Revista Vórtex | Vortex Music Journal | ISSN 2317–9937 | http://vortex.unespar.edu.br/
D.O.I.: https://doi.org/10.33871/23179937.2020.8.3.1.10

The Guitar as a Laboratory for Experimentation

Camilo A. Mendez San Juan

Hong Kong Baptist University | Hong Kong SAR

Abstract: In this article, I will discuss the role of the electric guitar in the conception, development and composition of three recent works: *Recessional Motion*, *Flexidra IV*, and *Volpi/Formentera*. In *Recessional Motion*, I will address compositional, technical and notational issues to explain the underlying creative process. In *Flexidra IV*, all the pre-compositional materials were the result of extensive experimentation sessions with electric guitars, pedals and found objects that subsequently were extrapolated to other instruments to generate the instrumental textures. In *Volpi/Formentera*, the electric guitar is at the centre of the compositional processes and all the musical parameters orbit around it. I will examine in detail how the different preparations and instrumental textures were derived from my own 'exploratory sessions' presenting possible solutions to notate the necessary actions to produce the sounds in the guitar.

Keywords: electric guitar, prepared instruments, extended techniques, notation, compositional techniques.

Received on: August 27th, 2020. Approved on: October 31st, 2020. Online available on: December 15th, 2020. Guest-Editor: Dr. Humberto Amorim. Editor-in-chief: Dr. Felipe de Almeida Ribeiro.

My compositional approach is based on the idea of composing musical cycles: series of works composed using the same musical ideas; but scored for different instrumental combinations (ranging from solo to large ensembles), using prepared musical instruments (understood as musical instruments that have been altered using extrinsic objects to modify their timbre). Conceptually, I refer to these instruments as '*impossible objects*.'

In recent years, I have been working intermittently in three compositional cycles: Fragmentos Cardinales (Eng. Cardinal Fragments)[1], BURSZTYN and Archipelago Sierpinski. In this article, I will discuss the role the electric guitar has played in the conception, development and composition of three (3) works of these cycles: *Recessional Motion* for electric guitar and ensemble (MENDEZ, 2013), *Flexidra IV* for prepared ensemble (MENDEZ, 2015), and *Volpi/Formentera* for prepared bass clarinet and prepared electric guitar (MENDEZ, 2017).

Fragmentos Cardinales is a compositional cycle inspired by scientific ideas, concepts and theories. Each work of this cycle is also based on a fragment of a work by a Colombian composer that I admire (MENDEZ, 2016, p. 14-17). The first work was inspired by the Law of Conservation of Angular Momentum[2] and the work *Dialogo en Simetrías Móviles* for prepared piano and harpsichord by Catalina Peralta C. (1963) (GARCIA and PERALTA, 2009); the second by Pulsars/Neutron Stars[3] (SKUSE, 2019) and the work *Quattuor Verba* for string quartet by Carolina Noguera Palau (1978) (NOGUERA, 2006); the third by the Torsional Pendulum Experiment[4] and the work *Archipiélago de la Esperanza* for viola and cello by Rodolfo Acosta (1970) (ACOSTA, 2006); the fourth by the Apparent Magnitudes Scale[5] (HUBBLE, 1958, p. 9) and the work *Trópico de Capricornio* for solo cello by Guillermo Rendón (1935) (RENDON, 2005); and the fifth by the Recessional Motion of Galaxies[6] (RECER, 1999) and the work *Doce Móviles* for chamber ensemble by Jacqueline Nova Sondag (1935-75) (PARASKEVAÍDIS, 2000). The structure of the fourth (*Apparent Magnitudes*) and the fifth (*Recessional Motion*) works is modular, they are conceived as collections of self-contained and independent miniatures that can be performed in any order, but

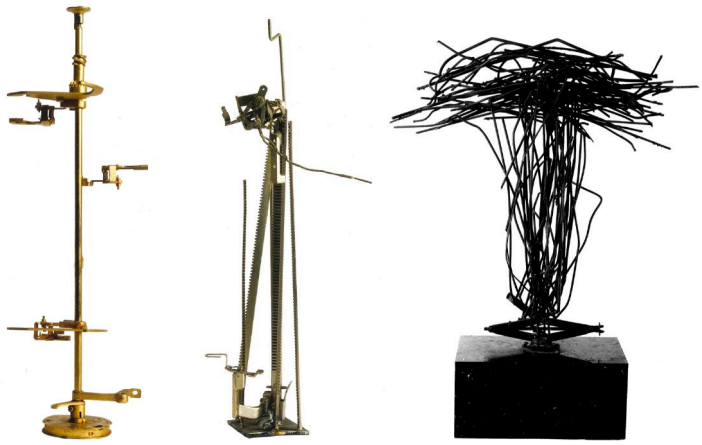
[1] All translations are my own unless otherwise indicated.
[2] This law states that when no external forces act on an object, no change of Angular Momentum will occur.
[3] In 1967 English scientist Jocelyn Bell-Burnell (1943) discovered Pulsars, a specific type of Neutron Star.
[4] The Torsional Pendulum Experiment was designed to determine the characteristics of freely decaying polymers.
[5] Apparent Magnitudes is a scale to measure the brightness of celestial objects.
[6] American astronomer Vera Rubin (1928-2016) discovered that galaxies are moving away from each other faster than predicted.

always as single movements, hence these pieces must be performed *attacca*.

In *Recessional Motion*, I will address compositional, technical and notational issues to explain the underlying creative process and its relationship with the electric guitar.

The cycle BURSZTYN is inspired by the work of Colombian artist Feliza Bursztyn (1933-82), specifically, two series of sculptures (Fig. 1): *Minimáquina* (Eng. Tiny machines), and *Flexidra*; which is the combination of the verb to flex with the word clepsydra (an ancient device to measure the passing of time using flowing water). Bursztyn's works interested me due to the fact that her sculptures are assembled (welded) using unconventional (discarded) materials: washers, gears, ferrules, valves and elastic springs amongst many other mechanical components (LEYVA et al., 2009). In her sculptures is possible to distinguish each component, but they are rearranged and reassembled (or reimagined) in such a way that they do not work as they supposed to; and on the contrary, they have been transformed into '*impossible objects*' that reminds us of their functional past (TRABA, 1986, p. 25; McDaniel Tarver, 2013).

FIGURE 1 – *Minimaquinas* and *Flexidra*.



LEYVA, et al. (2009, p. 4, 56 and 59)

The works of this cycle are scored using prepared musical instruments or '*impossible objects*' as I refer to them, and they are titled as *Minimáquinas* or *Flexidras*. The *Minimáquina* pieces are scored for different prepared chamber ensembles (a trio, a quartet and a quintet); The *Flexidra* pieces are for solo prepared instruments (to date marimba and baritone saxophone) and a sextet. Conceptually my cycle explores the idea of creating impossible musical instruments by altering their

structures or adding extrinsic objects to traditional western instruments (Fig. 2). Structurally each work is an assemblage of musical textures that resemble collapsing machines.

FIGURE 2 – Example of an *'impossible object'* (prepared trumpet) used in *Flexidra IV*.

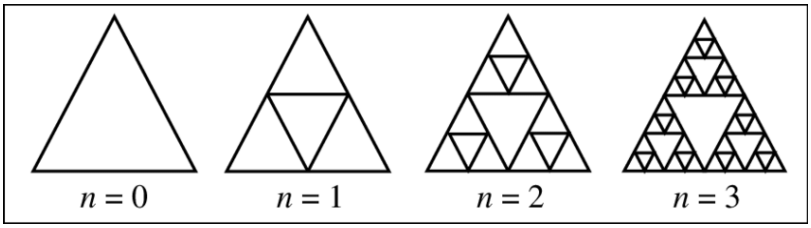
In *Flexidra IV*, the seventh work of BURSZTYN, all the pre-compositional materials were the result of extensive experimentation sessions with electric guitars, effect pedals and found objects that subsequently were extrapolated to other instruments to build '*impossible objects*,' and in turn used to generate all the instrumental textures.

