- Audible ideas for sound construction -

by

Rafael Romo-Tavizon

Faculty Advisor: Professor Ronald Kuivila

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Chapter 1

Orchestra and fixed media // Setnicso

Introduction.

This piece was a commission by the “Orquesta de Música de Cámara de Bellas Artes” of Mexico City. For the last two or three years I have been very interested in writing music for large ensembles and orchestra. However, in spite of my interest I never got the time to work on such a project.

Finally in August of 2012 I got an invitation to work on a new chamber orchestra piece. Since this was my very first orchestra commission I was quite excited and as soon as I replied announcing my acceptance in the project I started to imagine possible “sonic ideas” or potential segments and textures that could become the basis for the piece. On the other hand not everything was happiness. Due to a misleading communication (and a long tradition of nonsense bureaucracy) I ended up in a situation in which I had only three weeks to compose, edit, mix, have the parts printed and finally rush into three days of rehearsal immediately before the actual concert. In fact, for some days I thought that the project was canceled, but one day I received a call from the manager of the orchestra asking me the name of the piece, the duration, the specific instrumentation and a short description of the piece that was going to be printed out in the next two days. I provided all this information, with the exception of the program notes that I sent the next day, during the same call. Immediately after that conversation, the piece that I had not even started yet was already being shaped. In other words, it was clear that I wasn’t going to have enough time to work in the kind of meticulous way that I usually do.
In addition to that, the limited time for the orchestra to learn the piece and the fact that I wasn’t going to be available to assist in the rehearsals, were circumstances that were shaping the piece as well environmental conditions in which the composer works have always influenced the final result.

**Thoughts around the area.**

I decided that I was going to work on a string chamber orchestra piece with a fixed media component. Even though I had an ongoing interest in working with all the sections of the orchestra, it was quite clear that I had to narrow my mind and that I must try to move within a simpler mechanism in order to complete the piece and secure a strong performance. I also decided to adopt something of a “spectralist” approach. Spectral music has always got my attention. What I find fascinating about spectral music is that it not only breaks with the division between pitch and timbre, but also gives you a structure immediately.

Furthermore, what is even more fascinating is the idea of “Spectromorphology”, a term that was coined by the composer Denis Smalley in 1986. This is an approach in which structures and sound materials blends into one unit. It basically focuses on the spectrum of frequencies and their shaping in time. At the end, sound spectrum is perceived throughout time, and time is perceived as spectral motion.

It's easier to think about this idea inside the electroacoustic world, but it doesn't mean that it cannot be implemented with traditional instruments, specially with the string section of the orchestra, which is by far the most flexible section in terms of being available to play long sustain pitches that can be shifted without almost no interruptions, just like oscillators.
Nevertheless, there is something about spectral music that causes me a little bit of anxiety. It seems that most of the pieces that have been composed in this area concentrate on trying to reproduce a sound or a set of sounds that were previously studied throughout a spectral analysis. However, even though traditional acoustic instruments might be utilized in a spectro-morphological fashion, they all possess their own specific harmonic structure, making the reproduction of a spectrum (that it's not their own) absolutely impossible. Or it could be that the final goal is not the exact reproduction of a sound, but rather by trying to imitate a spectrum, the structure will keep the essence of the analyzed sound.

In my view – and I am sure that many composers have already done it- a more interesting approach to spectral music could rely on the utilization of the information given by the spectral analysis. That is to say that instead of trying to recreate a sound spectrum, the spectral information can determine other aspects of the piece, which might not be strictly related to pitch. Another interesting project would be to start looking at the natural harmonic structure of a particular set of acoustical instruments, and then assign them a synthesized sound that has similar spectral properties.

One of the most famous and beautiful pieces that have been done in this domain is Mortuos Plango, Vivos Voco for eight-channel tape (1980) by Jonathan Harvey. This was his very first work at IRCAM. The overall form of the piece is based on the spectrum of the Winchester Cathedral bell, which he recorded and then analyzed it through FFT (Fast Fourier Transformation) processes using a software called MUSIC V. The other sound material in the piece is a set of three recordings of his chorister son chanting the latin text inscribed on the bell. His son sang all the phonemes of the text separately, and Harvey constructed a short melody based on the spectrum pitches.
This is one of the pieces that changed the way I think about music. When I first listened to this piece I found very interesting the fact that when we listen to music, we don’t really decompose the spectrum, instead we hear pitch with timbre. But in this case I was hearing how the sounds were being unpacked into individual frequencies and how those frequencies were constructing the sounds again.

The pieces that I have composed have been developed throughout a combination of a variety of ideas, concerns, processes and tools, including the computer, but “Setnicso” is the first time where the computer played a central role in the compositional process.

