Virtual masks in the BACCHAE by Georgia Spiropoulos (IRCAM,2010) : exploring tragic vocality in Max/Msp environment

Georgia Spiropoulos
(IRCAM,georgiapsiropoulos@gmail.com
Anastasia Georgaki
(Music Department, University of Athens, georgaki@music.uoa.gr)

Abstract
In this paper we present some technical aspects on the interactive masks created by the composer Georgia Spiropoulos for the needs of the opera *Les Bacchantes* (Ircam, 2010). Bacchae is an opera for a single performer, tape and live electronics where the voice of the performer interprets four different roles with the interactive environment in Max/Msp. The virtual masks as a metaphor of Euripide's *dramatic personae* and masks[1] of the same actor. Are used as virtual scores which register the vocal trace of the performer and give further vocal agility, extensibility, mutation, multiplication and augmented vocality.

1. Introduction

Since the beginning of XXth century more than a thousand Greek composers have composed music for ancient Greek dramas. most of them have been based upon the prosody of the text [5], the ancient Greek modes and the Byzantine melos following the traces of archeomusicology[2]; on the second half of the century many composers have gone one step further by introducing contemporary vocal techniques which exalt the tragic element through various means of vocal expression. Indeed, many composers for aesthetical reasons have changed the structure of the ancient Greek tragedy using traditional or non-traditional instruments in instrumental and electroacoustic music[4]. For example Xenakis's *Oresteia* (1965) written for a mixed and children's choir and a chamber ensemble, reflects the composer's most successful attempt to write music for a Greek tragedy focusing on the prosody of the ancient Greek text [7][9]. Jani Christou in the 60's introduced novel techniques for the vocal processing of the choir and electroacoustic tape on tape in order to reinforce the tragicalness of the text. [2] Michael Adamis in the 70s initiated processed voices in contrast to conventional sounds underlining the semantics of the text by preserving its prosody [6].
One step beyond, *G*eorgia's Spiropoulos re-reads Euripides"Bacchae" in another way: a single singer performs all the characters, the dramatic action turns into vocal, the actor's mask[3] into virtual mask, the interactive system replies as chorus and the theatre stage turns into a light sculpture. The close collaboration between the composer and the multivocalist Médéric Collignon[4] gave

[1] The masks in Greek drama allowed the actors to play multiple roles. They may have served as resonance chambers so actors could be heard even when their backs were turned.

[2] The electroacoustic material consisted of concrete and electronic sounds creating a kind of a soundscape that introduces the audience into a subconscious world.

[3] As a result, the art of ancient acting centered around a performer's flexibility carrried out with the help of the masks and costumes which hid his own face and form from the audience's view.

[4] Mederic Collignon is a French jazz cornet player and excellent vocalist who uses a large palette of vocal techniques, from normal singing

birth to a novel score which explores the boundaries between the written and oral, the composition and the improvisation, the real and virtual voices proposing a new vocabulary on the tragic vocality.

2. Exploring polyvocality in "The? Bacchae»[5]

"Bacchae" by G.Spiropoulos (Ircam, 2010) is an homage to Xenakis, particularly for his works for solo voices or vocal ensembles which integrate idiomatic vocal writing such as *Aïs*, *Kassandra*, *N'Shima*, *Akanthos* and *Nuits*.[6]

On the traces of this vocal exploration of the ritual, the composer has started her journey on the search of the boundaries between Greek oral vocal tradition and compositon through *Klama* (Ircam, 2006) for mixed choir, live electronics & "audio documents[7].

In Bacchae she continues her research on the vocality in the ritual context of the Greek oral tradition and the tragical vocality through three different paths:

a)Rewriting special vocal techniques that are used in traditional rituals: the Greek fire rite of *Anastenaria* and the ritual lament of New Guinea and Solomon Islands

b) using contemporary theories on the integrative approach in general phonetic theory and the standardisation of descriptive terminology for the voice[8] [11][12]

c)exploring avant-garde vocal techniques such as those used by Demetrio Stratos and others.