Archipelago Sierpinski is a compositional cycle that to date contains five works for different instrumental combinations. The title of each work is the combination of the name of a writer I admire and a physical place. *Ungar/Comala* for prepared ensemble, for example, combines the surname of Colombian writer Antonio Ungar (1974) and the Mexican town of Cómala. This town is also the fictional location in which the novel *Pedro Páramo* by Juan Rulfo (1917-86) takes place. The works of this cycle are titled using the pattern 'writer/place' or 'place/writer'[7] to emphasized the role of literature as an important source of inspiration in my work. In this cycle, I intend to epitomize compositional processes employed in previous cycles. The works are scored using '*impossible* objects,' and explore the possibilities of modular structures. Each work consists of fragments or '*islands*', as if I refer to them conceptually, that can be navigated in many different ways forming '*structural archipelagos*,' therefore, the overall design of the cycle is a '*collection of archipelagos*' or a collection of collections. Each work is modular and the whole cycle is also

[7] The other works are titled: *Uslar/Gorong*; *Huidobro/Cozumel*; and *Baikal/Sorokin*.

modular, and for that reason, the fractal structure known as the Sierpinsky Triangle[8] is included in the title (Fig. 3) (KAKA, 2013).

FIGURE 3 – Sierpinski Triangle.



KAKA (2013, p. 152)

In *Volpi/Formentera*, the electric guitar is at the centre of the compositional processes and all the other musical parameters orbit around it. I will examine in detail how the different preparations and instrumental textures were derived from my own investigations ('exploratory sessions') with the instrument, presenting my solutions to notate the necessary actions to produce the required sounds in the prepared guitar.

1. *Recessional Motion* for electric guitar and ensemble (Fragmentos Cardinales V)

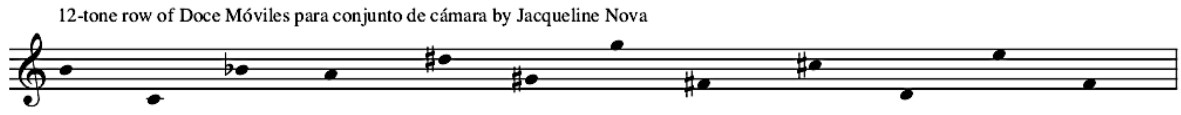
The ensemble of *Recessional Motion*[9] consists of soprano and baritone saxophones (two players), percussion, electric guitar, synthesizer, violin, viola, cello and double bass. This work was inspired by the research of Vera Rubin (1928-2016) (CHILDERS, 2019) and the work *Doce Móviles* (Eng. twelve mobiles) by Jacqueline Nova. This work was commissioned by Montreal-based ensemble La Machine and Canadian guitarist Marc-Olivier Lamontagne.[10]

In her PhD thesis, Rubin collected data that proved that galaxies are moving rapidly away from us and from each other; this is considered as theoretical evidence of the existence of dark matter and dark energy. (PANEK, 2011, p. 26). *Doce Móviles* was composed using a 12-tone row

[8] The Sierpinski Triangle is a self-similar structure. The parts and the overall structure are similar.
[9] A recording of the premiered can be streamed in the following link:
https://soundcloud.com/ca-mendez-san-juan/fragmentos-cardinales-v
[10] *Recessional Motion* is dedicated to him.

(Fig. 4); therefore, my piece is structured into twelve (12) self-contained and independent miniatures that can be performed in any order, but as if they are a single movement. The idea is that with the same set of miniatures the ensemble will produce different versions of the same piece each time is performed.[11]

FIGURE 4 – 12-tone row of *Doce Móviles*.



PARASKEVAÍDIS (2000, p. 4)

Each miniature was composed using only one pitch, they are labelled in the score using the pitch in which they are based, instead of using numbers to avoid suggesting a possible order and to reinforce the connection with the 12-tone row used by Nova to compose *Doce Móviles*. To expand my palette of sounds, inflections, microtonal tunings, timbral trills and extended techniques are used, also various subsets of the ensemble, for example miniature F is a solo for electric guitar, miniature F♯ is a trio for electric guitar, percussion and baritone saxophone, and miniature G♯ is a quintet for electric guitar, synthesizer, percussion, baritone and soprano saxophones. The rest of the miniatures (B, C, B♭, A, D♯, G, C♯, D and E) are scored using the whole ensemble.

While working on this piece I was living in London (UK) and Marc-Olivier Lamontagne was in Montreal, hence we were unable to try out my musical ideas and develop the techniques for this piece together, and for that reason, I contacted London-based guitarist Christian Lloyd[12], who helped me immensely during the pre-compositional process to understand the electric guitar as an environment that consists of magnetic pickups, effect pedals and an amplifier, and to develop my musical ideas within that context. After four (4) 'exploratory sessions'[13] with him I had enough materials to compose the piece, and I decided to tune the lowest string of the guitar (VI) down a whole tone; from E to D.

[11] Regardless of the order, the miniatures must be performed *attacca*.

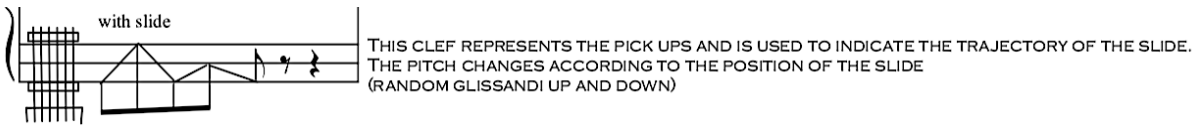
[12] At that time, Christian Lloyd was an active member of metal band Killerfix.

[13] The sessions were recorded in audio and video. I transcribed these sessions and used them as pre-compositional materials to develop musical materials and possible ways to notate certain techniques.

One of the challenges in this work was to find possible solutions to notate some of the actions and gestures that Lloyd showed me during the 'exploratory sessions' in the score. In order to solve this problem, I designed several unconventional clefs to represent the necessary actions to produce the sounds. These electric guitar clefs were inspired by the unconventional clefs used by Helmut Lachenmann to notate his instrumental techniques. In his precise notational system Lachenmann uses unconventional clefs to represent specific areas of the instruments where the actions take place, as well as to indicate the direction of the actions, the amount of pressure to be applied and in some cases the resultant pitches. Some of his techniques are notated using several staves (ALBERMAN, 2005, p. 46-47).

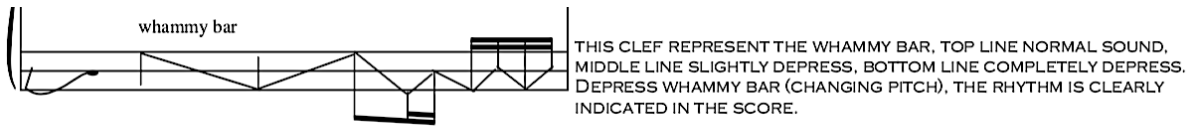
The *pickups clef* (Fig. 5) is used to represent actions that take place around that area, usually with a slide or tonebar. The three (3) staff lines (top – middle – bottom) represent the trajectories of the actions (closer to bridge towards fingerboard).

FIGURE 5 – *Pickups clef*.



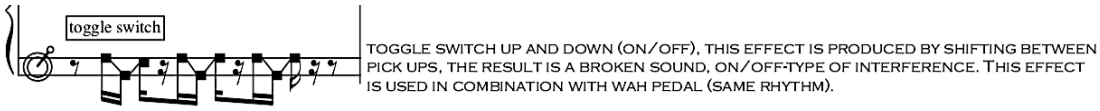
The *whammy bar clef* (Fig. 6) is used to represent gestures (pitch inflections) with the whammy bar. The widest possible interval is a semitone. The three (3) staff lines (top – middle – bottom) represent different positions or variations in the amount of tension of the *whammy bar* (top line: normal position, middle line: slightly depressed and bottom line: fully depressed).

FIGURE 6 – *Whammy bar clef*.



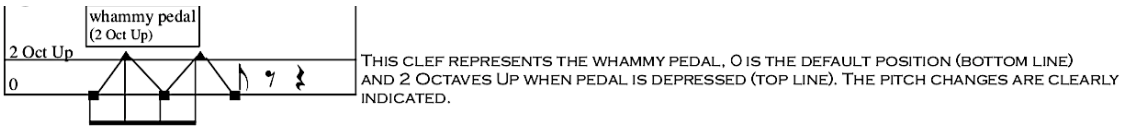
The *toggle switch clef*[14] (Fig. 7) is used to represent the different positions of the switch, effectively alternating between the magnetic pickups. Only two (2) staff lines are necessary, since I am interested in switching rapidly from one position to the other (without using the middle position). By alternating between the two (2) positions an on/off interference noise is achieved.

