

# **The Neural Correlates of Beat Perception in Musicians in Visual and Auditory Modalities**

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The perception of temporal patterns depends on how the stimulus is presented and it is fundamental to normal communication (Grahn, 2012a). In most experiments, rhythms have been presented in auditory modality. The activation areas are similar for both music and speech tasks and were found in the auditory cortex in for example right superior temporal gyrus, left middle temporal gyrus (Geiser, Zaechle, Jancke, & Meyer, 2008; LeCroix, Diaz, & Rogalsky, 2015). In new studies have used visual stimuli to explore the rhythm perception. Behavioral studies show that it is possible to discriminate rhythms relying only on visual presentation (Grahn, 2012b). However, the performance level was significantly lower compared to auditory presented stimuli and the group of participants consisted of people with different musical education what could influence the performance in this task. Moreover focusing on task-specific reorganization of the human brain, researchers noticed the visual task in deaf subjects to induce and increase functional connectivity between the auditory cortex and the dorsal visual cortex (Bola et al., 2017). Therefore, based on recent studies the aim of our study was to verify whether similar neuronal structures respond to visual and auditory beat perception and whether visual and auditory beat perception tasks are being performed at the same accuracy level. I would like to show the results of a behavioral experiment and a fMRI study based on discrimination of visual and auditory rhythms in a group of professional musicians. Our results show that the level of performance in the auditory task is significantly higher than the visual task. However, both tasks were performed significantly above the level of significance. Moreover, in the fMRI experiments we observed activations for visual and auditory rhythms in auditory cortex in musicians. However, in auditory tasks our study showed activation in both parts of brain.

Bola, Ł., Zimmermann, M., Mostowski, P., Jednoróg, K., Marchewka, A., Rutkowski, P., Szwed, M. (2017). Task-specific reorganization of the auditory cortex in deaf humans.

*Proceedings of the National Academy of Sciences USA*, 14, 600-609.

doi:10.1073/pnas.1609000114

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