I must mention that in my personal experience I have always had problems explaining what kind of role the computer plays in my music. This might be due to that the field of computer music that tends to be harder to understand is that in which the device is treated as a compositional tool (and not as a generator of sound material). There isn’t any other tool or instrument with the capacity to adapt itself to a specific composer's mind. One thing is clear, and that is computers increase the number of decisions for the composer to make. For instance, software where you design and build their functionality from scratch -such as SuperCollider- allow, if not encourage, composers to start a project with fewer preconceptions. I believe this is very important because the results of those initial decisions create a framework which already contains some of the composer’s aesthetics. Or as my professor of composition Ignacio Baca used to say; “Never start a piece sitting on a desk with staff paper in front of you”. Which could be equivalent to starting an electronic piece by opening a “Logic session”.
The composer Michael McNabb wrote:

- One of the most powerful innovations in the field of computer science in the last few year has been the introduction of object-oriented programming. This style of programming essentially removes the distinction between “program” and “data”. In their place one has “objects”: user-defined combinations of algorithms, information and memory. An object is an independent entity which can be interrogated, asked to perform a task or remember something, or even modified by the actions of other objects. Within this paradigm, programming computer become less like traditional programming and more like teaching.

Construction.

I decided to use some environmental recordings that I got not long time ago. They consisted of recordings of insects, mostly crickets, that I recorded at night from a couple of locations, such as trees and bushes around the University. What I found interesting about this drone sounds was that they seem to be a product of a synthesis processes. Then, I selected small fragments from the recordings that were “cleaner”, in the sense of not having too much interference from the environment. Afterwards, I analyzed this fragments using the software “Spear” into a full spectral history over time. Also, to reduce the huge amount of information that this process generates, I filtered the sounds by establishing a threshold of duration and amplitude. Moreover I transposed the partials to a range where string instruments are more comfortable to play. Finally I decided that the structure of the piece was going to be based on eight segments of different spectrums, where six of them were complete static. In other words, the partials of these segments don't change in time. On the other hand, the partials of the other two segments not only change in time, but also they are more dynamic, in the sense of having partials coming in and out.
It is possible to export the results of the analysis as a text file directly from “Spear”. Here you get when a partial starts, its frequency and its amplitude. The problem is that sounds are made of thousands of partials, and even though I had already filtered information by establishing amplitude and duration thresholds, I still got a couple of hundred partials. Therefore, it was clear that I needed to find a more efficient way of looking at this data. Here is where Supercollider comes into place, just by learning a couple of “objects” (inside the Supercollider world) I was able to organize all this data in simple lines. Suddenly I had for each partial in a readable way; when it starts, when it ends, its frequency (and its equivalence in MIDI) and its amplitude.

So for the first section of the piece, I transcribed this data into a score, where each performer plays different partials. Then, I played around with the drone segments, superimposing them and combining them in a very intuitive way. In the meantime some of the partials that were filtered out are being played simultaneously through a sound system, complementing the rest of the spectrums.

**Conclusion.**

I was quite happy with the final result of the piece. Something that I found interesting was the fact that the sound materials and the structure of the piece where united from the beginning to end. It was process where I wasn't working with the sound materials and the overall form as separate entities.
Chapter 2

Improvising with an electric guitar and SuperCollider

Introduction.

Improvisation has been an important factor in my music career. It has helped me to develop, among other things, a sense of directionality and temporality of events. I must say that even though I find it pleasant to work several months on a single piece in a meticulous and slow manner, where everyday I add and subtract sound material or ideas, there are some other musical abilities that can not be learned or experienced by working under this sort of isolated circumstance.

In general it seems to me that composers who have moved out of the studio and experienced the world of improvisation and live electronics have “something” that others don't. Many times while improvising I have ended up in sonic areas where I don't see how I would ever be able to get there by using refined compositional methods and intellectual decisions made in the studio.

I am also interested in the development of human-computer interfaces, which has been growing in the last years. These interfaces are divided into two categories. The first one is where the machine focuses on measuring or tracking physical action (like MIDI controllers do). While the second one concentrates on analyzing an incoming audio signal from an acoustic object (like an ordinary instrument) and then reacting in a preconceived way. My intentions for this improvisation-oriented piece was to develop an interface that combines these two categories.
Thoughts around the area.

There are two basic concepts that I took into consideration for this piece, that is the relationship between the terms “texture” and “gesture”. I have composed many pieces based on these concepts before, “separately” and together, but this time I wanted to explore them in an improvisational environment with an electroacoustic component that can be actively performed through a control interface.

I wanted to treat these terms so that they would act as a way to structure different improvisational strategies, that at the same time would collaborate in a multi-level experience that over time would display an overall form of the piece. At first sight, making a distinction between this two terms seems to be unnecessary because they are complete different. Nevertheless, I had the impression that I could find something else behind their standard definitions.

