DEVELOPMENTAL ASPECTS OF MUSIC PROCESSING AS MEASURED WITH EEG AND FMRI

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Numerous studies have investigated physiological correlates of the processing of musical information in adults. How these correlates develop during childhood is poorly understood. The study examined event-related electric brain potentials elicited in 5- and 9-year-old children while they listened to (major-minor tonal) music. Stimuli were chord sequences, infrequently containing harmonically inappropriate chords. Results demonstrate that the degree of harmonic (in)appropriateness of chords modified the brain responses in both age groups according to music-theoretical principles. This suggests that 5-year-old children already process music according to a well established cognitive representation of the major-minor tonal system, and to music-syntactic regularities. Moreover, we show that, in contrast to adults, an early negative brain response was left predominant in boys and bilateral in girls, indicating a gender difference in children processing music, and revealing that children process music with a hemispheric weighting different from that of adults. Because children process the music in the same hemispheres as they process language, our results indicate that children process music and language more similarly than adults do. This finding might support the notion of a common origin of music and language in the human brain, and concurs with findings that demonstrate the importance of the musical features of speech in the acquisition of language skills. Interestingly, fast and automatic brain responses of music-syntactic processing can be observed at an earlier age than the analogous responses for language-syntactic processing. Data obtained from 9 and 10-year-olds with functional magnet resonance imaging (fMRI) indicate that inferior fronto-lateral and posterior temporal cortical areas are involved in the processing of musical information, the pattern of activation being fairly similar when comparing adults and children.

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