrate the cyclic reactivation of internal representations, as well as the co-occurrence of perceptual- and attentional rhythmic fluctuations at distinct frequencies.