

# Extended "Drama Prosodic Tools": Design And Aesthetics

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**Abstract.** In this article we present an interactive toolkit for the extended vocal performance of Attic tragic poetry in drama related to its prosodic aspects. We focus on the development of modules for the phonological articulation of the ancient text based on archeomusicological readings (related to music and language) in order to add aesthetic values to the modern performance of ancient Greek drama. These tools are based on prosodic elements (melodic, rhythmic) of the ancient text and are used to:

- a) detect the dynamic of the articulation, accent, pronunciation as well as the tonality/pitch of the actor's voice (recited or sung),
- b) track the movements and gestures of the performer and
- c) combine the data which is collected by the abovementioned processes (a and b) to trigger interactive sound and speech processing during the performance in order to reintroduce the prosodic aspects of voice in ancient drama.

**Keywords.** Prosodic interactive tools, prosodic models, Greek ancient drama, dynamic-frequency and gesture detection, pitch curve, Dialogues on Drama Tool, Aristoxenus Tool.

## 1 Introduction

In this project we present a modern approach of the phonological and metrical articulation of the ancient drama performance related to extended vocal techniques and interactive practices (developed in contemporary music and theatrical approach [Salzman, 2008]) in combination with theories developed since ancient times.

Voice interpretation in ancient drama could be examined in two ways: the phonological<sup>1</sup> one (in ancient Greek or modern Greek text) and the prosodic one [Allen, 1987]. In our case we focus on the examination of the prosody of the voice related to the melodic and rhythmic articulation, dynamic and timbre (spectral/sonic) deviation during *sprechgesang* (lyric recitation).

a) On the theoretical part we rely on ancient theories [West, 1992] in order to add aesthetic values on interactivity and programming. These theories deal with the dynamics, the accents, the duration of the syllables, the transition between words and the activation – through motion – of the dialogues of the ancient text<sup>2</sup>.

b) The engineering (technical) part has to do with the implementation of the detection of dynamics and pitch of the recited voice as well as capturing/tracking the actor's gestures. A special camera is used that detects the movement of the actor and activates – via the computer – his dialogue with the chorus.

c) The aesthetical part is defined by the artistic interventions through interactive technology, the prosodic and archeomusicological approaches.

## 2 Contemporary prosodic and vocal extended approaches in ancient drama

Since the beginning of the 20th century there has been a tendency to revive the ancient Greek drama, the emphasis being on metrics and rhythms of the text rather than the phonological and prosodic aspects of the voice. Since the first revival of the Delphic Festival by Eva and Angelos Sikelianos and composer Konstantinos Psachos in 1927, the prosodic features of the ancient text have been based on the Byzantine and the Greek folk tradition [Sikelianos, 1993].

Both Iannis Xenakis and Jani Christou composed music for ancient drama, however, each dealt with prosodic intonation according to his own individual style.

Xenakis developed a prosodic synthesis technique which affects the instrumental style of his music. This technique is based on the long and short syllables, the accents and pronunciation of the dialect of Attica<sup>3</sup> [Solomos, 2007]. Therefore he claims the existence of a rudimentary polyphony in the performance of works in antiquity, which he attempts to recreate and is also inspired by both the ancient music theory and the

<sup>1</sup> Unlike phonetics, which describes all possible sounds of human languages, phonology examines the relationships between phthongs/phonemes within the system of a particular language in a given period. Portal for the Greek language.

<sup>2</sup> For example, we use the ancient Greek grammatical theory for long and short syllables of the Greek ancient text:

Ἰὼ ἴτε βάκχαι,  
 —    ~    ~    ~  
 Τιῶλου χρυσορόου χλιδᾶ  
 — —    ~    ~    ~ —    ~

<sup>3</sup> Xenakis creates a table with the *Pronunciation of the phonetic text* in which he correlates the articulation of ancient Greek letters with that of the Latin characters/letters having the closest pronunciation.

harmony of Greek folk songs. Thus, in his score for Helen by Euripides<sup>4</sup>, one voice recites/sings in this strict prosodic manner, while the second voice is allowed greater melodic freedom, based on Greek traditional and Byzantine modes.

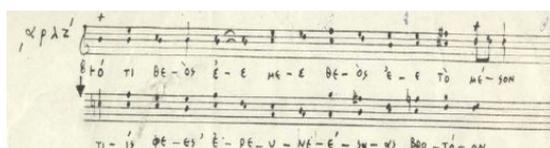


Fig. 1. Extract from the score for Helen by Xenakis.