FIGURE 7 – *Toggle switch clef*.



The *whammy pedal clef* (Fig. 8) is used to represent different parameters of the pedal.[15] The actions described using this clef are executed with the foot. Throughout the whole piece the pedal must be set from 0 to 2 octaves higher; 0 means normal sound (no shift in pitch), this position is represented using the bottom line; 2 means that the pitch is transposed two (2) octaves higher, this position is represented using the top line. The 'glissandi' lines connecting the bottom and top lines symbolize the shifting in pitch from 0 to 2 or from the original pitch to a pitch that is two (2) octaves higher.

FIGURE 8 – *Whammy pedal clef*.



The action of producing feedback (Fig. 9) is notated, as well as the gestures with an e-bow (Fig. 10).[16] The feedback is produced by lightly touching all the strings and moving closer to the amplifier, therefore a feedback loop is produced when the sound coming out from the amplifier is collected again by the pickups. The dynamic level of this noisy texture can be adjusted by moving the pickups away (diminuendo) or closer (crescendo) to the amplifier.

[14] In certain guitar models the toggle switch is used to decide which pickup is activated or to alternate between the pickups.

[15] Whammy pedal specifically refers to the DigiTech pitch shifting pedal; popularized by Rage Against the Machine's guitarist Tom Morello.

[16] E-bow is a hand-held (battery-powered) electronic bow.

FIGURE 9 – *Feedback*.

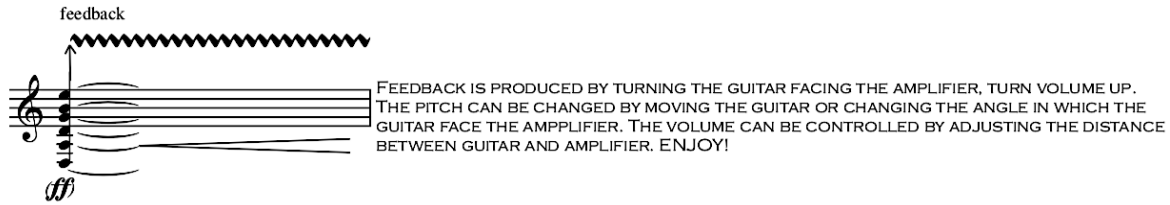
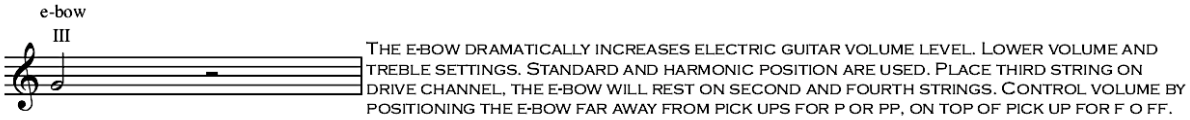


FIGURE 10 – *E-bow*.



Marc-Olivier Lamontagne and La Machine ensemble conducted by Cristian Gort premiered the piece in Montreal on 14th December 2013, in the following order: G#, C#, G, F, B, Bb, E, C, D#, D, F# and A. Hyperlinks to the full performance and the score can be found in the appendix dedicated to the audio-visual content.

2. *Flexidra IV (collide, splinter, splatter)* for prepared ensemble (BURSZTYN VII)

Flexidra IV (collide, splinter, splatter)[17] was scored for prepared saxophones (soprano and tenor), prepared trumpet, percussion, accordion, piano and electric guitar. The piece was commissioned by Galician ensemble Vertixe Sonora. Unable to work in person with Rubén Barros the guitarist of the ensemble, I collaborated with London-based guitarist Ed Dampier to develop all the pre-compositional materials. The result of these extensive 'exploratory sessions'[18] with electric guitars, effect pedals and found objects were subsequently extrapolated to other instruments to build '*impossible objects*' and used to generate all the instrumental textures in the piece; for example, during one of the sessions we coiled a spring drum[19] to the strings of the guitar (Fig. 11) and in other opportunity we coiled a metallic spring to the guitar (Fig. 12).

[17] A recording of the premiered can be streamed in the following link: https://www.youtube.com/watch?v=eK8hoKGdkHA

[18] These sessions were also documented and the transcriptions used as pre-compositional materials.

[19] The spring drum or 'thunder drum' is a percussion instrument that consists of a metallic spring attached to a drum, as see on Fig. 13.

FIGURE 11 – Spring drum coiled around the strings of the guitar.

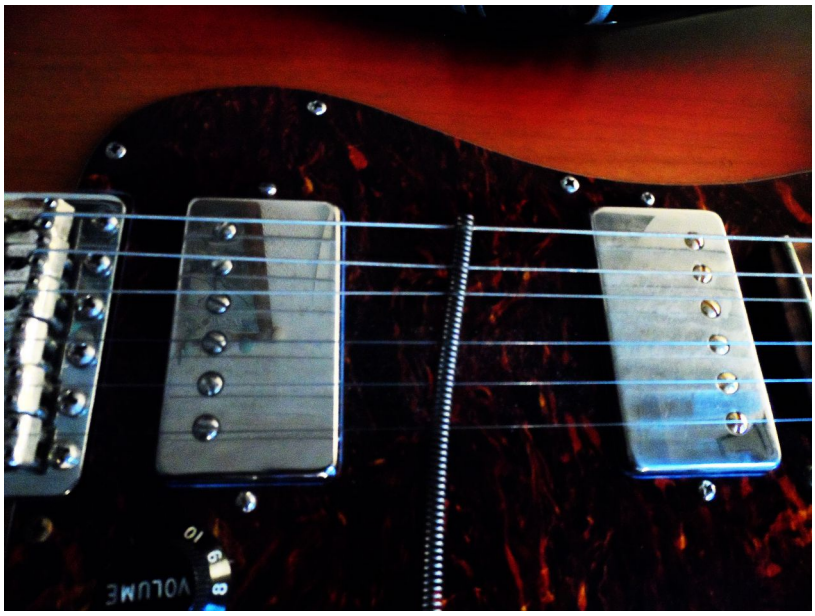


FIGURE 12 – Metallic spring coiled around the strings of the guitar.

These specific preparations and the techniques associated with them did not make it into the piece, but they were used in other pieces and on other instruments, for example a spring drum was attached to a double bass (Fig. 13). The sounds produced by the whole ensemble in *Flexidra IV* are intrinsically connected to the electric guitar. The percussion and the piano parts are composed using similar objects (pieces of paper, plastic cards and slides) and textures (rubbing, scratching and hitting).

FIGURE 13 – Spring drum attached to fourth the string of double bass.

The set-up used in this piece consists of a distortion pedal with two distortion settings: light and heavy/noisy distortion, a delay pedal with two settings: short and long delay, and a volume pedal (Fig. 14).

FIGURE 14 – Pedal board used during the '*exploratory sessions*' and to compose *Flexidra IV*.

The guitarist also needs some additional objects (a plastic card, a piece of paper, a milk frother, a hand-held battery-powered fan and a double bass bow) to perform some of the techniques and textures developed for this piece (Fig. 15).

FIGURE 15 – Hand-fan and milk frother.

The guitar must be placed flat on a table (Fig. 16) and the guitarist (as if it is a percussionist) executes different actions (with both hands) on different areas of the instrument. The techniques and gestures were notated using the same notational system (action clefs for each hand inspired by Helmut Lachenmann's unconventional clefs) developed for *Recessional Motion* (Fig. 17).

FIGURE 16 – Still frame of 'exploratory session' with Ed Dampier.

