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Hits to the left, flops to the right: different emotions during listening to music are reflected in cortical lateralisation patterns

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Abstract

In order to investigate the neurobiological mechanisms accompanying emotional valence judgements during listening to complex auditory stimuli, cortical direct current (dc)-electroencephalography (EEG) activation patterns were recorded from 16 right-handed students. Students listened to 160 short sequences taken from the repertoires of jazz, rock-pop, classical music and environmental sounds (each $n=40$). Emotional valence of the perceived stimuli were rated on a 5-step scale after each sequence. Brain activation patterns during listening revealed widespread bilateral fronto-temporal activation, but a highly significant lateralisation effect: positive emotional attributions were accompanied by an increase in left temporal activation, negative by a more bilateral pattern with preponderance of the right fronto-temporal cortex. Female participants demonstrated greater valence-related differences than males. No differences related to the four

stimulus categories could be detected, suggesting that the actual auditory brain activation patterns were more determined by their affective emotional valence than by differences in acoustical "fine" structure. The results are consistent with a model of hemispheric specialisation concerning perceived positive or negative emotions proposed by Heilman [Journal of Neuropsychiatry and Clinical Neuroscience 9 (1997) 439].



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Keywords

Emotions; Music; Environmental sounds; Brain activation patterns; Hemispheric lateralisation; dc-EEG

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