According to Xenakis' instructions the pronunciation of words and syllables of the poetic text is not by recitation; therefore the text should be delivered without any emotion or expression, in a *recto tono* of voice, and without any variation in pitch or volume.

A similar approach can be found in the the use of *protypa* (patterns) which is a structural feature in the composition of Janis Christou [Lucciano, 1987]. These repeated rhythmic patterns, which are the components of the composition, structurally correspond to the phrases of a text.



Fig. 2. A sentence split into two (patterns): the first part is recited by the chorus and the second by the actor.

From past interactive performances<sup>5</sup> of ancient drama we will single out those of director Theodoros Terzopoulos, who has developed the *biodynamic method* [Decreus, 2016]. The concepts of ritual and physicality are very important for the director.

In the aesthetic approach of Terzopoulos, interactive audio systems are used for real-time processing through the actor's movement. His/her voice alters and controls the interactive system sound in real-time in order to add to the performance ritual and myth [Decreus, 2016].

We may also mention the work by composer Georgia Spyropoulos, *Les Bacchantes*, as an attempt to recreate the spirit of tragedy through vocal utterances, dance and interactive music interventions. The performer assumes all the roles and the voice simulates the sound which would have come through the mask worn by actors during the performances in antiquity [Spiropoulos, Georgaki, 2010].

Searching beyond the field of ancient tragedy with respect to the processing and manipulation of the human voice, which has some relevance to our own work as well,

<sup>4</sup> He applied the same model, in a more sophisticated form, to other works as well, mainly in the part of the Chorus, the most important being the *Oresteia*. <http://www.nt-archive.gr/>

<sup>5</sup> The most representative one being that of *Bacchae* (1986) by the theatre [theatre company] ATTIS, which was staged in many parts of the world.

the most interesting tools that we have found are those that have been developed for *Extending Opera*. [Unander-Scharin Carl, Thesis, 2011]. These tools, however, deal with timbre, tonal and dynamic expansion of the sound of the voice and not the rhythm and melody, which are drawn from the original text/logos. Opera and multimedia productions are suitable areas to find similarities with the ancient drama and its presentation.

What is new in our approach - is that we develop and shape our tools based on interactivity and theories from ancient Greek music theory and language. In this way we add aesthetic values on the vocal interpretation of actors and reinforce the scenic and sound dramaturgy by recalling the phonological and prosodic rules of the ancient text. For example, we lead the recitation of the text to a specific scale/mode in order to help the actor (who is not necessarily a musician) with the use of those ancient Greek scales/modes.

Our methodology is based on:

- a) Selecting the durations and accents of syllables of the original text in order to trigger rhythmic patterns which are based on rhythmic prosody,
- b) Directing the tone/pitch of the reciting voice according to the mode of an ancient scale and
- c) Activating/triggering of dialogues through the actor's gestures.

### 3 Design of extended "drama prosodic tools"

Two main interactive tools and functions are developed for the needs of this research: the *Aristoxenus Tool* and the *Ancient Dialogues on Drama Tool*. The first is based on the dynamic and tone/pitch detection voice processing and the second on the detection of the performer's movement and gestures.

a) *Aristoxenus Tool*: With this tool – reference to the pitch curve theory of Aristoxenus – we aim to extend the ending syllables of the ancient text in order to create continuity. This is achieved by freezing the last syllable related to the next. It can also be done in a tonal version by leading the frozen syllables into an ancient Greek mode.

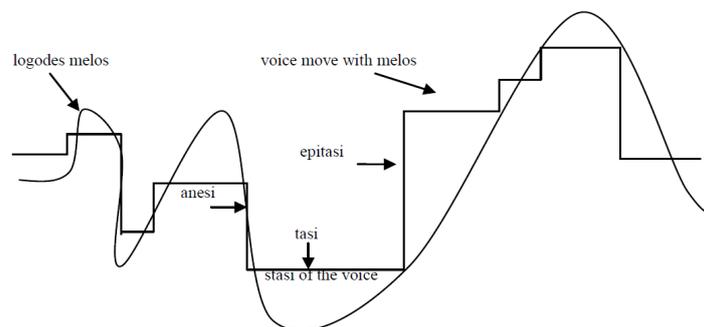


Fig. 3. The pitch curve of the *logodes melos* by Aristoxenus, which represents the movement of the voice while singing and speaking.