For instance;

- Actions that appear to have a specific objective could be seen as “gesture”.
- Gesture can also be seen as the employment of sonic energy that generates some sort of sonic consequence.
- A gesture could be seen as the result of a “sonic reaction”, which whatever triggered it might not be always obvious.
- On the other hand, internal conduct that receives energy from its inside structure and has the possibility to propagate or expand creating patterns, could be associated with the term “texture”.
- Once triggered, it follows its own behavior, having the possibility to alter the media or its surroundings where it has been deployed.
Or as Dennis Smalley says;

*Where gesture is interventionist, texture is laissez-faire; where gesture is occupied with growth and progress, texture is rapt in contemplation, where gesture presses forward, texture marks time; where gesture is carried by external shape, texture turns to internal activity; where gesture encourages higher-level focus, texture encourages lower-level focus. Texture finds its sources and connections in all like-minded activities experienced or observed as part of human existence.*

Texture and gesture always collaborate, sharing influence over the overall structure of music, although not always with the same proportion. In other words, some pieces seem to have an inclination towards one or the other.

**Construction.**

I wanted to create a piece with an element of live interaction and an element of physical control. Therefore I decided that I could have the computer analyzing the incoming audio signal of the guitar and reacting in a sort of way, while having the possibility of controlling certain aspects to specify different ways that the computer would react. After this, it seems natural to continue by looking at which elements of the piece were going to be analyzed and controlled. Then I started to wonder about the kind of procedures and methods in which the interface would operate. Suddenly I realized that by pondering about the structure of these systems I was actually engaging the piece from a very different perspective than I usually do. This computer music system approach allowed or even encouraged me to think differently about sound.
Moving to the patch, I wrote a Supercollider program that analyzes any pitch being produce by the guitar. Then, each time it detects incoming audio it plays a set of sine waves whose frequencies are determinate by the result of those analysis. Then, those sine waves are processed in a delay line with no interpolation and with two independent decay times. Finally, the resulting audio goes throughout an automated eight channel panner that diffuses the audio based on two parameters. In the speaker arrangement, the first parameter defines position, that is to say from which speaker would the audio be coming from. The second parameter defines the spread of a panning envelope, that is to say how many speakers would be active at a time. Now, in terms of what could be controlled with physical actions, in this case I decided to use a MIDI controller. The interface allows me to specify parameters such as; adding harmonics to the sine waves, modifying the delay time and the two decay times, and changing the rate for the position and the width in which the eight channel panner operates.

Now, coming back to the terms “Texture” and “gesture”. I started to wonder about gestural a sound I could get from a minimally gestural physical action. And the other way around, how could I trigger a sustained texture sound from a short gestural action. Musicians have been looking for hundreds of years ways to expand the range of sound expression; by modifying, inventing and making more precise older instruments, the production of sound have always been proportional to a physical action implemented and extended through mechanical devices. However, now in the digital era, and since the implementation el electricity and electronic technology in music applications, it is possible to break these relationships of physical gesture to object to sound. Substituting them with a wider ambit from which a new universe of possibilities has emerged. In this piece, I wished to explore some of those possibilities.
Conclusion.

First of all, I believe that the most important thing to consider when working on a piece where you create or program an specific “patch”, is to keep in mind that you must stop programming at some point and just focus on the music and what you can get from what you have, instead of endlessly trying to develop the perfect application.

There was a point where I forgot everything about the technical details so that I could concentrate on the piece itself. In other words, once I finished programming a “decent patch” I went directly to explore the whole interface together with the guitar and from there I just tried to see what it could provide musically. The actual performance of the piece was organized in a very intuitive way. I didn't even establish how long the performance was going to be, although I believe it was around the fourth teen minutes. I wanted to experience what Karlheinz Stockhausen described as intuitive music.

- There are certain abilities required in order to play this sort of music that I call intuitive music, that the traditional musician has never learned. He doesn't even have thought about. The most profound moments in musical interpretation and composition are those which are not the result of mental processes, are not derived from what we already know, nor are they simply deducible from what has happened in the past.
Chapter 3

Video Piece.

Introduction.

I have composed pieces that are based on many things, such as; the spectrum of a sound, environmental recordings, terms like directionality, and different types of information. For instance, few years ago, by counting everyday for a month the number of steps that I walked from my house to the school I made a piece that was based on the difference between the total amount of steps among the month (which by the way, even though I always walked through the same path, the number of steps I took was never the same).

These are just examples of what I call "excuses" to start a piece. For some reason that is beyond my understanding, starting a piece is by far the most difficult part in my creative process. However, once I find a suitable "excuse" I can work easily from there. In fact once I started working on a project I find more natural not only to develop that particular idea, but also somehow at this point the creation of new rules seems easier as well, and even, as I have done many times, I might just decide to stop following the initial "excuse" and direct the piece to a complete different direction.