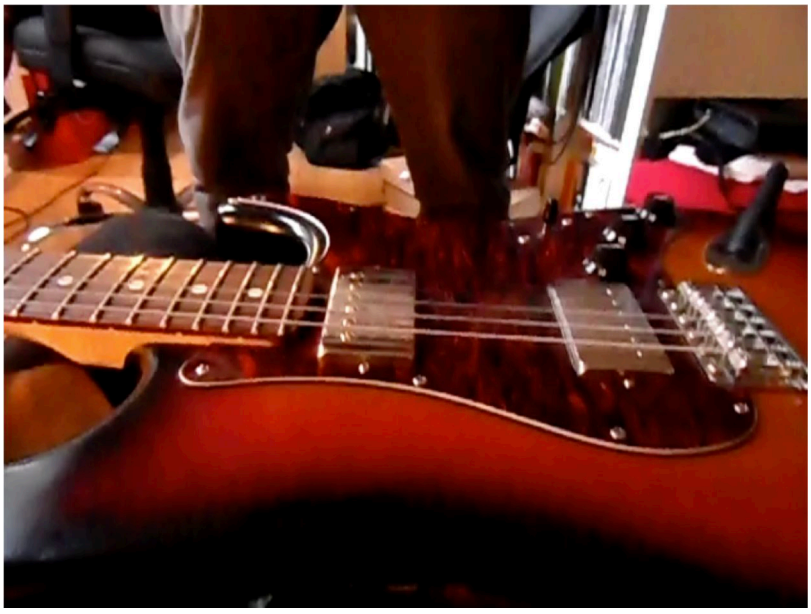
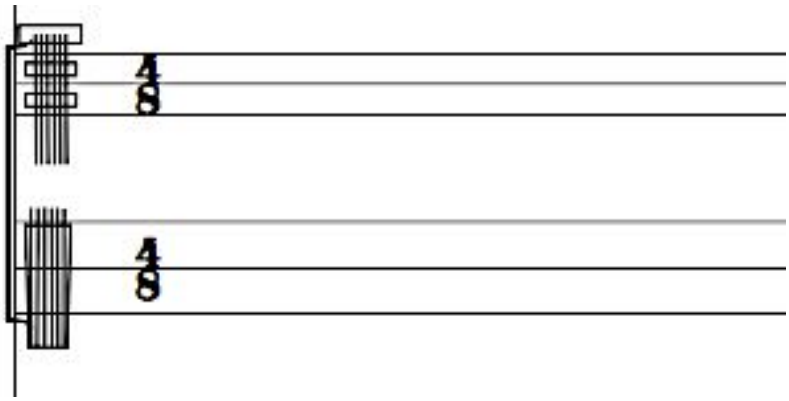
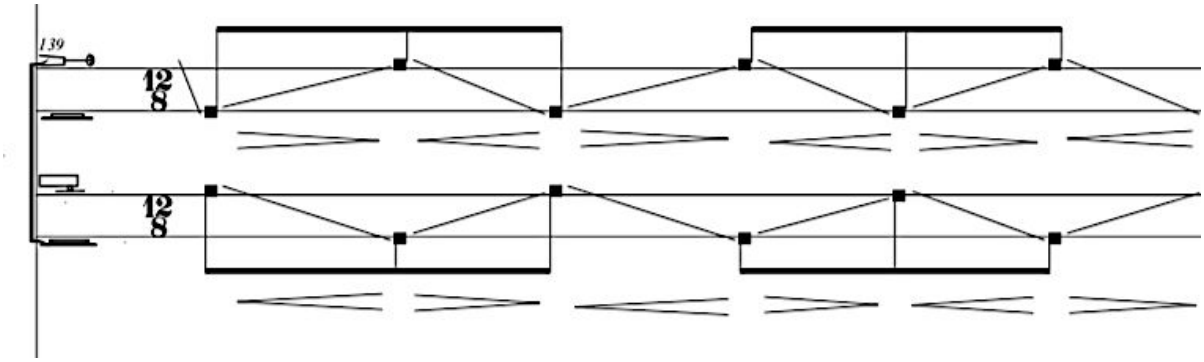


FIGURE 17 – Action clefs/unconventional clefs (both hands).



The top stave represents the bridge/fingerboard area around the magnetic pickups and the bottom stave represents the fingerboard/nut area. The three (3) staff lines are used to indicate the trajectories of the different actions. Two (2) additional clefs were designed to notate the gestures executed with the hand-held fan and the milk frother (Fig. 18).

FIGURE 18 – Clefs to notate actions executed with the hand-held fan and the milk frother.



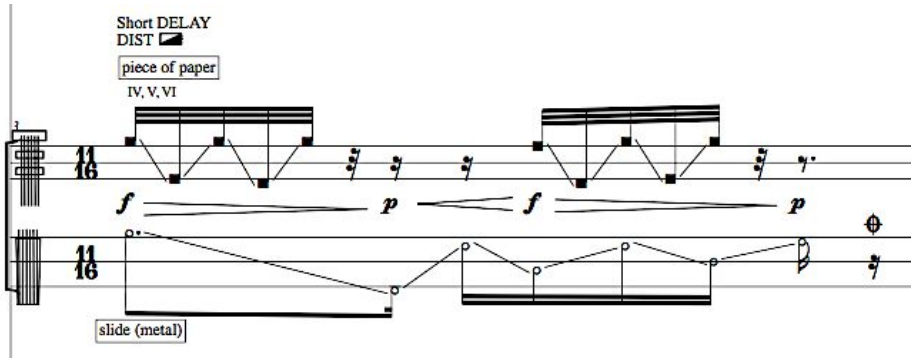
The top stave represents the milk frother (top line) and the pickup (bottom line); the bottom stave represents the hand-held electric fan (top line) and the pickup (bottom line). This sound/texture is produced without touching the strings of the guitar. With the volume of the guitar at the maximum level and with the milk frother (right hand) and the hand-held fan (left hand) switch on; the performer must bring closer and move away the objects to the magnetic pickups. The sound is then produced by the pickups amplifying the buzzing of the objects, without physically touching the instrument (Fig. 19). The lines connecting top and bottom staff lines symbolize the action of moving closer to the pickups to immediately moving away. The dynamics are also affected, and for that reason regulators are included in the score. When the

objects are in close proximity to the pickups there is an increase in the dynamic level, and in the same way, when the objects are farther away the dynamic level decreases.

FIGURE 19 – Still frame of Rubén Barros executing the technique during the premiere.

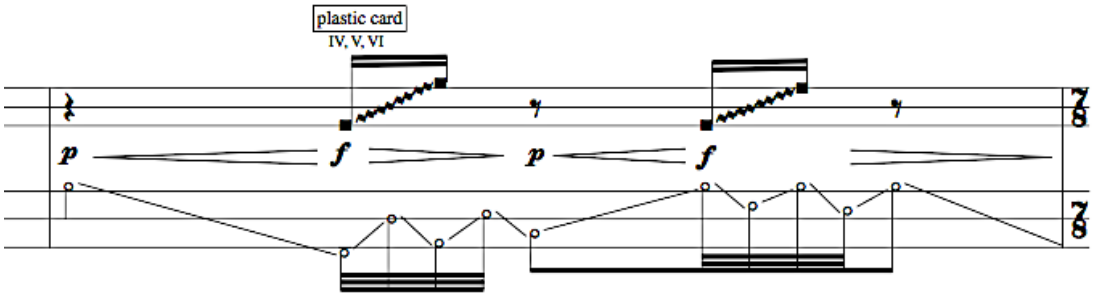
All the actions in *Flexidra IV* are notated using two (2) staves. In some cases, each hand works independently and the desired texture is the combination of both sounds; for example, while a piece of paper is dragged across the length of the strings (right hand), in the area between the bridge and the fingerboard, a slide or tonebar is used to play random glissandi, in the area between the fingerboard and the nut, also along the length of the strings (left hand), the positions and trajectories are clearly indicated (Fig. 20). The effect pedal and the amount of effect are always indicated in the score. The amount of distortion is indicated using a rectangle, when completely dark it means noisy distortion, when is empty means light distortion; half rectangle means a type of distortion in between both settings.

FIGURE 20 – Piece of paper on strings



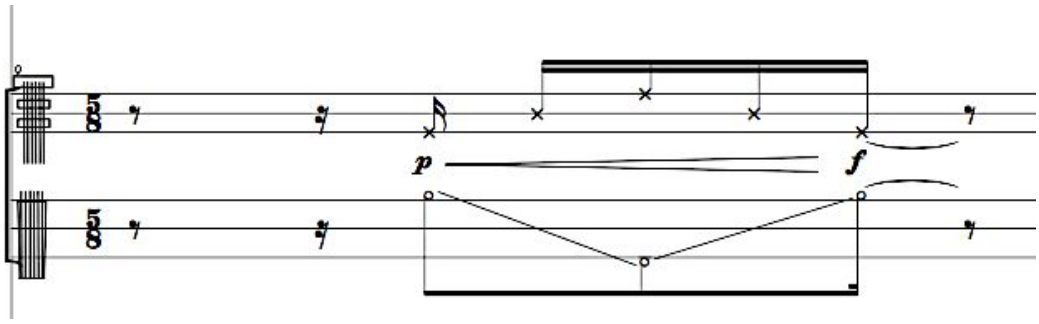
Other technique involves scraping the strings, represented using square-shaped note heads (around bridge/fingerboard area), with the edge of a plastic card (right hand) and at the same time playing random glissandi (left hand) using a slide (around fingerboard/nut area). Various types of lines are used to symbolize different types of contact: jagged line means scraping, whereas a straight line means glissando/sliding (Fig. 21).

