Interpreting EEG by voice: Vocal EEG Sonification

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Abstract

Vocal EEG sonifications are presented as a method for complex time series sonification that is particularly tailored to address both humans' articulatory and auditory competences in order to improve the understanding and communication of the underlying data. In Vocal EEG sonification, the EEG data is represented in real-time by synthesized sound in a systematic, reproducible, task-centered way using an articulatory sound synthesizer capable of creating vowel transitions. Patterns such as 'EEG at rest', epileptic EEG, sleep EEG, etc. are thereby turned into characteristically different sonic gestalts that human listeners can discern from listening to the 'data babble'.

In this contribution, we emphasize the aspect of designing sonification particularly for the purpose of enhancing communication about sonic patterns, and we conduct a preliminary study about the human skill to use the own vocal tract to mimic or imitate patterns heard in the sonification. Our study will show to what degree humans are capable to recognize signal types correctly, both from the original sonifications and from vocal imitations performed by trained sonification users and naïve users without extended previous experience in sonification

The presentation will first give a motivation for Vocal EEG Sonification, explain the sonification technique, then present and discuss the sonification examples (which are two sound segments each for three different signal types, namely artifacts, epilepsy and sleep spindles). The experimental technique of 'dissimilarity rating' will be presented and the results of a Multidimensional Scaling Analysis for collected user ratings will be shown. For the demo, we plan to setup a working experimental setup where visitors can listen to and rate the dissimilarities both of sonifications and vocal imitations themselves. We will also present various human imitations of the selected sound examples, which shed a light on the variability in human performance to imitate vocal sonifications.

The technique of Vocal EEG sonification has been introduced by the authors and sonification examples are available online on our website at
http://www.sonification.de/publications/HermannBaierStephaniRitter2006-VSO/