According to the theory there is a continuous undulation of the voice, moving from one pitch to another. When the voice pitch drops it is *anesis*, when it rises it is *epitasis*, and when it is stabilized at a specific pitch it is *tasis*. This tool identifies syllables, depending on their durations and accents via dynamic detection; we use the accents in order to trigger the freeze object. In this way we lead the sound - through programming - and direct it (going either up or down) to a particular mode/scale. Freeze creates an illusion of space, as the space does not exist (sense of depth, space in time, virtual space).

By using the dynamic detection for recognizing syllables while activating freeze the receiver direction tonicity produces a chord of 8 voices (chorusing) which are tuned to an ancient Greek mode. Thus, using the freezing technique and pitch direction the text is automatically set to music. Once again, the performer is free to use these tools by choice.

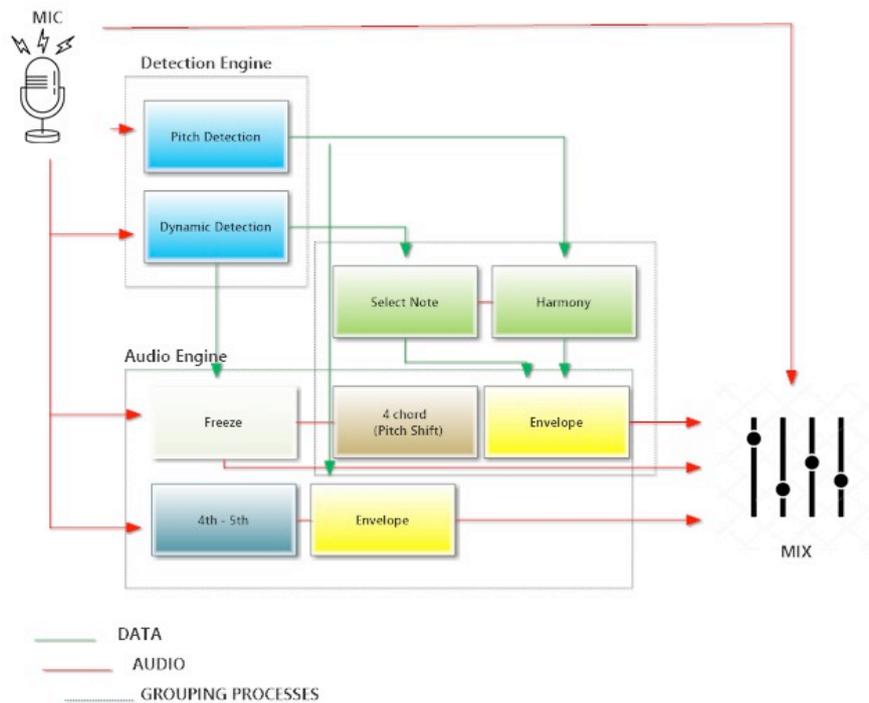


Fig. 4. The general design of the first tool.

In this layout/diagram we see the following: four audio out signals that end up in a mixer and shape the final result. The edits in each of the signals are different aiming at different sound qualities and based on organizing different parameters. All processes rely on the incoming voice signal assays which activate the audio responses and determine the interactive methods of the performance. The microphone signal is

input and undergoes three audio signal processings - *the freeze*, *the four-string (4chord)* and *the 4<sup>th</sup>s & 5<sup>th</sup>s*. The *freeze* processing produces the extension of syllables, the *4chord* produces tonal configuration and the *4<sup>th</sup>s & 5<sup>th</sup>s* harmonious intervals and resonances.

