

Approaches to duo Electroacoustics

Introduction

In 2014 midyear I started thinking, reading and researching about the presence of technological interactivity in art. Particularly the human-computer relationship from a musical point of view denotes extensive unexplored fields. I decided then to begin a research about the liability and feasibility of the composition of a series of musical pieces for the two: performer and computer, where the interactivity between them would be structural.

After an entire term of investigation and talks with colleagues, I attained valuable information and abundantly justification to get involved with the idea and make it real. Contributions and positive thoughts became from professionals in music coming from different perspectives, culture and countries. These results encouraged me to begin working on the technical and musical structures of the futures pieces; as well as to create a software prototype where I would experiment and test the principal procedures that each piece of the series will follow.

On this paper I will present briefly the most important results attained during the research, the outline that will be used for the creation of each one of the pieces in the series and the musical organization that each piece will follow. Finally, I will present and explain the functioning of the software prototype I have created for testing purposes.

GOALS

Project general goals

- To be familiar and collect information, thoughts and necessities about the current situation of the new music available for solo instrument and real-time sound processing.
- To set the artistic and technological basis structures for the creation of a series of musical pieces for solo instrument and computer.
- To create a first software prototype and set the compositional procedures of the series to be used in each single piece.

- To begin composing the first piece, Duo 1: Baritone Saxophone and Computer.

Individual pieces goals

- To create pieces for solo instrument and computer, where the communication between performer and computer is permanent.
- To write the music under a performer's supervision to attain a piece that is performable in a medium-high level of instrument technical difficulty.
- To provide music that can be used with pedagogic purposes for instructors that teach new music and feel a lack of material that includes solo instrument and real-time sound processing.
- To require a small and easy-to-mount technological set-up among with a friendly graphical user interface.

RESEARCH

As explained on this course's summaries 3 and 4, an on-line survey has been released since mid-February 2015 to the moment. The main goal of this survey was to collect information about the actual situation of new music pieces for solo instrument and computer, as well as collecting personal opinions of instrument specialists about the future of this type of music.

To the moment, the results have been intriguing and encouraging: Professionals from North America, South America and Europe have filled up the survey providing valuable information about existing pieces, names of music composers working on the field that were unknown to me, and offering valuable individual opinions about how the future of this kind of musical works should be developed.

Following, I will share what has been highlighted by the majority of the responders and, therefore, an essential part of my work.

Technological strategies.

Since the beginning, it was my suspicion that the higher technological demand of a musical work, the more discouraging performers find the piece to be studied and performed. Large hardware set-ups tends to require extra personal and effort to make it happen, on top of that, the technicians involved have to be proficient in non-traditional sound systems set-ups. Likewise, as harder to manage a piece of software as more demand to the performer for increasing their knowledge in things no related with their musical practice, this situation generates apathy for some players that do not have the time or the desire to invest their time in non-musical issues. My reaction was then, to ask on the survey about this situation: what is their opinion about the technological demand a piece of new music should have. The results confirmed my suspect; simplicity in hardware set up and software use was mostly preferred.

Also, it was repeatedly mentioned that performers look for stability on software performing. They also prefer pieces that attain a strong aesthetical result aimed to musicality and composition than technology ostentatiousness. Finally, it was required that the score should be clearly displayed in both, specific notation and overall presentation.

Musical characteristics

I was wondering how to proceed for musical content on these works. Because these pieces will be created for the performers learning, growing and enjoyment was my idea to ask them about the treatment of the musical content, as a result I collected many crucial advices and opinions. Here are presented the most astounding.

Many times composers (like myself), create pieces of new music with an electronic content without having in mind the performers opinion about the processing of their sound. I started thinking about this and wondering if performers feel comfortable on how we process their timbre. I was surprised with some answers, many of them brought out this topic: Some players are not comfortable with the way some composers treat their sounds. Performers dedicate their live in acquiring a particular sound, polishing the texture and volume of their timbre up to the minimal detail, if the composer add layers of sound manipulation without been careful, their work get buried in a sea of noise. Because this project has been thought to be a pieces for two, I will respect the player timbre as more as I can, giving the computer a second player role, not a computational system to process live the sounds of the performer.