My work in the visual arts started this way. I have worked on serval pieces, mostly for ensemble, using graphical methods for compositional purposes. I have found a lot of room for inspiration by creating and observing graphic pattern materials. However my graphics were always constrained by my ability to draw and my skill with pencil and ruler – which have never been really good. Therefore I thought that I could expand my visual imagination with the help of a computer.
Then, as soon as I started looking at different ways of creating and manipulating images, the video world almost immediately caught my attention. I look at it as way of creating new graphics and more complex patterns, but also, the fact that I could animate those graphics completely blew my mind.

**Thoughts around the area.**

Since the second half of the twentieth century, computers have gotten to a point where artists of many disciplines can take advantage of such technology. In addition to that, this has already become another subject to study for the artist. Consequently, this implies a need to learn and understand of how digital media and technology work, which has also become another distraction and even a source of frustration for many artist, which this is why I have decided to learn this at a peaceful rate.

Leaving behind the technological aspect for a moment, there is another aspect that I found interesting around this area. That is that as a composer many times, if not always, we are used to having control of every aspect of the music. For many composers, including myself, the more control over the final performance the better. This probably has to do with how we learn to make music. We have been told that we have to design an structure, a melodic motive, a functional harmony among other things. All these are decisions that the composer most take, but more importantly decisions that she or he most choose carefully.

So I got the idea from the composer John Cage, that instead of deciding every single aspect of a piece I could design a set of instructions that would describe possible performances of the same piece. This is the case with John Cage’s Cartridge Music (1960). In Cartridge Music John Cage established a set of instructions that the performers use to elaborate a performance.
Therefore, it could be said that this is not a composition in the usual sense, since every performance would be dramatically different. The piece can be performed by two to twenty people and the score is generated by the performers themselves using chance operations. In this case the composer designed a process by which events will occur, but he doesn't specify how the final results should be. For this reason, it could be said that the design of the process is deterministic, but every performance will be different. Moreover, by indicating that the objects (random physical objects that the performers choose) should be hit, scraped and amplified using phonograph cartridges, he is already describing which kind of sounds should be produced. So it is a mix of decisions where he definitely had an idea of how he wanted the piece to sound, but at the same time he was very cautious so that his decisions still leave a lot of room for sound exploration.

In my personal case I am interested in exploring this sort of methodology or ideology. Mainly because when I have an idea of how a piece should sound like, many times my own decisions have ended up affecting the piece itself. In other words I keep adding or subtracting so much that the original idea get lost.

**Construction.**

Originally I was looking for different ways of improving my compositional graphics, but suddenly I was amazed by the potential and the beautiful patterns that could be created by working with images in an algorithmic fashion. So I decided to animate those images and hopefully I would get new shapes and ideas for my compositions.

Using a software called “processing” I programmed a set of functions that describe different aspects of the final video. For instance, some of these functions establish the position of the objects in the screen, others the amount of objects and others the rate at which each object appears.
However, all of these functions need to be filled out with information, more specifically with numbers, only then, they would do their process and return a result.

I decided to use the spectral information from the orchestra piece, mainly because the enormous amount of information that was involved around the process of that piece. So I used some of this information to fix the behavior of the functions that are assigned a specific task, and that also have a random element. On the other hand I established the shapes that each function produces, but not their dimensions. Also, I established different types of limits, such as the duration of each section and therefore the total duration of the piece.

The final video is the result of patterns that emerge from the original shapes which behavior is controlled by a set of functions that can be fed with any kind of information. In the case of my recital, the functions were filled out with information from the orchestra piece.

**Conclusion.**

I am definitely moving towards this direction, I just started to explore the world of animation and algorithmic graphics, and I can clearly see the potential in this area. I am not aiming to become a visual artist or work under more elaborate video tendencies or aesthetics. In other words, my goal to continue exploring this field is strictly confined to compositional procedures and musical purposes.

Furthermore, I feel the necessity of making more pieces in this kind of way, where I don't take all the decisions myself. But this is not to avoid some sort of “responsibility” but rather to try to achieve different results and explore different areas.
Chapter 4

Multichannel fixed media pieces.

Introduction.