"Bacchae" follows the narrative thread of the original text;[9] it is articulated in 7 parts (*Prolog, Episodes I-V, Exodos*) binded by 5 electroacoustic interludes (*Stasima*). (fig.1.the virtual score of Bacchae). Spiropoulos explores the idea of "polyvocality" in music and creates a highly virtuosic score where the performer interprets 4 different characters : Dionysos, Pentheus, Agave and the Messenger. Each character has by his own "mask" determined by three elements : the vocal mask (vocal type or phonation),the virtual mask (electronic or microphonic transformation), and the spatial point (the position on stage). The vocal mask is articulated through different "types of phonation" (vocal modes).

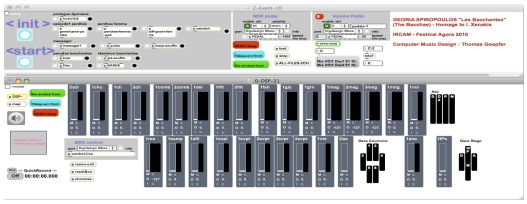


fig.1.The main patch (virtual score) of Bacchantes

The electronic masks generated with Max/Msp reinforce the vocal identity of each character and generates the Bacchae Chorus. [10]

---

to tuva multiphonic technics, scat singing, beatbox and aspirated singing.

[7] "Klama" has its roots in the death rituals, performed in the region of Mani, in south Peloponese. The meaning of the word "klama" is simultaneously "cry" and "ritual lament". It characterizes a polyphony encompassing improvised monodies (moiroloya), epodes, crying, screams and monologues, accompanied by ritual gestures. Due to its acoustic violence..... More at : www.georgiaspiropoulos.com/programnotes/klama.html

[9] The structure of Greek tragedy is based on dialogues and choral parts where chorus may comment on what has already been said.

[9] From an aural point of view in Cued Speech and sign languages, prosody involves the rhythm, length, and tenseness of gestures, mouthing, and facial expression.

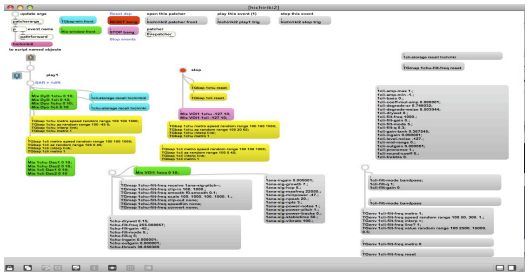
[10] The text fragments in french comes from the

3.Virtual masks in Max/Msp

In order to describe her work "inside of sound", Spiropoulos 3 types of *sound mask* : natural mask, virtual mask, and combined mask. The *natural mask* transforms the timbre through a vocal or instrumental technique ; the *virtual mask* transforms the timbre through electronic treatment, the microphone and the electromagnetic waves ; the *combined mask* is the simultaneous utilization of the natural and of the virtual mask.[11]

The function of the virtual mask, the vocal treatment by live electronics, is to reinforce the vocal identity of the characters and to generate the Bacchae chorus; it serves to modify the sound (timbre, pitch, density, loudness) and the temporality (duration, rhythm).[12]

In the following table one can see the three kind of masks of each character.