For having a real sensation of duo, the computer has to be an independent source of sound. The idea of looping a buffer containing material of the instrument (rhythmic or textural) seems to be overused for some composers, players are more attracted to perform with a computer that has its own timbral identity, exposing a variety of timbres that are characteristic of their capability. On top of all this, the composition has to maintain a positive coherency between the two sound sources.

Finally, I found the following advices crucial for the composition of my pieces: to have in consideration the level of expertise required to the performer, to obtain an instrument-electronic coherency, dialog and interaction; to expand the sense of instrument control and virtuosity by using computer capabilities; to provide clear instructions for music performing and hardware set up; to offer a system that gives the performer the chance of rehearsing under different environments and finally, to try to find an intriguing musical result that enhances a compelling experience for the performer and audience.

PIECES COMPOSITION

All the pieces in the series will be characterized musically and technologically as shown above. Also, to support this idea of unity between pieces, the compositional processes will be the same for all of them. For “compositional process” I mean the writing of the piece, the coding of the software, and the global outline of events where these processes will be completed.

To have a wider spectrum of possibilities and more pieces on the series to compose, I have decided to compose each piece for just one instrument at the time, this is effective specially for those instruments that are subdivided in families (saxophones, flutes, strings, and specially percussion, among others). Also, the focus on the instruments to compose will be extended by creating music for traditional, non-traditional, folk and any other kind of instruments, and even sounding elements not considered traditionally as musical instruments.

Generally speaking, the composition will be done in different stages before considered completed. Because at this point I am starting with the idea, and especially because I am not

completely familiar with the software I am using, a couple of revisions and extra work probably will be required.

As mentioned, these pieces are thought to be performed without many complications (from an instrument technical point of view, technological set up and software management). To acquire a clear system for music notation as well as a realistic level of technical difficulty I will be working aside with the performer to ask questions, request advices and review my writing. Also, I want to reach the heart of the instrument, to compose music that really makes use of those particularities that each musical instrument has, having the performer working with me will help on my way towards the soul of the instrument.

I have planned to follow a series of steps to create the piece, the outline looks as follows:

The meetings and procedures

There will be four meetings with the performer, in between meetings I will be doing my compositional processes:

1. *First meeting with the performer:* On the first meeting I will introduce to the performer the idea and ask questions about technics and personal approach to the instrument.
2. *First writing:* With the information collected I will write the piece on paper, I will compose both parts (instrument and computer part), no work on software yet, just working on rhythms, pitches collections, harmonies, textures and similar musical parameters for both.
3. *Second meeting with the performer:* I will bring to the performer a partially finished score to have him/her playing it. I will look for feedback on the technics requested, liability of performance and clarity on notation. Secondly I will request to play some clues fragments and record them.
4. *Second writing:* This is the time where I will arrange the score following the performer's feedback. Also I will begin coding following the paper score. I will use the recordings made on the second meeting to adjust and calibrate the software by playing them on a good quality speaker pointing towards the computer microphone simulating the instrument.

5. *Third meeting with the performer*: First we will review again the score to confirm that the fixed sections are now correct. Secondly we will give a general try to the electronics, testing the clarity of the score display on the computer screen but most importantly to test the software reactions' to the real instrument.
6. *Third writing*: Review and fix problems, finish the piece. A pdf version with the music for the performer will be sent by email for him/her to practice.
7. *Fourth meeting with the performer*: Run the complete piece a couple of times, measure the software reaction, take notes. Ask to the performer his/her opinion about the piece, how he/she feels the reaction of the computer to his/her playing. Take notes.
8. *Fourth writing (optional)*: If necessary, details will be fixed.
9. *Fifth meeting with the performer*: If changes were made, a last meeting will be arranged to confirm the overall success of the writing and coding.

