

TRAINING NON-MUSICIANS ON A MUSICAL TASK – AN FMRI STUDY

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Background

Several studies using various brain mapping techniques showed differences in auditory processing comparing musicians to non-musicians. It is unclear whether these differences are due to differences in brain structure or intensive musical training.

Aims

The aim of this study was to determine brain changes in non-musicians associated with learning an auditory musical task and to compare trained non-musicians with musicians performing the same auditory musical task.

Method

Seven non-musicians (training group) underwent fMRI-scanning twice (separated by 5 days of auditory training) while performing a pitch memory task. Subjects listened to a sequence of 6-7 tones lasting 4.5 seconds and were required to make a decision whether the last tone or second-to-last tone compared to the first tone (depending on a visual prompt) was “same” or “different”. The control condition was a rest condition with alternating button presses after a visual prompt. Using a variation of a sparse temporal sampling technique, a set of 24 axial slices (4x4x6mm voxel size) was acquired after each auditory stimulation (TR = 17 sec.) with varying the delay time between auditory stimulation and MR-acquisition over a 7sec interval. Non-musicians significantly

improved in their percent correct responses after the training period. The training group was matched for gender and performance score to a group of musicians who underwent the same fMRI-experiment.

Results

In comparing the non-musician group prior to the training sessions with the musician group, we found more bilateral superior temporal gyrus activation in the non-musician group. Comparing both groups with each other after the training sessions showed that the activation pattern in the non-musician group was more similar to the musician group; nevertheless, the non-musician group had even stronger left-sided temporal activation than the musician group. A performance difference between non-musicians and musicians was present prior to the training sessions, but not afterwards.

Conclusions

A greater left hemispheric lateralization of the auditory activation pattern seems to occur with training non-musicians in a pitch memory task, making the activation patterns more similar between trained non-musicians and musicians. This would lend support to the notion that functional differences between musicians and non-musicians are due to training and are not due to pre-existing differences in either brain anatomy or function.