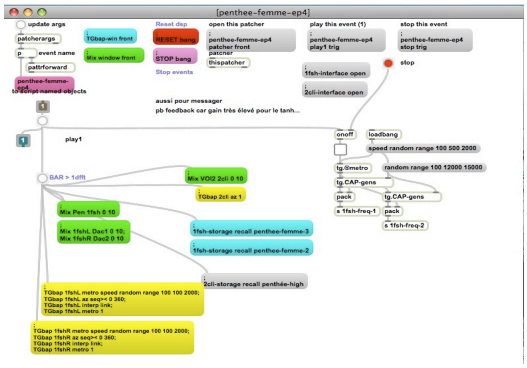


fig.2. Mask of Dionysos

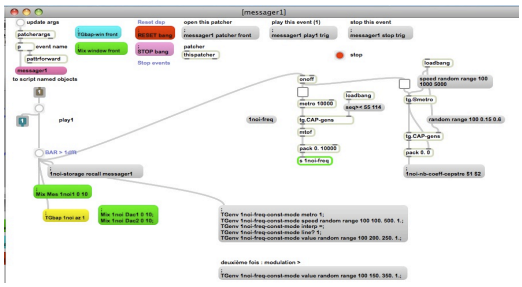


fig.3. mask of messenger

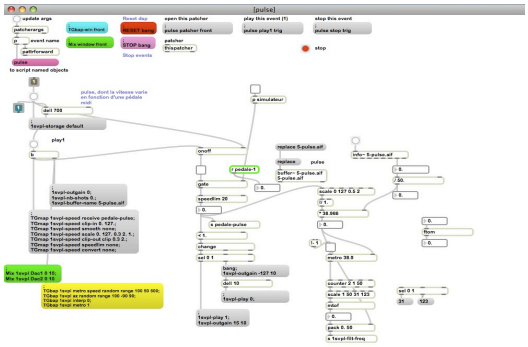


fig.4 Mask of Pentheus

---

translation by Jean and Mayotte Bollack.

[11] The composer borrows the idea of the mask in theatre and in ritual, and transposes it in the vocal and electronic writing as an element of acoustic identification or transformation of a character (or sound).

[12] Behind the idea of *mask*, there is not any descriptive function of a psychological, emotional or naturalistic portrait, this dimension being perfectly accomplished by the narratives.

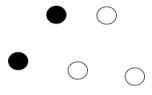
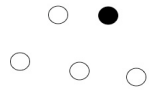
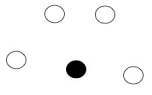
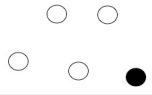
	NATURAL VOCAL MASK *type of phonation*	**VIRTUAL MASK** *Voice processing with Max/Msp controlled with a midi mixer*	**SPATIAL POSITION** *on stage*
DIONYSOS (God & Stranger)	tense voice (japanese hischiriki wind instrument like) falsetto voice whistle voice bisbigliando(different types)	clipping resonant filter whistle effect (ok)	
PENTHEUS	harsh aspirated voice (low) growl falsetto (as a woman)	comb filter spectral stretch freq shifting clipping	
THE MESSENGER	whispery voice breathy voice aspirated voice tense voice	cepstral noise granular synthesis pulse sound (controlled by midi pedal)	
AGAVE	tense aspirated voice falsetto harsh,aspirated falsetto creaky voiced	transposition stretching granular synthesis	
THE CHORUS (The Bacchae)	ELECTROACOUSTIC TAPE	clipping spectral stretch freq shifting time stretching granular synthesis convolution filtering	*6 Loudspeakers around the audience.*

Table.1: natural and virtual masks

4. Virtual Choirs and Max/Msp objects

α) Virtual choir on tape

The psychoirtrist[13]~ Max/Msp module has been used on the electroacoustic part to generate the virtual choir of the bacchants. Two different phonations of Dionysos give the material for the baccants choir: a tense voice singing a

[13] psychoirtrist~ transposes and delays a monophonic input multiple times with random variations obtaining a choir effect. Each voice has its own output.]

"li" at the very beggining of the work and a whistle expirated voice singing a "(h)a".

