

Abstract

Cross-frequency coupling (CFC) and phase-amplitude coupling (PAC) are widely used frameworks for analyzing interactions between neural oscillations of different frequencies. Many of these approaches, however, are susceptible to distortions caused by non-uniform phase distributions, which can lead to inaccurate coupling estimates. In this study, we compare our previously presented method for reconstructing phase-amplitude dynamics from measured signals with several established CFC and PAC measures. Using a model of coupled phase-amplitude oscillators and numerically simulated signals with controlled coupling properties, we demonstrate that, compared to other methods, our approach effectively resolves issues related to phase non-uniformity, providing an undistorted representation of phase-amplitude coupling. Furthermore, it extends existing CFC and PAC measures and provides a consistent and interpretable framework for their analysis.