FIGURE 21 – Scraping strings with plastic card.



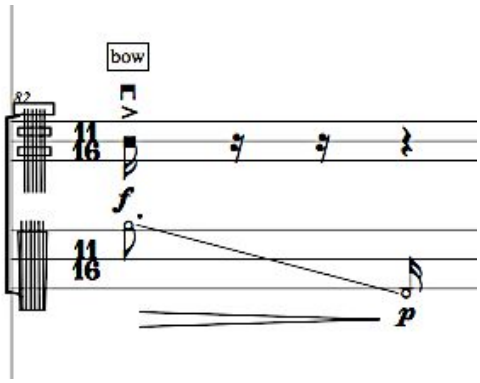
The tapping technique (Fig. 22) is achieved by hitting randomly with the fingertips of the right hand the indicated strings (roman numerals) within the prescribed area; while playing random glissandi (left hand) using a slide. The length, direction and speed of glissandi are clearly indicated.

FIGURE 22 – Tapping.



Finally, the bow (right hand) must be dragged transversally on the strings, while the left-hand plays glissandi with the slide (Fig. 23).

FIGURE 23 – Bowing.



The piece was premiered by Vertixe Sonora Ensemble on 15th December 2015 at the Centro Galego de Arte Contemporánea (Eng. Galician Centre for Contemporary Art), as part of the concert series: Musica e Arte: Correspondencias Sonoras (Eng. Music and Art: Sound Correspondences). Hyperlinks to the full performance and the score can be found in the appendix dedicated to the audio-visual content.

3. *Volpi/Formentera* for prepared bass clarinet and prepared electric guitar (Archipelago Sierpinski)

Volpi/Formentera[20] was the first piece of the cycle Archipelago Sierpinski to be composed. This work was commissioned by the Spanish ensemble NOU for guitarist and composer José Pablo Polo and clarinettist David Romero Pascual. In this cycle, I intend to epitomize compositional processes employed in my previous cycles. The works are inspired by the combination of the name of a writer that I admire and a place that interest me. The title *Volpi/Formentera* is the combination of the name of Mexican writer Jorge Volpi (1968)[21] and the island of Formentera. Besides using '*impossible objects*,' in Archipelago Sierpinski, I seek to explore in more depth the possibilities of modular structures. Each work consists of fragments (*islands*) that can be performed (*navigated*) in many different ways forming *structural archipelagos*, hence the overall design of the cycle is a

[20] A recording of the premiered can be streamed in the following link:
https://soundcloud.com/ca-mendez-san-juan/volpiformenterav-iii-i-vi-iv-ii

[21] While working on the materials for this piece I was reading Volpi's book *In Search of Klingsor* and for that reason, I decided to use his surname in the title.

collection of collections or an *archipelago of archipelagos*. The structure of each work is modular and the structure of the whole cycle is also modular. *Volpi/Formentera* consists of six (6) sections, labelled in the score using roman numerals (I-VI), that can be performed continuously in any order; therefore, the piece must be perceived as a single movement, and under no circumstances the work must be performed in such a way that changes of sections are perceived as such, similarly to *Recessional Motion* the sections must be executed *attacca*.

In this occasion encouraged by my previous experiences with guitarists Christian Lloyd and Ed Dampier I decided to explore the possibilities of the electric guitar and to find possible preparations on my own. I used a reduced set-up (only two pedals: one distortion and one delay), but with the addition of the DigiTech pitch shifting pedal: whammy (Fig. 24).

FIGURE 24 – Reduced set up.

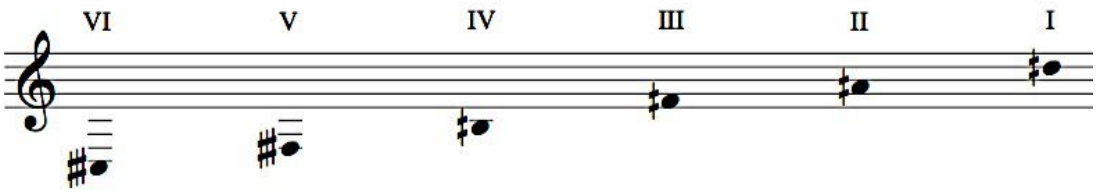
The bass clarinet is prepared using aluminium foil paper wrapped around the bell, in such a way that the low frequencies of the bass clarinet are distorted. The guitar is prepared using a metallic spring coiled around the strings (near the tuning pegs)[22] and a stripe of lighting gel wrapped around the other end of strings in the area near the pickups (Fig. 25). These preparations help me to reinforce the metallic qualities of the sounds and to blend the distorted sounds produced on both instruments. To emphasize the effect of the preparations all the strings were

[22] We developed this technique with Ed Dampier during the sessions for *Flexidra IV*, but I did not use it.

tuned down, after experimenting with several detunings, the following microtonal *scordatura* was chosen: C𝄲 (three-quarter tone sharp), F𝄲 (three-quarter tone sharp), B𝄰 (quarter tone sharp), F𝄰 (quarter tone sharp), A𝄰 (quarter tone sharp) and D𝄰 (quarter tone sharp) (Fig. 26). To facilitate the low tuning, ordinary strings were replaced for thicker ones.[23]

FIGURE 25 – Electric guitar preparations.

FIGURE 26 – Electric guitar *scordatura*.

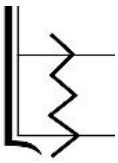


The techniques are notated following the same principles explained in *Flexidra IV* (action clefs inspired by Helmut Lachenmann's unconventional clefs), and one stave for each hand. The top stave for the right hand and the middle stave for the left hand, with the addition of an extra stave to represent the actions executed with the foot on the whammy pedal (bottom stave). The original set of unconventional clefs used to notate the actions in *Recessional Motion* and *Flexidra IV* were expanded to represent different types of actions in different areas of the guitar, as well as to

[23] I used Dunlop's heavy core strings (heaviest gauge). These strings are specially manufactured for extremely low tunings.

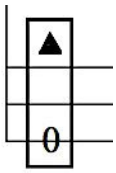
include actions that are executed on the preparations. These are the unconventional clefs: *spring clef* (Fig. 27), *whammy pedal* (Fig. 28), *lower part of neck* (Fig. 29), *upper part of neck* (Fig. 30), *pickups* (Fig. 31), *toggle Switch* (Fig. 32) and *strings clefs* (Fig. 33).

FIGURE 27 – Spring clef.



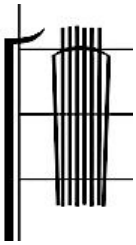
The *spring clef* is used to represent actions/sounds that are executed on the coiled metal spring.

FIGURE 28 – Whammy pedal clef.



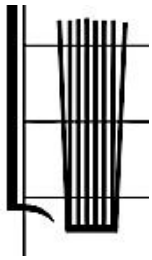
The *whammy pedal clef* represents the actions executed with the foot on the expression pedal of the Whammy. The top line signifies that the expression pedal is completely depressed; therefore, the pitch is two (2) octaves higher, the middle line (half depressed) signifies that the position of the expression pedal is in-between normal position and completely depressed, therefore the pitch is roughly one octave higher and the bottom line signifies standby position or original pitch.

FIGURE 29 – Lower part of neck clef.



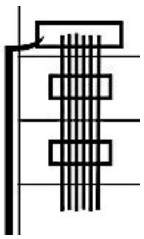
The *lower neck clef* is used to represent the actions that take place in this area of the neck (fingerboard). When specific actions must be executed on specific strings they are clearly marked using roman numerals (I-VI). The top line signifies area closer to pickups and lower line signifies (roughly) middle of neck (fingerboard) or around the 12th fret.

