



First author Brechmann, Andre (poster)

Poster board D5 - Tue 15/07/2008, 16:45 - Hall 1
Session 188 - Auditory 2
Abstract n° 188.5
Publication ref.: *FENS Abstr., vol.4, 188.5, 2008*

Authors Brechmann A. (1), Durrant S. (2), Scheich H. (1) & Miranda E. R. (2)

Addresses (1) Leibniz Inst for Neurobiol, Magdeburg, Germany; (2) Univ of Plymouth, Plymouth, UK

Title Activation in auditory cortex correlates with the distance of musical key change.

Text The neural processing of music including its tonal structure has received increasing attention. A previous fMRI study investigating the neural correlates of tonality suggested a tonal map in the rostromedial prefrontal cortex (Janata et al. 2002). This finding, however, has not been replicated so far and it seems unclear why no tonality specific activation was observed in the auditory cortex. Therefore we investigated tonal processing, and in particular the effect of distance of key changes along the circle-of-fifths.

Musical sequences were 8 s long and consisted of 16 isochronous piano sounds lasting 500 ms; each sound consisted of four simultaneous tones forming a chord recognized in Western tonal music theory. Three of these sequences were ordered into twenty-four groups with no gaps between sequences and groups. The first sequence in each group was always tonal presented in the home key of C major, the second was also tonal and could either be in F# major (distant key), in G major (close key), or in C-major (same key). The third sequence in each group was always atonal which reset the listener's sense of key. Sixteen subjects (9 female, 7 male; age 19-31) with no formal musical education were instructed to indicate any change from one key to another by left button click, and a change towards a sequence with no key by right button click. Subjects were given an initial practice period in order to ensure that they understood the task. Functional volumes were collected at 3 Tesla using echo planar imaging (TE=30ms; TR=2000ms; FA: 80; 32 slices with 3x3x3 mm resolution, 606 volumes).

The group analysis did not show a specific effect in rostromedial prefrontal cortex but instead a cluster of fMRI activation in secondary auditory cortex (especially in the left hemisphere) showing a systematic increase in BOLD amplitude with increasing distance in key. This suggests a specific role of the auditory cortex in tonal processing.

Theme D - Sensory and motor systems
Auditory - Auditory cortex