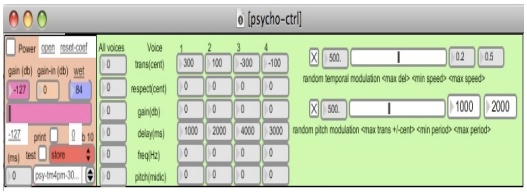


fig. 5 . Psychoiriste module

The psychoirtrist~ module is a psola (pitch-synchronous-overlap-analysis) choral harmonizer developed by Norbert Schnell at Ircam. Applying random temporal andpitch modulation parameters it is used to emulate a choir from the voice of one singer. It has been also used for the first section of "Klama" to create progressively a 4-voice virtual choir glissando texture between a given interval from a single repeated tone. [13]

b)**virtual choir live I**

Stasimon 3 - The Chorus (improvised on Pentheus microphone)[14]

All the stasima (the chorus parts) are purely electroacoustic except the third stasimon entirely improvised. In the third Stasimon the vocal mask of Dionysos becomes once again the bacchae chorus.Different types of live vocal sounds (whistle expirated or aspirated, sometimes transformed by the hand of the singer) has been digitally processed.

The vocal sounds are treated by four supervp.ring~ modules. The incoming sound is buffered in a ring buffer allowing for arbitrary scrubbing and thus varying the timing of a real-time stream as well as the transformations of pitch and timbre.

The module allows high quality pitch transposition, de/re-mixing of sinusoidal, noise and transitory components as well as spectral envelope transformations and cross-synthesis.

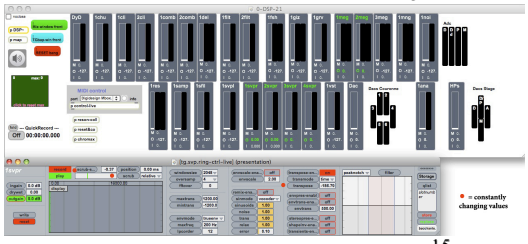


Fig. 6 Supervp.ring (stasimon 3)[15]

The supervp.ring~ module is part of the Phase vocoder Max/Msp external modules. These modules are enirely based on Axel Roebel's SuperVP also known as the calculation engine behind AudioSculpt.

c) Virtual choir live II:Agave's lament (becomes a mourner chorus) - Exodos[16]

At the end of the work (Exodos) Agave's lament is multiplied through the loudspeakers on stage and in the concert hall. The idea is to create an acoustic dissemination of the lament as we may find at the ritual laments.

Agave is moving slowly to the extreme edge of the stage. During this passage the voice is captured by three microphones at the middle of the stage and a mix of the three signals is treated by two Max/Msp modules used (l'un après l'autre) to create a mourner chorus: munger~ for granulation and gizmo~ (four times) for variable and

[14] *On patch and description: 1svpr, 2svpr, 3svpr, 4svpr > stretch for Agave (stasimon)*

[15] *http://imtr.ircam.fr/imtr/Max/MSP_externals*

[16] *On patch and description: ctrl 7, channel 7 : 1 mung, 1giz > granulation + transposition for Agave (stasimon)*

delayed transpositions.

The munger~ module is a granular synthesis object made by Luke Dubois that we use in order to emulate another kind of distortion. Various-sized grains of sound are taken from the signal and re-synthetized after adding small random time and pitch variations. ("KLAMA: The Voice from Oral Tradition in Death Rituals to a Work for Choir & Live Electronics", Georgia Spiropoulos, Benoît Meudic, SMC 2007).

The gizmo~ module is a frequency-domain pitch shifter working by analysing the frequency bins of an FFT'd signal, finding the peaks in the spectrum and shifting them along the frequency axis to transpose the sound. (doc in Max/Msp gizmo! help window).

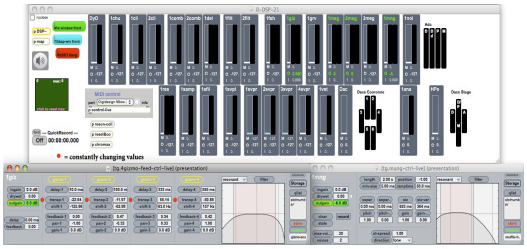


fig.5. Agave's modules

The Exodos ends with fragments of recorded ritual laments from New Guinea, Solomon Islands, Terra del Fuego, Pontus and a very short fragment by Demetrio Stratos.