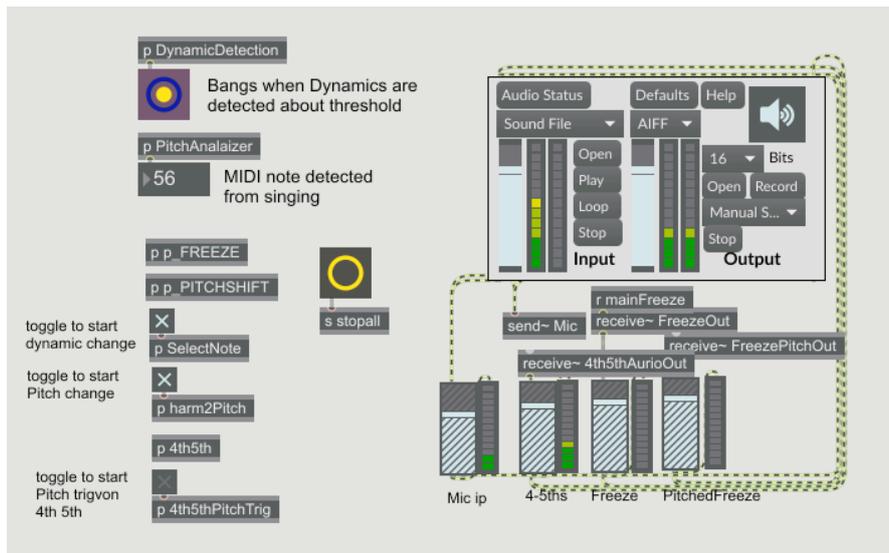


Fig. 5. The main patch of the AristoXenus Tool.

#### b) Ancient Dialogues on Drama Tool:

This system reproduces and activates dialogues and assists the performer to manage/direct/conduct the performance her/himself. In this way this tool makes a skeleton tracking data extraction via a camera sensor. The data format helps calculate the relative position of the body and its ends. A two-dimensional (2D) representation of the motion helps control the results, test the conditions and transfer the data to the sound engine.

This tool gives the liberty of gesture to the performer in order to activate dialogues by the computer (in this case the Chorus). The Chorus in ancient drama is always present and represents the people, the judge, etc. This tool recreates the dialogue between the actor and the Chorus. By extracting data<sup>6</sup> from the performance of the actor (which include his gesture, expression and rhythm), a *skeleton tracking* is performed to track multiple points of the human body. Limb data (data ends) are used and particularly the movement of the performer's legs, which triggers a series of samples which are extracts of Chorus' text. To achieve control a 3D space/environment was also created where the movement of the actor is tracked. In this way, the actor sets the pace of the

<sup>6</sup> The data is extracted using the camera extension for the Max/MSP, *dbkinect* plug in.

dialogue by playing his part by triggering the response of the Chorus whenever he wants. With his/her motions other sound parameters can easily be affected such as the speed of the speech of the Chorus, the pitch, rhythmic accompaniment etc.

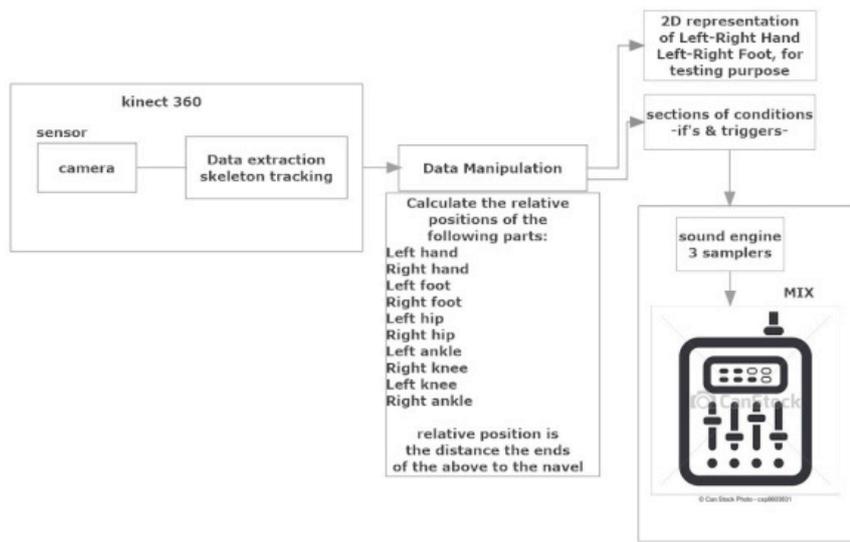


Fig. 6. The general design of the second tool.