The first section of my recital was a combination of three different fixed media pieces. Two of them combine environmental recordings and synthesized sounds, while the other one was a reconfiguration of a piece that I did several years ago, in which the only sound material being used is a two second recording of a clock. Each piece was composed for a specific sound system configuration. The first one requires an eight channel sound system, the second one is in a standard stereo formant and the last one is in four channels. I have been interested in multichannel works for several years, but more importantly I have experienced many times the frustration and ineffectiveness of my own multichannel performances. What usually happens is that I would work in the studio and locate the speakers in the exact position that I want and from there composed a piece by designing the trajectory of the sounds and the position where they might rest for a specific time before moving again and so on. Then, the day of the performance, which of course is not in the studio, but in a concert hall, or any other space, almost none of my spacialization work is actually perceivable. This is just the beginning of the elaborate nightmare that it is working with multichannel arrangements. In many occasions I have showed up the day of the performance with my eight track piece, perfectly balanced and with an internal spatialization constituting an important aspect of the piece, to encounter all kinds of restrictions in the space, such as; speakers that can't be moved, the fact that there aren't enough cables (XLR or power extensions) to locate the speakers where I want, the use of completely different types of speakers among the sound system, the location of the mixer is in a position from where I can't distinguish anything of what is happening and many other problems.
Even when I have finished readjusting and negotiating with all these problems -usually a few minutes before the performance-, I realized that only a handful of people would sit in the spot where they can actually appreciate what took me several months of work. Sadly the only solution that I saw at that time was to stop working on multichannel pieces.

The truth is that composers have been concerned with all the problems that apply to the distribution of sound in the concert hall since the very first concert of musique concrete. However, it seems that most of the solutions rely too much on having a better technical support for these kind of performances, which is sort of an obvious answer that doesn't really help if you are not presenting your piece in one of those a specialized concert hall designed for multichannel diffusion.

But there are more approaches to multichannel works, which can be even more interesting than having sounds spinning around the audience. Ron Kuivila introduced me to the idea of sound diffusion, that is to say that instead of putting sounds at specific speakers or moving sounds from one speaker to the other, I could think about spatialization as a way to diffuse sound into the acoustic space. This means that I could try to activate different acoustic properties of an specific space, which would result in a stronger distinction of the outcoming audio sources. And only then I would be using the space to my advantage instead of fighting against it.
Thoughts around the area

Sound is affected by space, mainly by characteristics like; absorption, reflection, refraction and diffraction. But rather than working with these terms directly, what I find most interesting about incorporating this idea of sound diffusion into my work is that it is closer to how we actually experience sound in our everyday life. I am talking about the natural acoustics of different urban or geographical areas in which live. While before I was trying to impose an artificial environment into a space, now I am working on using the acoustical properties of the space to present my work. This opened the possibility of presenting the same piece and get different results by playing it in different places. So one exercise that I have been exploring is to play a piece, then rearrange the speaker configuration and play the same piece again and try to make it sound as different as possible.

Furthermore, if we keep in mind that according to the definition in Larousse, the acousmatics were initiates in the Pythagorean brotherhood, who were required to listen, in silence, to lectures delivered from behind a curtain so that the lecturer could not be seen. The word “acousmatic” refers to the comprehension of a sound without relation to its source.

I believe that sound diffusion actually contributes to the experience of any acousmatic concert more than any other multichannel approach. This in the sense that the audience not only don’t see the physical objects that created the sounds or that are associated with, but also through sound diffusion it’s harder to identify where those sounds are coming from.

Finally I can think about one more way of exploring the acoustical properties of a space. This is in Alvin Lucier's music. Alvin, rather than being interested in establishing a virtual space through the use of speakers, his approach concentrates in studying the acoustic characteristics of existing spaces, and then utilizes them to produce a piece. In the case of “I am sitting in a room” this is done by the process of natural resonant feedback of a room. I found this idea very interesting and I would like to explore this approach in the near future.
Construction.

These three pieces were composed under different circumstances and therefore they have different goals and were built in different manners. However they share some ideas and concerns. So rather than describing each piece in detail I will describe about what they have in common. I find this more interesting than describing the tedious work of editing all the sound fragments that these pieces are made of. I would only mention that the sound material was organized in a very intuitive way.

The sound material for these works is quite extensive, but it can be divided into three categories. The first one is made of relatively short sounds from recordings of objects such as bike bells, the thorn of a cactus, flock of birds, musical instruments, washing machines, light bulbs and others. The second category is made of environmental recordings. These sounds are relative longer than the ones from the first category. Among others I used recordings of; public places from different cities and countries, my nephew learning to speak, a presentation for a psychology class that an old friend did and a recording of applauses after a concert of classical music. The third category is made of synthesized sounds. The sounds from this category act as a sort of “Joker”. I would only go to create a synthesized sound when I need a sound with specific characteristics. Then it would probably be expanded into a more elaborate texture.

