SONIFICATION: CELESTIAL DATA AND POETIC INQUIRY

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ABSTRACT

This paper describes a composition/sonification project to be realized by faculty and students from the Electronic Production and Design department (EP/D) at Berklee College of Music in Boston. The goal of the project is compose music for a 30-minute interdisciplinary-networked performance to be premiered in Boston, Lyon and Havana involving artists from each city. In the process, artists are examining new modes of expression and the construction of knowledge and artistic dialog. Kelly Snook, Ph.D. Astrophysicist, Division of Solar System Exploration, NASA Goddard Spaceflight Center is working with the group to choose scientific data for sonification including compelling new planetary science and solar system data.

1.　INTRODUCTION

The composition explores ancient questions related to the poetic use of pattern, symmetry and ratios. The piece leverages our study of the works of Pythagoras, Hildegard of Bingen, Bartok, Coltrane and Ikeda, all of whom explored these ideas. This resultant composition furthers my work in the sonification of naturally occurring patterns that I started in 1986 while working with Hubert Hohn, Director of the Computer Arts Center at Massachusetts College of Art.

An example composition is *Nocturnal Sounds from Hohle Fels* (2009) is for alto saxophone and laptop. The computer performs real-time signal processing and executes computer-driven models for improvisation, based in the Max/MSP programming environment. The audio excerpt provided for this conference uses a vocal performance of Vincenzo Galilei's madrigal *In Exitu Israel* (sung by Alessandro Carmignani) that was reworked using the partial editing resources of SPEAR, time-stretching algorithms of MetaSynth and the experimental use of convolution reverbs. In addition, other sections of *Nocturnal Sounds from Hohle Fels* feature 'glitch' sounds derived from my composition *M87* (1995) from my solo CD *Timaeus*. *M87* is named after a giant elliptical galaxy photographed by the NASA Hubble Space Telescope, and it is believed by some to be a supermassive black hole. The Hubble photos shows a 5000 light-year long jet stream made up of electrons being ejected outward at near light-speed. This 'mash-up' of *M87* was made using Max/MSP patches created by myself and EP/D alumni Gadi Sassoon and Edward Loveall.

In spring 2010, I formed the Global Sonification Network Ensemble (GSNE), to explore sonification and aesthetic issues with students. The GSNE made its debut performance for the live broadcast to the 25th anniversary of VideoFormes international video art and digital culture festival; Clermont-Ferrand, France. The ensemble included Berklee faculty, students and alumni: John Hull, Jinku Kim, Neil Leonard, Daniel Piccione, Enrico de Trizio, Pierce Warnecke and School of the Museum of Fine Arts students: Daniel Cevallos, Shane Butler, Merideth Hillbrand.

2.　COMPOSITION

The present task is to expand on selected poetic ideas using scientific models with special attention to data that is uniquely valuable to scientists working in sonification research.

2.1 Spatialization

One immediate undertaking is to expand on the celestial motion model for mixing that was explored in *Partita Tripla con Galilei* composed by composers Maura Capuzzo, Marco Braggion and myself and coordinated by Nicola Bernardini for the "Giornata dell' Ascolto" event in Padova, Italy, 2009. For this installation, Bernardini created an automated mix in Csound that featured a spiraling effect among the six-speaker array that was installed along the perimeter the main Piazza in Padova.

The vocal except presented here is a dense collage of processed samples, rendered in stereo for the conference proceedings. In fact, the piece demands a more choral-like sound dispersion model, where each voice can emanate from a discreet source. With the use of 12.2 audio or a similar 360 diffusions system, the group will explore the automated localization of samples, or even partials, based on solar system, galaxy and other celestial motion.

2.2 Pitch material

In 1993, using non-linear iterative functions almost exclusively, I composed weekly theme music for Hubert Hohn's program "Chaos and Order" (60 computer generated pieces in total), broadcast on MCET interactive educational television. My interest in the sonification of non-linear iterative functions was renewed when Dr. Snook introduced me to Joachim Goßmann's program "Audio Fraktal"[1]. Of particular interest is the use of "Audio Fraktal" to dynamically construct pitched sequences and harmonies outside of equal tempered tuning. The real-time construction of non-equal tempered harmonies has long been an integral part of how I process my saxophone in concert. The

creative use of fractal data to synthesize related harmonies in real-time, or to provide a control source for real-time audio pitch shifting potentially expands these new modes of expression.

2.3 Noise

Noise has long been a key artistic resource for musicians. In his article "Noh and Transcendence," composer Toru Takemitsu points out "On examination, we find that the Japanese prefer an artistic expression close to nature while the Westerner treasures an artificial expression that is not part of nature. This is true of the Japanese preferences in sound. Historically Western music has striven to eliminate noise. On the periphery of Western music we find folk and tribal music, which creates unusual sounds that include noise[2]." In short, noise has played an increasingly important role in Western music as well. It was formally embraced by futurists, Dadaists, mid-20th century avant-garde composers and present schools of pop-musicians[3].

Sonification of scientific and solar system data provides new and rich artistic resources for the exploration of noise as a critical resource. Perhaps the "music of the spheres" or "celestial harmonies" can be creatively coupled with "noise of the spheres" as artists Tony Oursler,Constance DeJong and I suggested in our collaborative piece *Relatives* (1989) that used audio/video noise to make a poetic reference to the big bang - the most ancient sonic icon[4].

3.   CONCLUSION

Artists evolve through continued experimentation, curiosity and exposure to new tools. The field of sonification provides new and powerful resources for artistic use. Poetic exploration of these sources calls for an ongoing dialog between artists and scientists. Innovations in sonic arts require new ways of listening and artist working at this intersection of disciplines are exposed not only to new modes of expression, but can also learn to listen to nature from the perspective of specialists from outside of the music guild, thus transforming their work at the most fundamental level.

4.   ACKNOWLEDGMENT

5.   REFERENCES

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