All this meetings will be digitally documented on video, sound recordings and pictures when necessary. I have prepared an index card to keep track of every detail (fig. 1).

Fig 1: The index card to keep organized the collected material.

Piece number 1

I have started composing the first piece of the series. At this point I already have the first meeting with the performer (Allison Balcetis). Because the selected instrument is the saxophone I left the performer to choose which saxophone she prefers. We accorded to write a piece for baritone saxophone. I have her opinion and advices for start writing this piece as well as her favorite sounds. I will begin with the second step shortly.

Project: Approaches to duo Electroacoustics

Piece Nro _____

For _____ and computer.

Performer: _____

Composer: Nicolás Arnáez

Dates:

- 1st meeting: ____/____/____
- 2nd meeting: ____/____/____
- 3rd meeting: ____/____/____
- 4th meeting: ____/____/____
- 5th meeting: ____/____/____

Documentation digital files names (pictures, video recordings and paper notes will document meetings. Paper notes will be scanned and added to the digital files)

1st meeting:

2nd meeting:

3rd meeting:

4th meeting:

5th meeting:

PROTOTYPE

I have created a software prototype with the objective of learning how to manage my coding and how the processes on the computer will be organized. As a result of this experience, I got closely familiar with the software I am using to create the final computer program.

I find important to clarify that this prototype has been created with the idea of learning and deciding procedures; it is NOT a musical piece: the rhythms are plain and purposeless, the harmonies does not content any musical organization, the lyrics added are random, the sound coming from the computer part is plain and boring.

Finally, the person testing the prototype has to wear headphones to avoid feedback and to avoid false triggers on the computer program. Another option is to plug speakers aiming away to the computers' microphone.

This request will be also made for the pieces performances. To use an audio interface and a good quality microphone to improve results will be the performers' decision, it will be mandatory to use a couple of larger speakers/monitors for performance situations, which is the only requirement for hardware.

The software environment

The application I built needed to be able to handle the shown signal flow (Fig 2). The series computational application will be built using this signal flow, plus other features like a sound spacializator, a sound effects processor, etc.