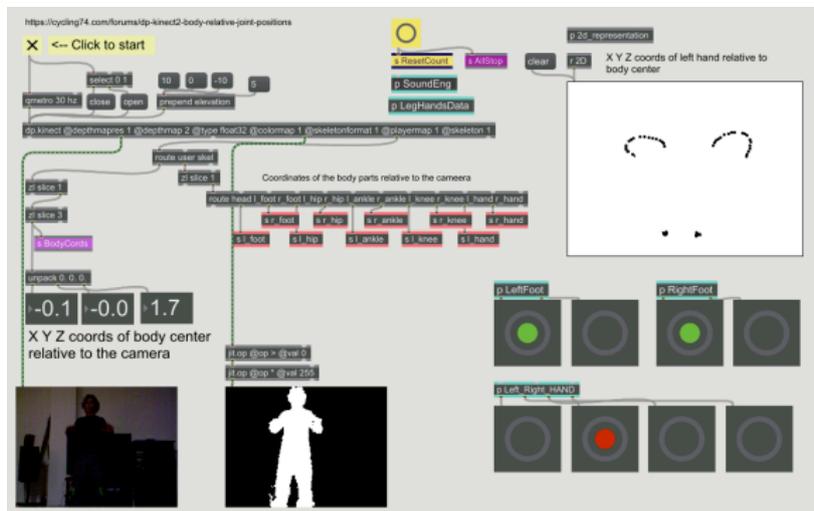


Fig. 7. The main patch of the Ancient Dialogues on Drama Tool.

In conclusion, these two tools can be used in different ways and have been tested by three different categories of performers: an actor, a singer, and an expert in ancient Greek prosody recitation. Each of them pronounced the text in a different way. These tools were tested in real time as their real purpose is to interact in a live performance. In this case the B-test of the tools with an actor is presented.

The results were:

The actor activated through her gestures the phrases of the text and created a “virtual dialogue”. This enabled dialogues where the actor intervened and influenced various parameters in her live or pre-recorded text. The main accent was on the elements of the prosody and the creation of rhythmic and melodic sequences which is part of the interpretation. Pre-recorded syllables of the text with their accents, their durations and their tonal directions were recalled and transformed in real time by the performer in order to recreate a virtual prosody. Also, by turning her movement into percussion sounds, she rhythmically accompanied all the dialogues and individual elements. In this way she was able to run/direct/conduct a performance on her own in many ways.



Fig. 8. The actor during the experimental testing of our tools and system.

## 4 Evaluation

The actor who has tested the system by using the two tools is an experienced performer of ancient drama. The impression she gained from this interactive experiment was a very rich and unprecedented experience. She felt a great release in the expression of the emotions caused by the dramaturgy of these works. The fact that she could make a dialogue with herself and lead in some way the evolution of the live performance by creating prosodical phrases and virtual choruses was a release from the shackles of the predetermined instructions of the writer and the director. She succeeded in choreographing, directing and composing the sound landscape of the performance through the elements of prosody that we used to design our system parameters. The improvisational and other practices recruited to test these systems were very different from the typical methods used so far to interpret ancient tragedy texts. The ability to shape the rhythm and the tone direction was very important for the dramatic process and the experiential approach of the performance.

Also, the users of the tools admitted that they understood the relationship between the interactive process and the theories we used to develop the parameters in the programming of the system. A similar evaluation was made by other users of the system as well as by those who just saw and listened to the performance.

## 5 Conclusions and perspectives

The extended Drama Prosodic tools offer a new aesthetic approach for interactive sound dramaturgy and reveal the prosodic characteristics of the ancient Greek text within a performance of ancient Greek drama. They also represent the state of dramaturgy and the rituality of the tragedy which, through interaction, can give emphasis and priority to these elements.

We do not interfere with the purpose of influencing the prosody but use its main features in order to add aesthetic value in the modern interpretation of the ancient Greek drama.

The functions of the tools are mainly:

a) The detection of the actor's dynamic and rhythmic patterns of speech in order to produce a continuous speech line that links one phrase to the next, which creates a sustained vocal sound stream. This continuous flow of speech can be tuned to various ancient Greek modes.

b) The creation of chorusing effect in real time. Thus the performer interacts with the tools in a continuous stream of speech where he can also acquire a tonal/pitch direction.

c) The control of prosodic dialogs (*Meliki/Melodic*) and vocal sounds during the live performance of the ancient drama. This can be achieved by the gestures of the performer which combine the movement of the body and speech. In this way we combine the prosody rhythm with the movement of the performer on stage.

The interactivity is based on the control of the dialogues by creating sound landscapes with the elements of the prosody. The syllable durations and their accents are of great importance for shaping the live performance through the voice process of the text. The difference is that in the second tool there is no dynamic detection, but detection of physical movement through the camera, shaping a stage action and an interactive practice.

This application is experimental and aims to broaden expressive features for the recitation of the ancient text with the use of interactive media. There is great interest in the use of this toolkit box by actors and performers who want to use it in live performances as it gives them the opportunity to perform in both languages (modern and Ancient Greek), extract the prosodic features and manipulate their voices real-time.

The combination of a classical discipline such as ancient drama with that of modern technologies and theories is very attractive and stimulates their/our imagination and creativity.

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