The main process that I followed to assemble sounds from the three categories into the actual piece was more of an idea rather than a specific procedure. I started by analyzing the environmental recordings, by “analyzing” I mean to just listen to them carefully. I realized that these recordings have sound objects as well, which are similar to the ones from the second category. For instance, starting with a recording of a restaurant that has tables outside, it is possible to hear, cars, people walking and talking, bikes, birds and an infinite amount of sounds. Then I gradually introduce sounds from the second category.
Then suddenly I have the recording of my friend giving his presentation, but more importantly I tried to make it sound as if it is part of the original environment. Finally I would try to recreate some sound objects through synthesis. In other words I would start adding synthesized sounds with similar characteristics of the “real” sound recordings, blending the two categories with the environmental recordings. From here the piece could take any direction, in some sections the synthesized sounds take over the other two categories and then it suddenly disappears again. There were so many decisions taken in the construction of these three pieces, but to be honest I don't remember many of them, which might be because the absence of any specific methodology. Therefore I will say that intuition was the main character of this multi-layer sonic drama.

**Conclusion.**

I am very satisfied with the result of these three pieces and my whole recital as well. In fact I was quite surprised that nothing went wrong during the performance, which is usually what happened in concerts where you rely so much on the unpredictable combination of hardware and software. I must say that the use of the Ipad as an spatialization device was pretty helpful not only during the performance but also as a tool to study the space. Finally I would like to add that as the twenty one century advance music would be heard everywhere, but also composers like myself would feel the necessity of “disorganize” sounds to achieve more interesting results, but what would be more important is to free the sound from any kind of preconception and aesthetic tendencies.
Appendix A

Score for Setnicso.

Orchestra and Fixed Media Piece.
"setnicso"

Rafael Romo-Tavizón

Instrumentation:
12 Violins
4 Violas
4 Cellos
2 Double basses

Performance Notes:
The conductor should use an stopwatch to synchronise the orchestra with the electronic part.
The times are at the top of every page.
The smaller numbers are approximate times while the bigger ones must be precise.

Sep/2012
Electronics...
\[
\begin{align*}
\text{VL I} &\quad \text{\textbullet} = 120 \\
\text{VL II} &\quad \text{\textbullet} = 120 \\
\text{VLA} &\quad \text{\textbullet} = 120 \\
\text{VLC} &\quad \text{\textbullet} = 120 \\
\text{CB} &\quad \text{\textbullet} = 120 \\
\end{align*}
\]
= tempo ad lib !!
Appendix B

SuperCollider Patch.

Improvising with an electric guitar and SuperCollider.
(SynthDef("palomaso", {
    numharm = 1, decay1 = 1, decay2 = 1, delay = 0.01, level = 1, pos = 0.01, width = 0.1
    var in, amp, freq, hasFreq, out, panner;
    in = Mix.new(SoundIn.ar(0));
    amp = Amplitude.kr(in, 0.05, 0.05);
    # freq, hasFreq = Pitch.kr(in, ampThreshold: 0.02, median: 7);
    out = Mix.new(Blip.ar(freq, numharm, amp));
    7.do(
        out = AllpassN.ar(out, 1, delay, [decay1, decay2])
    )
    panner = PanAz.ar(8, out, SinOsc.kr(pos).range(1, 15), level, SinOsc.kr(width).range(1, 8));
    Out.ar([0, 1, 2, 3, 4, 5, 6, 7], panner)
}).add)
~electric = Synth("palomaso")

/// MIDI
MIDIClient.init;
MIDIIn.connectAll;
MIDIdef.cc(test1, {arg ...args; args.postln}, nil);
MIDIdef.cc(test1).free;
MIDIdef.freeAll
{
    /// Guitarra_1
    MIDIdef.cc(num_harm,
        {arg val, num, chan, scr;
         ~electric.set(numharm, val.linlin(0, 127, 1, 20)).postln}, 42)
    ;
    MIDIdef.cc(decay_1,
        {arg val, num, chan, scr;
         ~electric.set(decay1, val.linlin(0, 127, 0.01, 10)).postln}, 43)
    ;
    MIDIdef.cc(decay_2,
        {arg val, num, chan, scr;
         ~electric.set(decay2, val.linlin(0, 127, 0.01, 10)).postln}, 50)
    ;
    MIDIdef.cc(delay,
        {arg val, num, chan, scr;
         ~electric.set(delay, val.linlin(0, 127, 0.01, 0.1)).postln}, 51)
    ;
    MIDIdef.cc(level_electric,
        {arg val, num, chan, scr;
         ~electric.set(level, val.linlin(0, 127, 0, 1)).postln}, 13)
    ;
    MIDIdef.cc(electric_pos,
        {arg val, num, chan, scr;
         ~electric.set('pos', val.linlin(0, 127, 0.01, 5)).postln}, 55)
    ;
    MIDIdef.cc(electric_width,
        {arg val, num, chan, scr;
         ~electric.set('width', val.linlin(0, 127, 0.1, 3)).postln}, 65)
    ;
})
Appendix C

Examples of Algorithmic Graphics

and Handmade Graphics
Appendix D

Processing Patch.