FIGURE 30 – Upper part of neck clef.



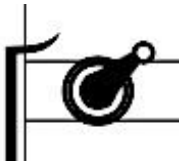
The *upper neck clef* is used to represent the actions that take place in this area of the neck (fingerboard). The strings where certain actions take place are clearly marked using roman numerals. The top line signifies (roughly) the middle of neck or around the 12th fret, the lower line signifies (roughly) the area closer to the coiled metal spring (tuning pegs) or around the 3rd fret.

FIGURE 31 –Pickups clef.



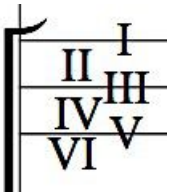
The *pickups clef* is used to represent the actions that take place in this area. The top line signifies the area closer to the bridge (around stripe of gel, but without touching it). The bottom line signifies area closer to neck (fingerboard) or around the 23rd fret.

FIGURE 32 –Toggle switch clef.



The *toggle switch clef* represents the positions of toggle switch. The top line signifies treble position and the bottom line signifies rhythm position.

FIGURE 33 – Strings clef.

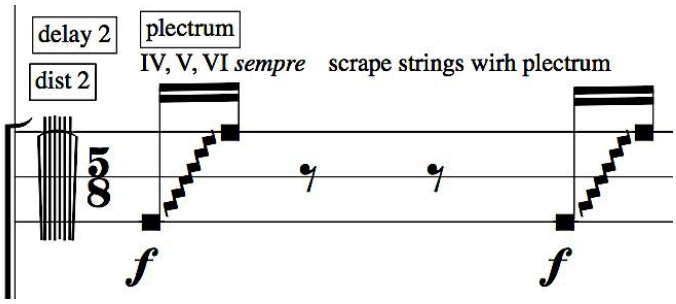


The *strings clef* represents the actions executed on the strings. The top line represents first (I) string, middle line represents third (III) string, bottom line represents fifth (V) string. First space (from top to bottom) represents second (II) string, second space represents fourth (IV) string and lower space (below bottom line) represents sixth (VI) string.

The techniques are notated in the score according to the following rules: different types of contact are represented using different types of lines (jagged, wavy and straight), unconventional techniques are notated using different types of note-heads; percussive actions are represented using crosses (X); slides are notated using empty circles (O) and all the other actions are notated using square note-heads (■). The effect pedals and the different objects used to produce the sounds are also indicated in the score. These are some examples of the notation system: scraping the strings (Fig. 34), actions on the spring (Fig. 35), tapping the strings (with plectrum) with right hand, while dragging the slide along the length of the strings with left hand (Fig. 36) and tapping the strings with the fingertips of both hands (Fig. 37), in both cases the bottom stave is used to represent actions executed with the expression pedal of the whammy. A technique I have labelled as DJ-scratching effect or Tom Morello's[24] effect is also included (Fig. 38). I encounter this particular technique during the 'exploratory sessions' with guitarists Christian Lloyd and Ed Dampier, but it was not use on *Recessional Motion* or *Flexidra IV*. This technique features prominently in this piece.

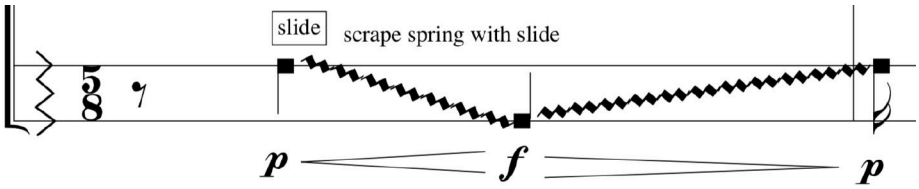
[24] Tom Morello (1964) is a member of the bands Rage Against the Machine and Audioslave. This technique features in the solo of the song 'Bulls on Parade' and it is explained in the following link: https://www.youtube.com/watch?v=kyxKJLgfT7A

FIGURE 34 – Scraping strings.



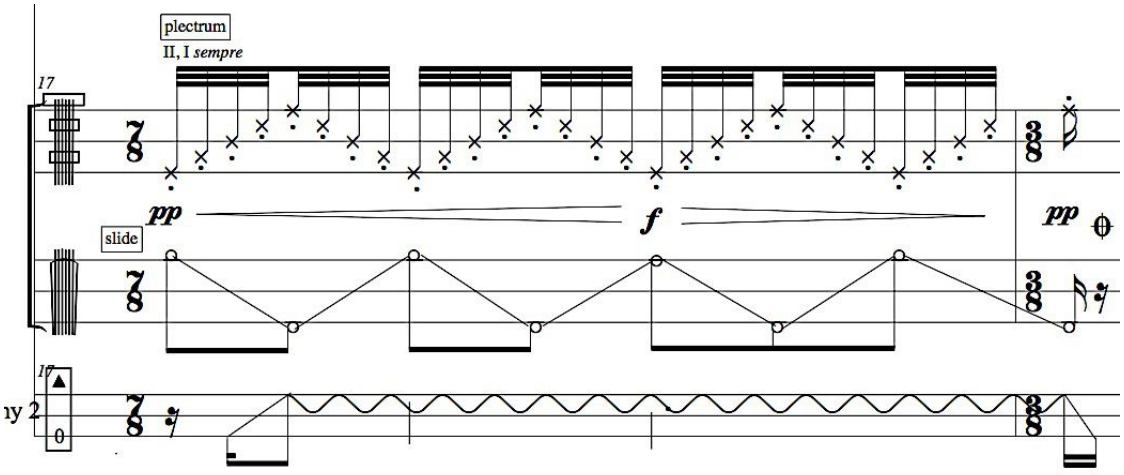
The rectangles on top of the score indicate the effects and their amounts, as well as the object used to produce the sound. The scraping sound (jagged line) is produced by dragging the edge of the plectrum with sufficient pressure to scratch the strings. This technique works better when applied to the lower strings (VI-IV).

FIGURE 35 – Actions of the spring.



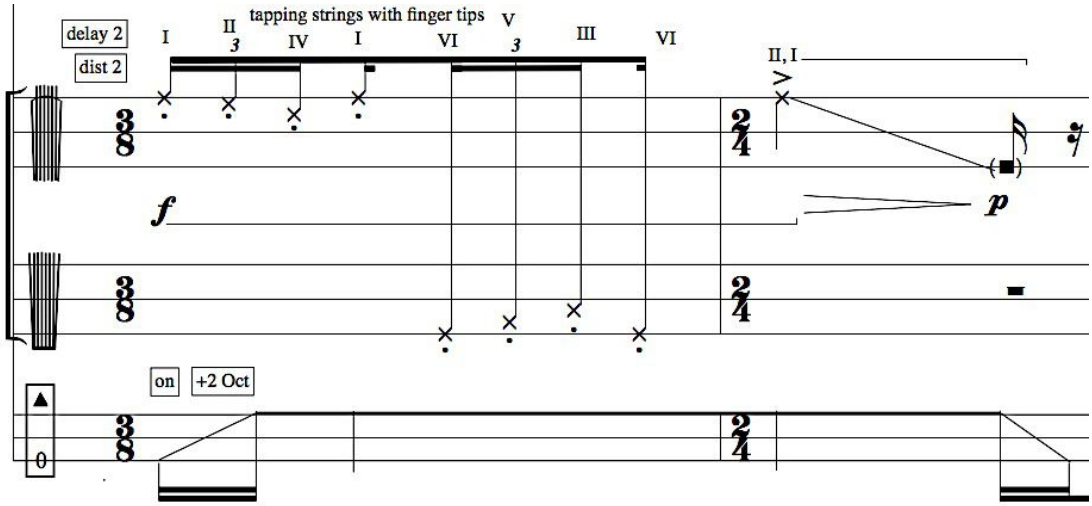
The rectangle indicates that the action must be executed with the slide directly onto the metallic spring (*spring clef*) with the slide, dragging it up and down along the length of the preparation.

FIGURE 36 – Tapping strings with plectrum while sliding.



