

The functional relevance of neural entrainment for rhythm perception

Many of us know this situation: We are listening to music and our foot starts tapping along with the beat almost by itself – we are *entrained*. Entrainment to auditory rhythms is not only observable on a motor level, but also on a neural level. In a musical context, neural entrainment describes the temporal alignment of neural oscillations and the pulse of a rhythm. In two EEG studies, we presented drum rhythms that were interrupted by silent periods of a few seconds. By analyzing ongoing oscillatory and event-related EEG activity, we showed that neural entrainment does not only exist during tapping to the beat or just listening to the musical rhythms, but persists throughout the silent periods. These findings suggest that neural entrainment is composed of the interplay between stimulus-driven bottom-up sensation and higher-order top-down perception. Additionally, the two studies provided evidence for the functional relevance of neural entrainment by showing that finger tapping performances and temporal predictions were associated with specific event-related and ongoing oscillatory EEG activity. Further support for the functional relevance of neural entrainment is provided by the finding that beat-related neural oscillations during silent periods were stronger in musicians compared to non-musicians. Our findings add to the evidence supporting resonance theories of pulse and meter perception and help to shed light on the role of entrained neural oscillations for shaping sensory, motor, and cognitive processes.