Video Piece.
// Patch 1

void setup(){
    size(1440,900);
    smooth();
    noFill();
    strokeWeight(1);
    frameRate(500);
    background(255);
    stroke(0,10);
}
void draw() {
    int n = 20;
    float[] xTop = new float[n];
    float[] xBottom = new float[n];
    for (int i = 0; i < n; i++)
    {
        xTop[i] = random (10,1440);
        xBottom[i] = random (10, 1440);
        line(xTop[i], 10, xBottom[i], 850);
    }
    saveFrame("lines-####.jpg");
}

// Patch 2

color[] colors = {#FFFFFF, #030303,#A6C49C, #7EA571, #467C34};
color[] palette = colors;
int s = 3;
void setup(){
    size(1440, 900);
    background(0);
    smooth();
    // noStroke();
    frameRate(201);
    for(int x = 0; x < width; x += s){
        for(int y = 0; y < height; y += s) {

    }
void draw()
{
    fill(palette[int(random(1, 5))]);
    int x = int(random(width/s))*s;
    int y = int(random(height/s))*s;
    rect(x, y, s, s);
}

void setup()
{
    size(1440,900);
    smooth();
    noFill();
    strokeWeight(5);
    frameRate(201);
    background(255);
}

void draw()
{
    float x = random(width);
    float y = random(height);
    float d = random(3,10);
    // stroke(random(255),random(255),random(255));
    ellipse(x,y,d,d);
}
Appendix E

SuperCollider Patch.

Fixed Media Works.
ExML

{~channel_1 = Buffer.cueSoundFile(s, "/Users/rafaelromo-tavizon/Desktop/Recital/FIX MEDIA/chnnels/This 1.wav", 0, 1);
~channel_2 = Buffer.cueSoundFile(s, "/Users/rafaelromo-tavizon/Desktop/Recital/FIX MEDIA/chnnels/This 2.wav", 0, 1);
~channel_3 = Buffer.cueSoundFile(s, "/Users/rafaelromo-tavigon/Desktop/Recital/FIX MEDIA/chnnels/This 3.wav", 0, 1);
~channel_4 = Buffer.cueSoundFile(s, "/Users/rafaelromo-tavigon/Desktop/Recital/FIX MEDIA/chnnels/This 4.wav", 0, 1);
~channel_5 = Buffer.cueSoundFile(s, "/Users/rafaelromo-tavigon/Desktop/Recital/FIX MEDIA/chnnels/This 5.wav", 0, 1);
~channel_6 = Buffer.cueSoundFile(s, "/Users/rafaelromo-tavigon/Desktop/Recital/FIX MEDIA/chnnels/This 6.wav", 0, 1);
~channel_7 = Buffer.cueSoundFile(s, "/Users/rafaelromo-tavigon/Desktop/Recital/FIX MEDIA/chnnels/This 7.wav", 0, 1);
~channel_8 = Buffer.cueSoundFile(s, "/Users/rafaelromo-tavigon/Desktop/Recital/FIX MEDIA/chnnels/This 8.wav", 0, 1);
}

---

// channel 1

```
SynthDef(channel_1, {
  |pos= 0, width=7, level=1|
  var audio, panner;
  audio = DiskIn.ar(1, ~channel_1.bufnum);
  panner = PanAz.ar(8, audio, pos, level, width, orientation:4);
  Out.ar(0, panner);
})
```

---

//a = Synth(channel_1)
//a.free

---

// channel 2

```
SynthDef(channel_2, {
  |pos= 0, width=7, level=1|
  var audio, panner;
  audio = DiskIn.ar(1, ~channel_2.bufnum);
  panner = PanAz.ar(8, audio, pos, level, width, orientation:4);
  Out.ar(0, panner);
})
```

---

//b = Synth(channel_2)
//b.free

---

// channel 3

```
SynthDef(channel_3, {
  |pos= 0, width=7, level=1|
  var audio, panner;
  audio = DiskIn.ar(1, ~channel_3.bufnum);
  panner = PanAz.ar(8, audio, pos, level, width, orientation:4);
  Out.ar(0, panner);
})
```

---

//c = Synth(channel_3)
//c.free

---

// channel 4

```
SynthDef(channel_4, {
```
var audio, paner;
audio = DiskIn.ar(1, ~channel_4.bufnum);
paner = PanAz.ar(8, audio, pos, level, width, orientation: 4);
Out.ar(0, paner);
}
}.add

//d = Synth(channel_4)
//d.free

/// channel 5
 SynthDef(channel_5,
{
    var audio, paner;
    audio = DiskIn.ar(1, ~channel_5.bufnum);
    paner = PanAz.ar(8, audio, pos, level, width, orientation: 4);
    Out.ar(0, paner);
}
).add

