

## Masterarbeit/Master's thesis

### An investigation of musical expertise on the neurological processing of the rhythm of spoken language

Previous neuro-scientific studies on the processing of linguistic rhythm (Kandylaki et al., 2017) have revealed that in the context of natural stories being heard by human participants, the human brain responds to the alternation of strong and weak beats under some conditions, showing a similar processing pattern to musical stimuli (Grahn 2012). This informs and expands the results of previous studies in the area (Schmidt-Kassow and Kotz 2009), however it is not yet clear if there is an effect of expertise with musical rhythm on the processing of speech rhythm. In part of the EU-funded project "The NEurobiology of RHYthm: effects of MUSical expertise on natural speech comprehension" (NERHYMUS), it is investigated how rhythm expertise of musicians may affect the way they process the rhythm of spoken language. To this end, we test both musicians and non-musicians in a variety of tests: online questionnaire for quantification of musical experience, behavioral measures of beat perception in language, EEG, and fMRI measurements, with possible implications which are useful for educational programs and rehabilitation therapies.

In this thesis, you will evaluate questionnaire and behavioral data. Part of the internship will take place in Maastricht university under the supervision of Dr. Katerina Kandylaki. The audio signal analysis (which entails speech rhythm analysis using techniques similar to those found in Lykartsis & Weinzierl (2015)) will be performed under the supervision of collaborator Athanasios Lykartsis from TU Berlin. As a result, you will gain experience in audio signal and behavioral data analysis (quantitative), as well as gain the possibility to expand your programming skills in MATLAB and R.

#### Literatur/Literature

- Grahn, J. A. (2012). Neural mechanisms of rhythm perception: current findings and future perspectives. *Topics in cognitive science*, 4(4), 585-606.
- Kandylaki, K. D., Henrich, K., Nagels, A., Kircher, T., Domahs, U., Schlesewsky, M., & Wiese, R. (2017). Where is the beat? the neural correlates of lexical stress and rhythmical well-formedness in auditory story comprehension. *Journal of cognitive neuroscience*, 29(7), 1119-1131.
- Lykartsis, A., & Weinzierl, S. (2015). Using the beat histogram for speech rhythm description and language identification. In *Sixteenth Annual Conference of the International Speech Communication Association*.
- Schmidt-Kassow, M., & Kotz, S. A. (2009). Attention and perceptual regularity in speech. *NeuroReport*, 20(18), 1643-1647.

#### Voraussetzungen/Requirements

High motivation to engage in scientific research, previous experience with audio signal analysis (preferably in MATLAB), very good knowledge in R or motivation to acquire that knowledge.

#### Betreuung/Supervision

- Prof. Dr. Stefan Weinzierl, EN 322, [stefan.weinzierl@tu-berlin.de](mailto:stefan.weinzierl@tu-berlin.de)  
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