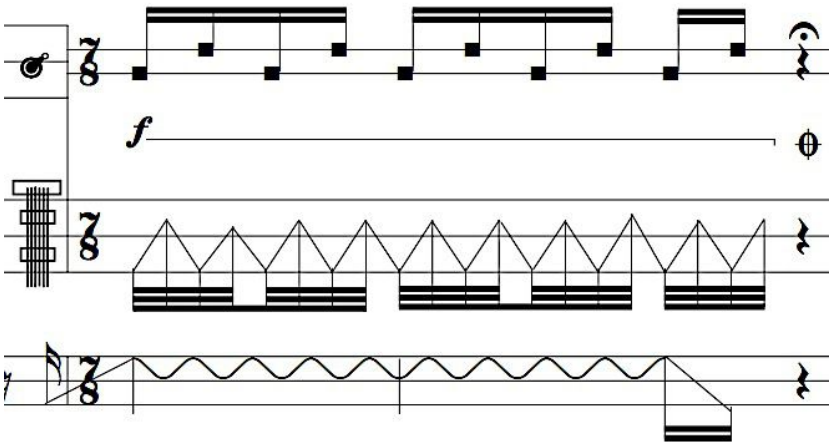
In this example, the right hand is executing percussive sounds with the plectrum in the area around the pickups (top stave), the left hand is performing glissandi (up and down) along the length of the strings from the beginning of the fingerboard (roughly 23rd fret) until the area around the metallic spring (3rd fret) with the slide, while at the same time the pitch-shifting effect is executed with the foot on the expression pedal. The wavy line indicated undulation with the foot.

FIGURE 37 – Tapping strings with fingertips while sliding.



In this case the percussive sounds are produced with the fingertips of both hands (top and middle staves), on the *lower neck clef* and *upper neck clef* respectively. The bottom stave represents the actions executed on the expression pedal of the whammy effect (pitch-shifting effect).

FIGURE 38 – DJ-scratching or Tom Morello's Scratching.



In order to produce the DJ-scratching texture the guitarist must execute three (3) independent actions on three (3) different areas of the guitar: toggle switch, area around the pickups and undulation with the foot on the whammy. With the right hand, the toggle switch alternates rapidly between treble and rhythm positions, while rubbing the palm of the left hand along the length of the strings (around pickups) and at the same time performing pitch-shifting undulations with the whammy pedal.

Volpi/Formentera was premiered by Jose Pablo Polo and David Romero Pascual on 6th May 2017 in Barcelona, as part of the Sampler Concert Series of L'Auditori. Hyperlinks to the full performance and the score can be found in the appendix dedicated to the audio-visual content.

3. Final considerations and future projects.

The compositional approaches and instrumental techniques I have generated to compose these cycles are still relevant, and in a continuous state of development. The electric guitar has been an essential part of this process. The 'exploratory sessions' with Christian Lloyd, Ed Dampier and on my own helped me to develop preparations and unconventional techniques for the guitar and effect pedals that I used to compose *Recessional Motion*, *Flexidra IV* and *Volpi/Formentera*, and also have inspired me to produce new objects and techniques for other instruments that I have employed in more recent works of BURSZTYN, Spatio-Temporal Cartographies and Archipelago Sierpinski.

In my piece *Baikal/Sorokin*[25] some of these ideas were applied and recontextualised. After several sessions of experimentation, an ordinary table was transformed into a massive guitar-like instrument or '*impossible object*,' using steel wires, a sieve, a bowl, ratchet straps, tuning pegs and steel metal sheets (Fig. 39).

[25] The title combines the surname of Vladimir Sorokin (1955) and Lake Baikal in Siberia.

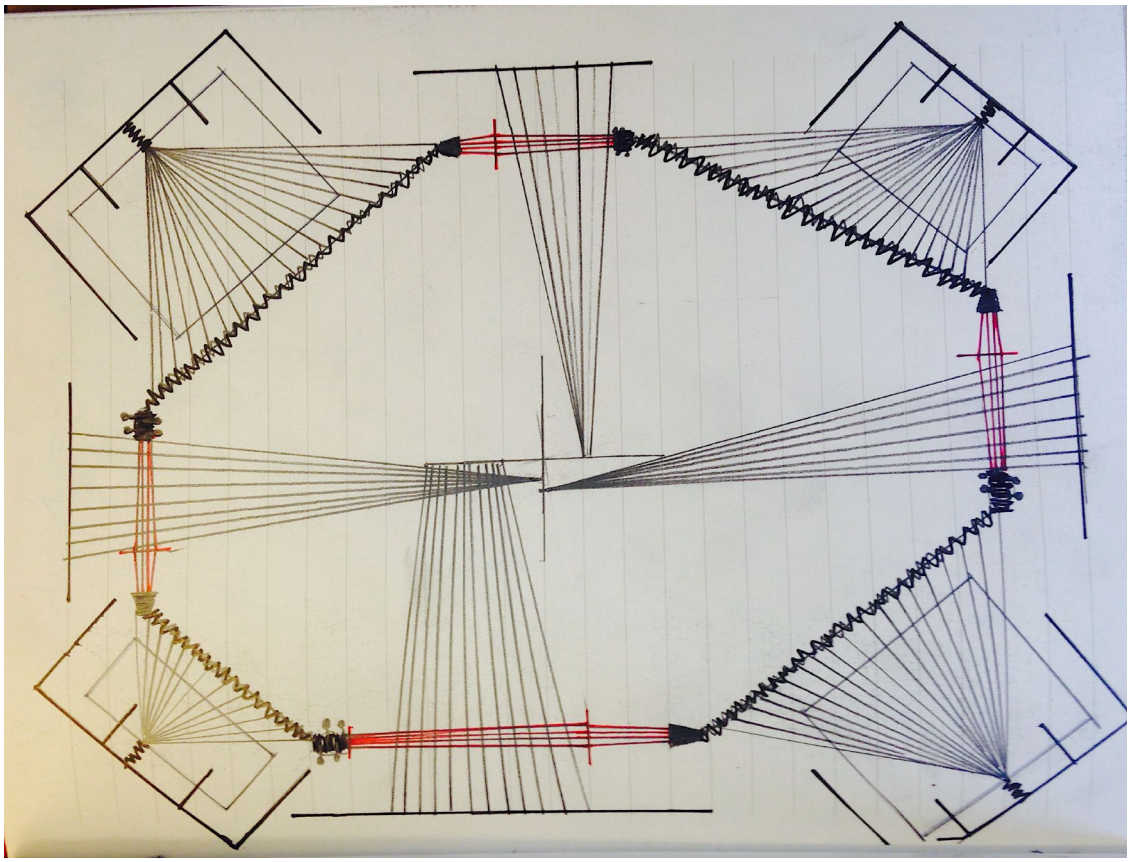
FIGURE 39 – Guitar-like 'impossible object' develop for *Baikal/Sorokin*.

The object is divided into three (3) performance areas: steel sheet area, wires on bowl and wires in-between bowl and metal sheet. This object is executed by two musicians facing each other (Fig. 40).

FIGURE 40 – Still frame of Ian Antonio and Russell Greenberg from Yarn/Wire performing *Baikal/Sorokin*.

For my next project, tentatively titled *Aira/Sonora*[26], I am developing a structure that will 'contain' prepared stringed instruments. This work, effectively, will be scored for an enhanced string quartet. At the moment, I am designing prototypes for a structure that will enhance and amplify the sound of the quartet (Fig. 41).

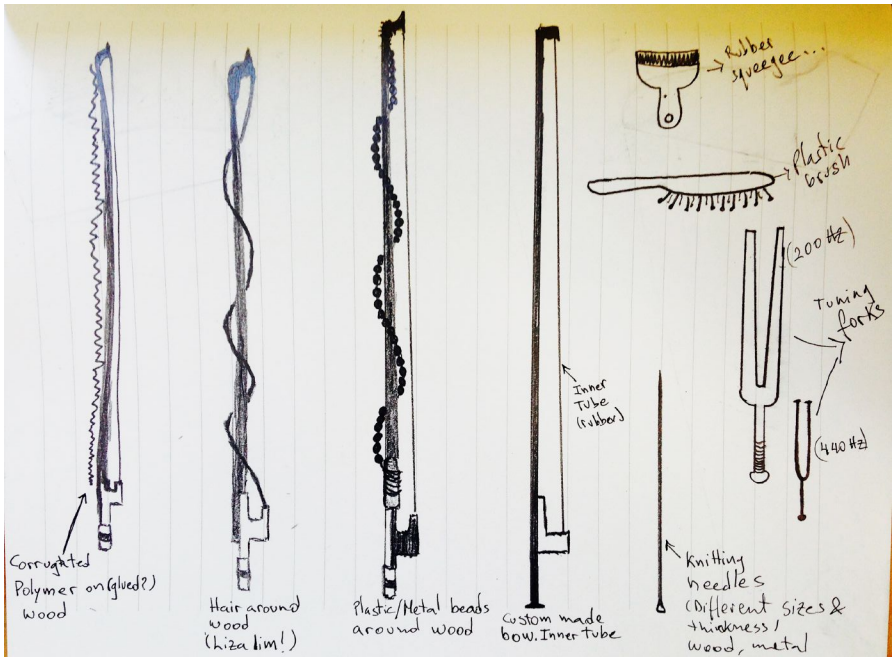
FIGURE 41 – Current design of the structure.