//e = Synth(channel_5)
//e.free

/// channel 6
 SynthDef(channel_6,
{
    var audio, paner;
    audio = DiskIn.ar(1, ~channel_6.bufnum);
    paner = PanAz.ar(8, audio, pos, level, width, orientation: 4);
    Out.ar(0, paner);
}
).add

//f = Synth(channel_6)
//f.free

/// channel 7
 SynthDef(channel_7,
{
    var audio, paner;
    audio = DiskIn.ar(1, ~channel_7.bufnum);
    paner = PanAz.ar(8, audio, pos, level, width, orientation: 4);
    Out.ar(0, paner);
}
).add

//g = Synth(channel_7)
//g.free

/// channel 8
 SynthDef(channel_8,
{
    var audio, paner;
    audio = DiskIn.ar(1, ~channel_8.bufnum);
    paner = PanAz.ar(8, audio, pos, level, width, orientation: 4);
    Out.ar(0, paner);
}
).add

//h = Synth(channel_8)
//h.free

} s.scope

/// master

a = Synth(channel_1);
b = Synth(channel_2);
c = Synth(channel_3);
d = Synth(channel_4);
e = Synth(channel_5);
f = Synth(channel_6);
g = Synth(channel_7);
h=Synth('channel_8);

///// MIDI
MIDIClient.init;
MIDIn.connectAll;
MIDIdef.cc('test1', (arg ...args; args.postln), nil);
MIDIdef.cc('test1').free;
MIDIdef.freeAll

///// channel_1

MIDIdef.cc('width1',

\{
{arg val, num, chan, scr;
    a.set('width',val.linlin(0,127,9,0)).postln),49)
\}

MIDIdef.cc('pos1',

\{
{arg val, num, chan, scr;
    a.set('pos',val.linlin(0,127,-1,1)).postln),50)
\}

///// channel_2

MIDIdef.cc('width2',

\{
{arg val, num, chan, scr;
    b.set('width',val.linlin(0,127,9,0)).postln),45)
\}

MIDIdef.cc('pos2',

\{
{arg val, num, chan, scr;
    b.set('pos',val.linlin(0,127,-1,1)).postln),46)
\}

///// channel_3

MIDIdef.cc('width3',

\{
{arg val, num, chan, scr;
    c.set('width',val.linlin(0,127,9,0)).postln),41)
\}

MIDIdef.cc('pos3',

\{
{arg val, num, chan, scr;
    c.set('pos',val.linlin(0,127,-1,1)).postln),42)
\}

///// channel_4

MIDIdef.cc('width4',

\{
{arg val, num, chan, scr;
    d.set('width',val.linlin(0,127,9,0)).postln),37)
\}

MIDIdef.cc('pos4',

\{
{arg val, num, chan, scr;
    d.set('pos',val.linlin(0,127,-1,1)).postln),38)
\}

///// channel_5

MIDIdef.cc('width5',

\{
{arg val, num, chan, scr;
    e.set('width',val.linlin(0,127,9,0)).postln),51)
\}

MIDIdef.cc('pos5',

\{
{arg val, num, chan, scr;
    e.set('pos',val.linlin(0,127,-1,1)).postln),52)
\}

///// channel_6

MIDIdef.cc('width6',

\{
{arg val, num, chan, scr;
    f.set('width',val.linlin(0,127,9,0)).postln),47)
\}

MIDIdef.cc('pos6',

\{
{arg val, num, chan, scr;
    f.set('pos',val.linlin(0,127,-1,1)).postln),48)
\}

///// channel_7

MIDIdef.cc('width7',

\{
{arg val, num, chan, scr;
    g.set('width',val.linlin(0,127,9,0)).postln),43)
\}

MIDIdef.cc('pos7',

\{
{arg val, num, chan, scr;
    g.set('pos',val.linlin(0,127,-1,1)).postln),44)
\}
/// channel 8
MIDIdef.cc(width8,
    { arg val, num, chan, scr;
      h.set(width, val.linlin(0,127,9,0)).postln},39);

MIDIdef.cc(pos8,
    { arg val, num, chan, scr;
      h.set(pos, val.linlin(0,127,-1,1)).postln},40);

/// Master
MIDIdef.cc(master,
    { arg val, num, chan, scr;
      a.set(level, val.linlin(0,127,0,1));
      b.set(level, val.linlin(0,127,0,1));
      c.set(level, val.linlin(0,127,0,1));
      d.set(level, val.linlin(0,127,0,1));
      e.set(level, val.linlin(0,127,0,1));
      f.set(level, val.linlin(0,127,0,1));
      g.set(level, val.linlin(0,127,0,1));
      h.set(level, val.linlin(0,127,0,1));
    },2);
)