

# **Sonic materialization of linguistic data**

## **The problem of sonification**

Kramer Gregory (1994) in his book *“Auditory Display: Sonification, Audification, and Auditory Interfaces”* defines sonification as “use of non-speech audio to convey information or perceptualize data”.

In our digital age we can store, edit and examine almost all qualities and quantities as data. Sound itself can be considered as a pure stream of information able to be modulated, transformed and analyzed in a lot of different ways.

The success of sonification occurs when the sound reveals one or more qualities of data or data reveals one or more qualities of sound. Thus, this kind of materialization of data is an interdisciplinary act which involves both the proper analysis of data and the structure of sound.

While technology provides us with a wide variety of tools, the core of the problem still exists. As this kind of interdisciplinary knowledge is hard to be combined, there aren't enough available tools which help artists to escape from an arbitrary mapping of data to sound qualities. This leads to arbitrary results both for the artist and the listener as the sonification process doesn't take advantage of neither the auditory perception properties nor sound's advantages in temporal, amplitude and frequency resolution. As a result, in most cases, sonification fails its purpose which “is to encode and convey information about an entire data set or relevant aspects of the data set.” (The Sonification Handbook 2011)

## **Sound and linguistics**

“Sonic Materialization of Linguistic Data“ is a series of work and a research project aiming to provide sound artists with the tools for the proper linguistic analysis of the mined data.

In our age of constant connectivity, social media - and especially the twitter text-based platform- can be considered as a monitor corpus which evolves perpetually and it is in a process of constant change. In order to create new structures and transform this chaotic

stream of data into new material - in our case sound, it needs to be organized according to its different kind of properties- here its linguistic aspects. With our work “Sonic Materialization of Linguistic Data“ we provide different software modules that can perform real time linguistic analysis of data and output the result for sonification purposes.

Our software consists of different kind of modules, from which the user can choose only one or a combination of more. Here we present the *Stress Module*. The program enables the user to aggregate data from different hashtag [#] feeds on twitter in real time. The incoming data is being processed according to their linguistic features and in particular stress. The algorithm performs a series of tasks and extracts the stressed syllables of the aforementioned data. The output is a phonetic transcription code which represents each phoneme of the input twitter feed. The encoded outputted list of data also includes suggestions for the sonic mapping that occurs from data’s linguistic features and the sound’s nature. For instance, the strong syllables are a numerical output which represents a longer sound event (time envelope), whereas the weaker syllables are a numerical representation of a briefer sound event. Similar kind of optional mapping can also affect other sound features such as pitch, timbre, ADSR envelopes, modulation etc.

Stress, which can be considered as a prosodic feature, manifests itself in the speech stream in several ways. Stress patterns seem to be highly language dependent, considering that there is a dichotomy between stress timed and syllable timed languages. In stress timed languages primary stress occurs at regular intervals, regardless of the number of unstressed syllables in between, whereas in syllable timed languages syllables tend to be equal in duration and therefore are inclined to follow each other at regular intervals of time. According Halliday(1985: 272), “salient syllables occur in stress timed languages at regular intervals”. Strong syllables bear primary or secondary stress and contain full vowels, whereas weak syllables are unstressed and contain short, central vowels.

Particularly in English, which is a stress language, speech rhythm has a characteristic pattern which is expressed in the opposition of strong versus weak syllables. Stressed syllables in English are louder, but they also tend to be longer and have a higher pitch. Despite the fact that stress can be also influenced by pragmatic factors such as emphasis, our project aims to capture the natural stress pattern of English in order to

extract meaning from sound patterns too, as they will be delineated by the phonetic structure of natural language.

## **Presentation**

For the presentation of the project we are proposing a poster with the description of how exactly the software works and what its aim is. We also would like to include a pair of headphones and a small screen (or projector) in order to have the data analysis and the sonification process in real time for the audience to experience.

## **References**

Kramer, Gregory 1994. Auditory Display: Sonification, Audification, and Auditory Interfaces. Santa Fe Institute Studies in the Sciences of Complexity, Proceedings Vol. XVIII. Addison Wesley, Reading, Mass.

Halliday, M. A .K. 1985. An Introduction to Functional Grammar. London: Arnold.

The Sonification Handbook. Edited by Thomas Hermann, Andy Hunt, John G. Neuhoff (Eds.). Berlin: Logos Verlag Berlin 2011