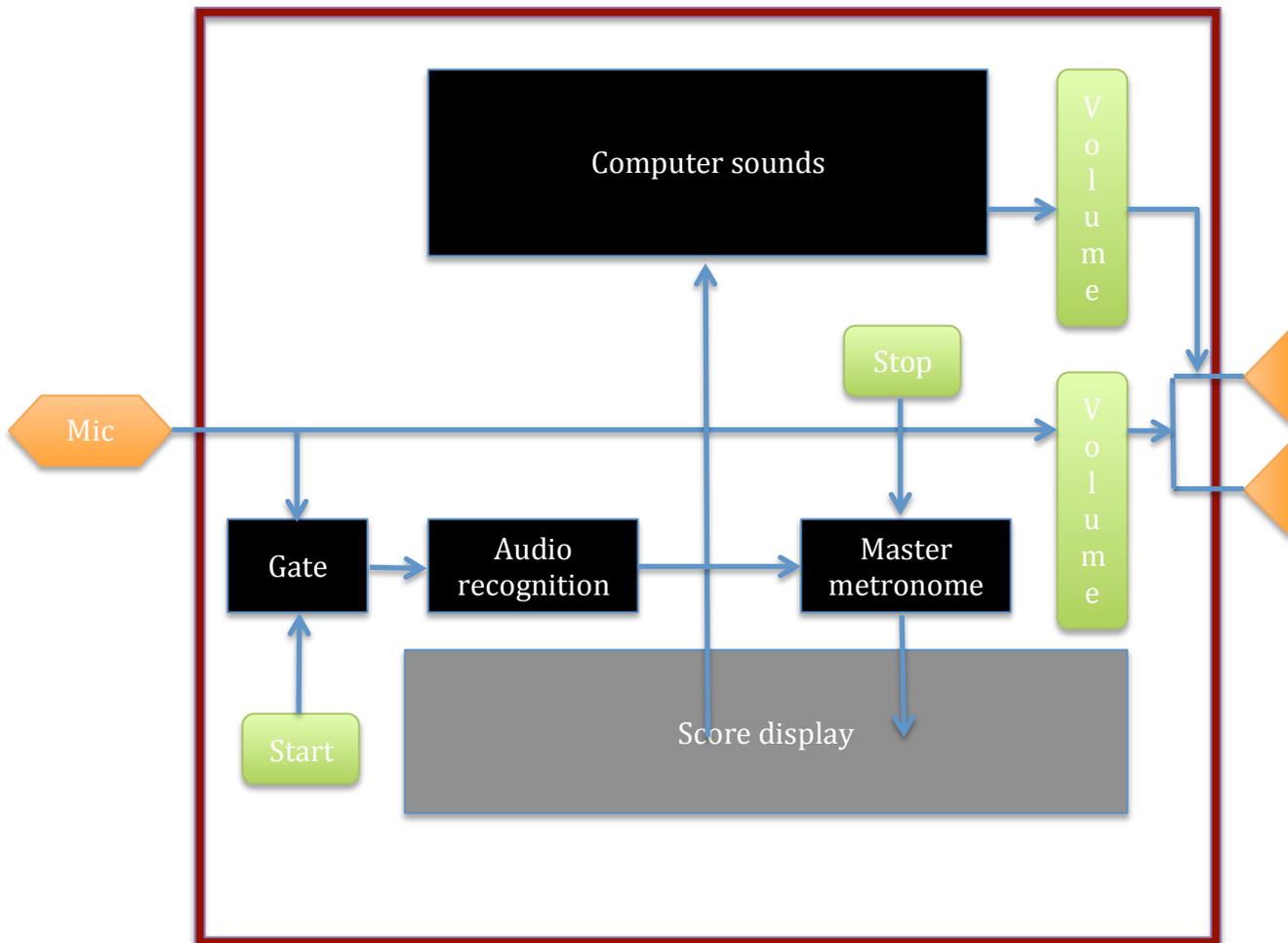


Fig 2: Signal flow of the prototype.

On Fig. 2, the orange elements represent the hardware required, the big dark red square represents the computer application, the black squares inside are the hidden-to-the-user elements, the green rectangles are the shown and changeable controls, the grey rectangle represents a shown element that does not offers capability of manipulation to the user.

As explained on the summary number 2 I have chosen to code my pieces on the graphic programming environment Max. For the computer audio recognition I decide to use the object analyzer~ created by Tristan Jehan. For the score display I found the Bach and Cage libraries extremely handy for this process. On the prototype, the computer sounding content is made by simple wave oscillators and audio synthesis processes.

It is important to mention that the software developed won't try to be a pitch recognizer nor a score follower. Basically what the application does is to display a score that shows to the performer two staves, one corresponding to the computer part and the other to

the performers part. This display scrolls ahead following a master metronome, here the performer has to follow the computer. There are strategic measures where the patch stops and waits for the performer to decide resume playing, this is shown as a fermata on the player staff, once the performer plays the indicated pitch as shown (articulation and dynamic) the patch starts the master metronome again and the score display start scrolling again.

The functioning and the interface

The prototype is presented by an easy-to-use user interface (fig 3). Is easy to recognize the signal flow chart explained above.

The app has some special features: on the top right of the interface an audio on/off switch is shown. Below this switch there is a white box that displays messages to inform the performer what to do. Below that we find the Start and Stop buttons, also we find a “Play reference pitch”: the tester can use the prototype by playing the music shown on the “Human” staff on any instrument or by singing, if decide to do it by signing the “Play reference pitch” button plays for few seconds the pitch that has to be sung for having the score running for the first time.

