

# **The melody and the sound structure in the human brain: results from neuro-imaging studies**

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In this talk I present data from the neuro-imaging studies of healthy, adult speakers while performing traditional speech perception and speech production tasks. The neural 'systems' that emerge from these experimental data vary as a function of the task. Tasks that require access to pure motor processing and pure auditory processing recruit different brain areas than the tasks that require access to phonological processing. I will show that while quite complex networks support the speech functions, there is one specific area (the left anterior Insula) which constitutes the primary substrate for constructing phonological representations for speech. I will also provide evidence that these representations are not pre-planned but that they are rather computed at the moment of speaking.

The neuro-imaging studies of the production and the perception of prosody suggest that there is a single area of the brain, the "prosody processor", which is involved in both production and perception of linguistic prosody (BA47/11). Furthermore, it can be argued that the brain processes the linguistic and the affective prosodic tasks in different (differently lateralized) cortical regions. The processing of speech rhythm and speech tempo are subserved by distinctive subcortical regions (Putamen and Cerebellum).

Our neuro-imaging results also support the idea of a "mental syllabary", a storage device which contains the most frequent syllable tokens of a given language. Apparently, the items from the syllabary are supported by different cortical structures and processes than these aspects of the phonological structure/melody which are not 'stored'.

In the discussion of the results I will concentrate on the question how the cortical networks and processors which support sound structure and speech functions are interfaced, and how they work together. I will also address the controversial issue of networks vs. processors as a basis of explanation of structure and melody in the human brain.

## References

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