

Event Related Brain Potentials Evoked by Carmen in Musicians and Dancers

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Abstract : Event-related potentials (ERPs) evoked by simple tones in the brain have been extensively studied. However, in reality the music surrounding us is spectrally and temporally complex and dynamic. Thus, the research using natural sounds is crucial in understanding the operation of the brain in its natural environment. Music is an excellent example of natural stimulation, which, in various forms, has always been an essential part of different cultures. In addition to sensory responses, music elicits vast cognitive and emotional processes in the brain. When compared to laymen, professional musicians have stronger ERP responses in processing individual musical features in simple tone sequences, such as changes in pitch, timbre and harmony. Here we show that the ERP responses evoked by rapid changes in individual musical features are more intense in musicians than in laymen, also while listening to long excerpts of the composition Carmen. Interestingly, for professional dancers, the amplitudes of the cognitive P300 response are weaker than for musicians but still stronger than for laymen. Also, the cognitive P300 latencies of musicians are significantly shorter whereas the latencies of laymen are significantly longer. In contrast, sensory N100 do not differ in amplitude or latency between musicians and laymen. These results, acquired from a novel ERP methodology for natural music, suggest that we can take the leap of studying the brain with long pieces of natural music also with the ERP method of electroencephalography (EEG), as has already been made with functional magnetic resonance (fMRI), as these two brain imaging devices complement each other.

Keywords : electroencephalography, expertise, musical features, real-life music

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