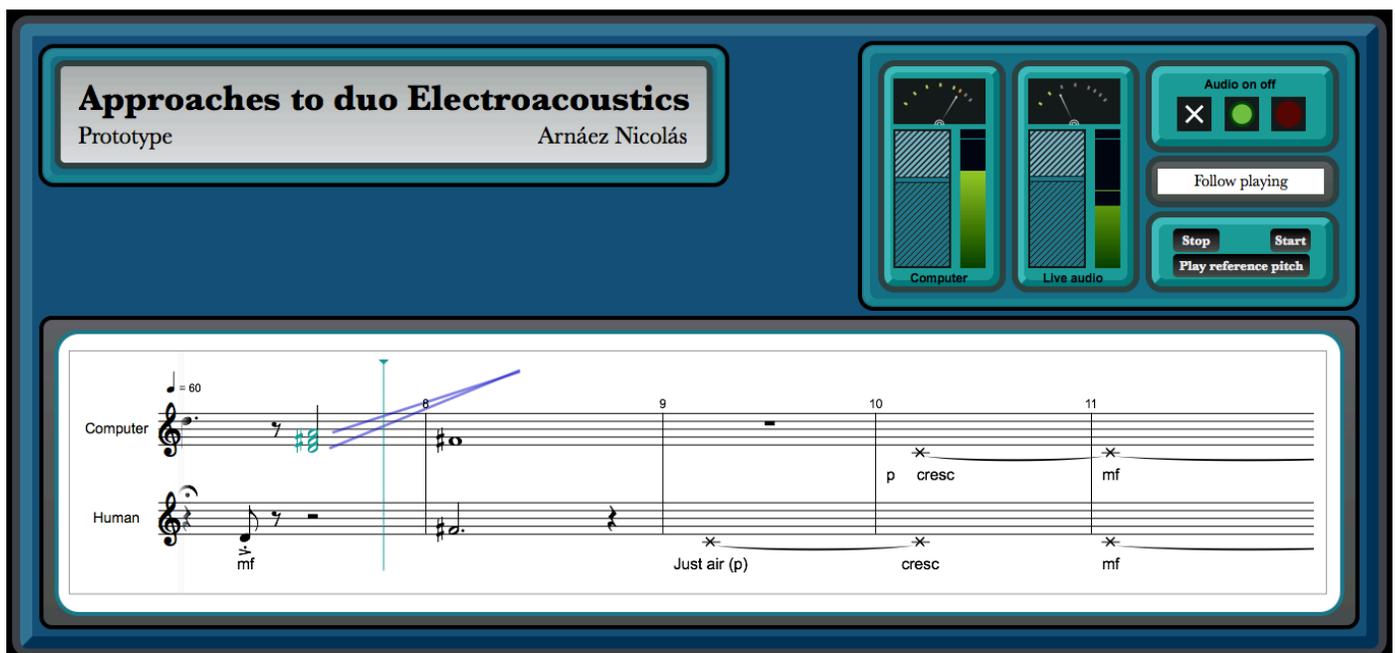


Fig 3: The prototype's user interface

The “score display” interacts with the performer by scrolling ahead following the master metronome. The master metronome is shown to the performer as a visual help: surrounding the Score Display a flashing short cyan color appears in every beat.

Notation is used as follows: traditional note heads means regular pitch, X note heads requires airy sounds, triangle note heads ask the performers to talk. Fermatas on the human staff makes the master metronome to pause, a yellow color flashes slowly on the score background while waiting to the performer to play the indicated pitch. The master metronome resume playing when the computer hears the pitch played with the intensity and articulation required.

The future of the patch:

The software developed for the real piece will use this basis plus some other features like:

- An intensity identifier that will measure the performers’ playing, this will affect the level of the computer part.
- Sometimes notation will offer to the performer freedom of choosing musical material, performers’ elections will affect the behavior and material on the computer part.
- Graphical notation will be implemented to have both: the performer deciding on what to play according to what the computer is playing, and having the computer deciding what to play according to what the performer is playing.
- The sound sources for the computer will be created by manipulating audio field-recordings, manipulated samples of the instrument, audio synthesis plus the addition of traditional audio effects, among others.