The structure will be built using metal pipes and the stringed instruments will be attached to it using steel wires and different types of strings (violin, viola, cello and double bass). Steel and copper sheets of different sizes will be hanged from the structure. The metal sheets and the structure will be connected through steel wires, so the sounds produced by the string quartet will be enhanced, amplified and distorted by the structure resonating on the metal sheets. The bows will be prepared as well (Fig. 42). I hope to build a working prototype in the following years.

[26] The title combines the surname of Cesar Aira (1949) and the Sonoran Desert in Mexico.

FIGURE 42 – Possible prepared bows and objects.



Finally, in the near future, I aim to build upon these past experiences and expand the concept of '*impossible objects*' by transitioning towards a sculptural approach to music composition using other instruments as laboratories for experimentation, and in the process developing brand-new custom build sound environments.

ACKNOWLEDGMENTS

I would like to thank Christian Lloyd and Ed Dampier for introducing me to the world of the electric guitar, also to Marc-Olivier Lamontagne, Daniel Añez and the members of La Machine Ensemble for performing *Recessional Motion*. Rubén Barros and the members of Vertixe Sonora for performing *Flexidra IV (collide, splinter, splatter)*, and finally to José Pablo Polo and David Romero Pascual for performing *Volpi/Formentera*.

REFERENCES

ACOSTA, Rodolfo. *Archipiélagos de la Esperanza para viola y violonchelo.* Bogotá: Matiz Rangel editores, 2006. Score.

ALBERMAN, David. Abnormal Playing Techniques in the String Quartets of Helmut

Lachenmann. *Contemporary Music Review*. London, Vol. 24, No. 1, p. 39 – 51, 2005.

CHILDERS, Tim. *Vera Rubin: The Astronomer Who Brought Dark Matter to Light*, Space, June 11 2019. Available at https://www.space.com/vera-rubin.html. Accessed on 6 Aug. 2020.

GARCÍA, Marcela. Estructuralismo y tendencias posmodernas en la obra *"Diálogo en simetrías móviles"* para piano preparado y clavicémbalo de la compositora contemporánea colombiana Catalina Peralta, *Revista A Contratiempo*, No. 13, 2009.

HUBBLE, Edwin. The Realm of Nebulae. New York: Dover Publications, 1953.

KAKA, Askander. Calculation Methods of the Length, Area and Volume of Iterated Function System Fractals. *Journal of Koya University*. No. 26, p. 149 – 158, 2013.

LEYVA, Camilo, et al. Feliza Bursztyn: Elogio de la Chatarra. Bogotá: Museo Nacional de Colombia, 2009.

MENDEZ, Camilo. *Texts, Numerical Sequences and Patterns in my Recent Music*. 2016.

Thesis (Doctoral, Music composition). Royal College of Music, London.

MENDEZ, Camilo. *Fragmentos Cardinales V: Recessional Motion*. Self-published, 2013. Score.

MENDEZ, Camilo. *BURSZTYN VII: Flexidra IV*. Self-published. 2015. Score.

MENDEZ, Camilo. *Archipelago Sierpinski: Volpi/Formentera*. Self-published. 2017. Score.

McDANIEL TARVER, Gina. The Art of Feliza Bursztyn: Confronting Cultural Hegemony, *Artelogie,* No 5, p. 1 – 20, 2013. Available at http://cral.in2p3.fr/artelogie/spip.php?article273. Accessed on 30 jul. 2020.

NOGUERA, Carolina. *Quattuor Verba para cuarteto de cuerdas*. Bogotá: self-published, 2006. Score.

PANEK, Richard. The 4% Universe. Oxford: Oneworld Publications, 2011.

PARASKEVAÍDIS, Graciela. *Doce móviles de Jacqueline Nova*: una aproximación analítica. Bogotá: Latinoamérica Música, 2000. Available at http://www.latinoamerica-musica.net/obras/nova/moviles.html. Accessed on: 3 aug. 2019.

PERALTA, Catalina. *Diálogo en Simetrias Móviles para clavicémbalo y piano*. Revista A Contratiempo No. 13, 2009. Score.

RECER, Paul. *Phantoms in the Machine of Universe*. Los Angeles Times, 1999. Available at

http://articles.latimes.com/1999/jan/17/news/mn-64222. Accessed on 13 jul. 2020.

RENDÓN, Guillermo. *Trópico de Capricornio para violonchelo solo*, Bogotá: Matiz Rangel editores, 2005. Score.

SKUSE, Ben. *Jocelyn Bell Burnell: Pulsar Pioneer*, Sky and Telescope, 2019. Available at https://skyandtelescope.org/astronomy-resources/famous-astronomers/jocelyn-bell-burnell-pulsar-pioneer/. Accessed on: 17 aug. 2020.

TRABA, Marta. Elogio de la Locura: Feliza Bursztyn/Alejandro Obregón, Bogotá: Editorial Universidad Nacional de Colombia, 1986.

ABOUT THE AUTHOR

Camilo Mendez is a composer of acoustic concert music. He conceives his works as compositional cycles; series of pieces orbiting around the same musical ideas, but written for different instrumental combinations. He completed a Doctorate and a Master's in advanced composition at the Royal College of Music in London. He has also studied privately with Rebecca Saunders and Pierluigi Billone. In 2017, Mendez was the Rieman and Baketel Fellow for Music at the Radcliffe Institute for Advanced Study at Harvard University. His music has been performed by ensembles and soloists who specialize in contemporary concert music and has been featured in such international festivals as Festival Internacional Cervantino, the International Summer Course for New Music Darmstadt, June in Buffalo, Klasik Keyifler, the Mallorca Saxophone Festival, and Next Generation Donaueschingen. In 2009, he was awarded the Colombian national prize in composition for his work *Tropical Textures VI*. He has held residencies at the Banff Centre for Arts and Creativity and Willapa Bay AiR. Dr. Camilo Mendez, joined the Department of Music at HKBU as Assistant Professor in 2018. ORCID: https://orcid.org/0000-0002-5368-7489. E-mail: camendez@hkbu.edu.hk

APPENDIX: Hyperlinks to Audio-visual Content

1. Fragmentos Cardinales V: *Recessional Motion* for electric guitar and ensemble (2013)

Score: https://drive.google.com/file/d/1nwGZVUHyWleHp6qDlqpQVg9eUparMCMd/view?usp=sharing

Recording: https://soundcloud.com/ca-mendez-san-juan/fragmentos-cardinales-v

2. BURSZTYN VII: *Flexidra IV* for prepared ensemble (2015)

Score: https://drive.google.com/file/d/11OjyIM5tyJPCh-KIz78n2zoUOKpCqKzi/view?usp=sharing

Recording: https://www.youtube.com/watch?v=eK8hoKGdkHA

3. Archipelago Sierpinski: *Volpi/Formentera* for prepared bass clarinet and prepared electric guitar (2017)

Score: https://drive.google.com/file/d/1SVBXicb_-Xr7SnHBDUG4AGa_1VNX1rf8/view?usp=sharing

Recording: https://soundcloud.com/ca-mendez-san-juan/volpiformenterav-iii-i-vi-iv-ii

4. Archipielago Sierpinski: *Baikal/Sorokin* for two percussionists (2017)

Score: https://drive.google.com/file/d/14CfIh9s4uGK5BnYBdsvCrRiUPc0dg7Hc/view?usp=sharing

Recording: https://drive.google.com/file/d/1P4m_4VZFdWfQS7qgjvOfkJeaBr-biyNJ/view?usp=sharing