

LISTENINGMINDLISTENING:

Untidy Mind

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ABSTRACT

The sonification of data in this piece is not consciously shaped by any guiding metaphor, but has developed through tinkering with and tweaking various synthesis methods while listening for coherences and differences in the sound field.

1. INTRODUCTION

I divided the data channels into two main groups, with the 1020 head signals in one and the remaining channels in the other.

This follows a pattern I noticed in a spectral analysis of the data in which the 1020 head signals all showed similar strong harmonic content, while the rest of the channels had no overall common characteristic. I processed the 1020 signals (ch. 1-26) in a uniform way, and took an ad-hoc approach with the rest (ch. 27-36), re-combining different channels of data in various syntheses. I hoped the redundancy would enhance a perception of structure through several different relations in the overall sound.

2. SONIFICATION

2.1. Channels 1-26

The energy in channels 1-26 was concentrated in bands between approximately 6 Hz and 32Hz. I pitch shifted the raw data by a factor of 34 to make these frequency bands audible. I tried hetrodyne analysis and resynthesis, but preferred the results of a simple rotating buffer technique because it produced more high-frequency detail than the resynthesis. The pitch-shifted signals had a strong constant drone beneath changing harmonics. I used fft to subtract the average spectrum in each channel, which de-emphasised the drone and accentuated the fluctuating harmonics. The channels are spatially positioned according to their recording locations in the 1020 system. (BarrassT01.wav ... BarrassT26.wav)

2.2. Channels 27-36

I let the raw values of these signals provide a chance starting point for tweaking usable sounds out a variety of syntheses. I tuned the sounds by ear and by watching the numerical values produced while adjusting the multiplication and offset of the raw data values on the fly. The output signals were positioned and adjusted in volume with an ear for being able to hear each sound separately at home on a four channel system.

The data channels were mapped to synthesis parameters as follows:

2.2.1. *moog+delay* : ch27-VPVA, ch28-VNVB, ch29-HPHL, ch30-HNHR (BarrassT27.wav)

ch27-VPVA drives the frequency of a sawtooth wave fed to a moog filter where the cutoff frequency is offset by ch28-VNVB and modulated by an LFO at a rate set by ch29-HPHL. The signal is sent to an echo with feedback level set by ch30-HNHR. The general positive slope of the data provides increasing echo intensity as the piece proceeds.

2.2.2. *bowed string model [1]*: ch27-VPVA, ch28-VNVB, ch29-HPHL, ch30-HNHR, ch34-EDA (BarrassT28.wav)

ch27-VPVA : bow pressure
ch28-VNVB : bow velocity, modulated at a rate set by ch30-HNHR
ch29-HPHL : vibrato frequency
ch30-HNHR : sets the rate of bowing, in multiples of the heart rate, determined by a tempo-finding algorithm
ch34-EDA : bow position

2.2.3. *“blowtar” model [2]*: ch27-VPVA, ch28-VNVB, ch29-HPHL, ch30-HNHR, ch32-OrbOcc, ch33-Mass, ch34-EDA (BarrassT29.wav)

ch27-VPVA : jet/feedback coefficient, pluck frequency in multiples of heartrate
ch28-VNVB : body size
ch29-HPHL : jet/feedback frequency
ch30-HNHR : flute/string frequency
ch32-OrbOcc : breath
ch33-Mass : pluck position
ch34-EDA : vibrato frequency

2.2.4. *Geiger-counter style “pingers”*

ch32-OrbOcc rate of ping, with 466 Hz fundametal frequency and a sweepable spectrum set by ch33-Mass. (BarrassT30.wav)

ch33-Mass : rate of unpitched click, processed with a short delay (1-10 msec) set by ch32-OrbOcc with lots of feedback for resonance. (BarrassT31.wav)

ch34-EDA : rate of reverse-enveloped ping, with a tone tuned by ch32-OrbOcc, and with noise band-pass filtered at a frequency set ch30-HNHR. The filter oscillates an octave in range at a fixed frequency of 20Hz. (BarrassT32.wav)

2.2.5. *Miscellaneous mappings*

ch35-Resp sets the band-pass frequency of filtered noise, which is then processed with a short delay (1-5 msec) set by ch30-HNHR with 99% feedback for resonance. (*BarrassT33wav*)

ch36-ECG and ch31-Erbs each set the frequencies of sin oscillators. These signals are mixed and distorted by waveshaping then sent to a flanger with the delay time modulated by ch31-Erbs. This signal is then filtered with a parametric equaliser to provide the deep throbbing bass that drives the piece. (*BarrassT34.wav*)

3. ADDITIONAL REMARKS

I think that in order to focus on details in the sonification, a listener would really need to be able to interact with the piece, at least by being able to adjust volume levels of different sounds, but probably other parameters as well. An interface would need to be designed along with the sonification, probably with a way to meaningfully change many interacting parameters simultaneously.

4. SOUND FILES/POSITIONS

BarrassT01.wav = (Fp1)
BarrassT02.wav = (Fp2)
BarrassT03.wav = (F7)
BarrassT04.wav = (F3)
BarrassT05.wav = (Fz)
BarrassT06.wav = (F4)
BarrassT07.wav = (F8)
BarrassT08.wav = (FC3)
BarrassT09.wav = (FCz)
BarrassT10.wav = (FC4)
BarrassT11.wav = (T3)
BarrassT12.wav = (C3)
BarrassT13.wav = (Cz)
BarrassT14.wav = (C4)
BarrassT15.wav = (T4)
BarrassT16.wav = (CP3)
BarrassT17.wav = (CPz)
BarrassT18.wav = (CP4)
BarrassT19.wav = (T5)
BarrassT20.wav = (P3)
BarrassT21.wav = (Pz)
BarrassT22.wav = (P4)
BarrassT23.wav = (T6)
BarrassT24.wav = (O1)
BarrassT25.wav = (Oz)
BarrassT26.wav = (O2)
BarrassT27.wav = (1.0, 338, 24)
BarrassT28.wav = (1.0, 48, 60)
BarrassT29wav = (1.0, 312, 62)
BarrassT30wav = (1.0, 158, 25)
BarrassT31.wav = (1.0, 264, 31)
BarrassT32wav = (1.0, 0, 48)
BarrassT33.wav = (1.0, 96, 34)
BarrassT34.wav = (1.0, 177, 77)

5. REFERENCES

- [1] [1, 2] These instruments are Pd (Miller Puckette, <http://www.crcs.ucsd.edu/~msp>) externals ported

from STK (by Perry Cook and Gary Scavone) by Dan Trueman, Computer Music Centre, Columbia University.