

**MUS 7220 7001**

**Dr. Colprit**

**Summaries**

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**Summary 1 – Time Relations:**

Sakai, K., Kikosaka, O., Miyauchi, S. Takino, R., Tamada, T., Iwata, N. K., & Nielsen, M. (1999). Neural representation of a rhythm depends on its interval ratio. *The Journal of Neuroscience*, 19(22), 10074-10081. DOI: <https://doi-org.ezproxy.bgsu.edu/10.1523/JNEUROSCI.19-22-10074.1999>

**Interest:** After reading about human beings' natural preference for consonance over dissonance, I became interested in how our brains perceive and deal with rhythm.

**Synopsis:** The purpose of the study was to identify if the metrical and non-metrical rhythm representations proposed by Essens and Povelin (1985) activate different neural networks or not. The researchers were seeking to answer the question “what neural networks are activated when humans execute metrical and non-metrical rhythms?” To achieve this, six normal, right-handed, subjects, all without musical training, were subjected to fMRI scans while attempting to replicate variations on the rhythm ratios 1:2:4, 1:2:3, and 1:2.5:3.5. The sound stimulus was provided for the subjects via a head set. Subjects were asked to listen to the sequence of rhythms, wait 10.8 seconds (signaled to them by way of a distinct tone), and replicate the rhythm from memory. An fMRI machine scanned the brains to identify the active areas. The research showed that the right

prefrontal cortex was only active for 1:2.5:3.5; the cerebellar posterior lobe was active bilaterally for 1:2.5:3.5 while only the right side was active for the other two rhythm ratios; and that the ratio 1:2.5:3.5 activate the right hemisphere while the other two ratios activated primarily the left. This research has shown that metrical and non-metrical rhythm representations activate distinct regions of the brain, often in dissociation from each other.

## **Summary 2 - Memory:**

Hickok, G., Buchsbaum, B., Humphries, C., & Muftuler, T. (2003). Auditory-motor interaction revealed by fMRI: speech, music, and working memory in area Spt. *Journal of Cognitive Neuroscience*, 15(5), 673-682.

<http://web.a.ebscohost.com.ezproxy.bgsu.edu/ehost/pdfviewer/pdfviewer?vid=7&sid=a7649c68-c364-4283-a431-059a638dc0a4%40sessionmgr4007>

**Interest:** Teachers often stress the importance of silent practice and listening to recordings of what is being practiced. It seems to me that understanding more about the relationship between auditory stimulus and motor reactions will help support these practices.

**Synopsis:** The purpose of this study was to determine if any auditory-motor response properties can be found in the Sylvian parietal temporal area, as well as identify the stimulus specificity of the response in area STP. This would be done by contrasting speech stimuli and melodic stimuli. In the research, the authors try to answer the question of whether the posterior Sylvian cortex has an auditory-motor interface system. For the experiment five subjects were asked to listen to and silently practice both nonsense sentences and tonal melodic sequences. An fMRI machine kept track of the hemodynamic activity during the trials. Through this process, the researchers were able to identify auditory, rehearsal, and auditory+rehearsal classes of responses. They noticed that for auditory as well as for rehearsal phases, the responses in the superior temporal lobe were bilateral. They also noticed that the posterior frontal lobes and anterior insula responded to rehearsal. Auditory+rehearsal responses were perceived in the left Spt for both speech and music, with a predominance of left hemisphere activity. It was found that the right hemisphere

responded in a similar fashion both to speech and to music, while there was a variance in response in the left hemisphere. The researchers found that, while speech activates the left STS more than music, the opposite is true for the right STS. These results lead them to hypothesize that the Spt is indeed part of a network in the auditory dorsal system. After these discussions, the article seemed to go off into another experiment, this time with nine right-handed twenty-seven-year-olds, following similar parameters as the ones used in the experiments described previously. The purpose of this second experiment, however, escaped me, as it was not followed by a discussion.