Epilogue.

In this paper we have presented different virtual masks created by Max/Msp tools which explore the verbal and non verbal aspects of the tragic voice through different vocal techniques focusing into paralinguistic codes (tone,volume, breaths, aspiration, formants,clipping,whistling,etc).

Virtual masks are here introduced as virtual scores which register the timbral mutations from different oral ritual traditions through the prism of contemporary techniques and interactive media. Virtual choirs in different and real-time accomplish the ritual vocality and the electronic dramaturgy.

Aknowledgments

Thomas Goepfer (Computer Music Designer)

Maxime Le Saux (Sound engineer)

Mederic Collignon (Performer)

Arnaud Jung (Light designer)

References

1.Vovolis, Thanos and Giorgos Zamboulakis. *The Acoustical Mask of Greak Tragedy*, Didaskalia Vol. 7.1.

2.Georgaki, P. Velianitis: "Aspects of musical structure and functionality of electroacoustic media in the performance of ancient Greek tragedy A composers' point of view", *in CIM08proceedings*,Thessaloniki, Aristotle University 2008.

3.Charles, Daniel (1980). Thèses sur la voix. *la Voix, l'écoute,Traverses*, 20, Centre G. Pompidou.

4.Daverio, John (1999): The legacy of Greek antiquity as a stimulus for the musical avant-garde. In *Symposium proceedins of music and ancient Greek international metting in 1996 in the Eutopean cultural center of Delphi.* Athens: Livanis publishing, p.283-299.

5.Devine, A. M. & Stephens, L. D. (1994). *The Prosody of Greek Speech*. New York: Oxford.

6.Georgaki, Anastasia (2008). Allegories et mutations vocales au sein de la tragedie Grecque moderne a travers les oeuvres de Yannis Christou (1926-1971) et Michael Adamis(1929). In Giordano Ferrari, Harmattan (ed.) *«la voix dans la dramaturgie contemporaine »* (a apparaître)

7.Lohmann, Johannes (1989). *Mousiké et Logos*, Ed.T.E.R, Paris

8.Loraux, Nicolas (1999). *«La voix endeuillée », un essai sur la tragédie Grecque*. Paris : Gallimard.

9.Vaggopoulou, Evagelia.(2005) *The Universality of Xenakis' Oresteia*.Incicm.mshparisnord.org/ColloqueXenakis/papers/Vaggopoulou.pdf

10.Nicolas D'Allesandro, Raphael Sebbe, Baris Bozkurt, Thiery Dutoit, "MAXMBROLA: A MAX/MSP BROLA-BASED TOOL FOR REAL TIME SYNTHESIS", *Proceedings of the 13th European Signal Processing Conference*

(EuSiPCo'05), 2005.
11.Laver, John. Principles of phonetics. Cambridge UP, 1994. xxviii, 707pp. biblio 622-684. P221.L293
12.Ladefoged, Peter & Ian Maddiesen. The sounds of the world's languages. Oxford: Blackwell, 1996.
12.Gold, Bernard et al. Speech and audio signal processing: processing and perception of speech and music.....
13. Georgia Spiropoulos, Benoît Meudic,KLAMA: The Voice from Oral Tradition in Death Rituals to a Work for Choir & Live Electronics", in proeceedings SMC 2007, Lefkada.

Technical support

See the technical sound documentation :
http://brahms.ircam.fr/media/uploads/spiropoulos-georgia/les-bacchantes/2010-06-19/agora-2010/sound-technics/BACCHANTES.pdf
DM2000 memory save :
http://brahms.ircam.fr/media/uploads/spiropoulos-georgia/les-bacchantes/2010-06-19/agora-2010/sound-technics/BACCHANTES_MEDERIC_MANOURY.YSE

Videos of the opera

http://www.georgiaspiropoulos.com/works/bacchae_en.html#TEASER