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DRAWING THE DIAGONAL: A VISUAL APPROACH TO PIERRE BOULEZ'S CONCEPTS OF THE SMOOTH AND THE STRIATED.

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This paper investigates the concepts of time and space in the oeuvre of the composer Pierre Boulez, with the aim of engaging with his musical ideas and writings through visual arts. In particular, it focuses on the notions of the Smooth and Striated time-space shaped through a series of drawings that combine analogical techniques with Computer Aided Design.

Key words: Drawing, Computer Aided Design, Music, Pierre Boulez, Gilles Deleuze

"If all the disciplines communicate together, it is on the level of that which never emerges for itself, but which is, as it were, engaged in every creative discipline, and this is the constitution of space-times."[1]

"L'oeuvre est un fragment de l'espace et du temps et ceci est valable aussi bien pour la peinture que pour la musique"[2]

INTRODUCTION

This article investigates the concepts of time and space in the oeuvre of the composer Pierre Boulez, with the aim of engaging with his musical ideas and writings through visual arts. In particular, it focuses on the notions of the Smooth and Striated time-space that I have explored and shaped through a series of drawings.

The methodology employed involves the creation of a series of drawings using analogical techniques, in this case graphite on paper, combined with computer-aided design (CAD) in order to better illustrate these concepts. Thus, the final goal of this study is to contribute to the understanding of Boulez's music and writings, through my own visual interpretive practice.

Furthermore, the study relies on the analogies between musical and visual ideas and processes, which represent a central aspect in Boulez's music and theory throughout his career as it could be seen for example in his book on Paul Klee: *The Fertile Land* (1989). These analogies were significantly investigated by the philosopher Gilles Deleuze, who in his article 'Boulez, Proust and Time: "Occupying without Counting"', refers to Boulez's music as an attempt to '*capture the forces of time and render it sonorous'* (Deleuze, 1998, p.72). Similar in principle, through the practice of drawing I have tried to capture the *forces* of time and render it *visible*.

Consequently, my visual research on Boulez's musical ideas on the smooth and the striated is constructed with the following structure or procedure: I established an analogy between the aural (Boulez music) and the visual (my own drawings) by following the theory of Synaesthesia in the arts and more precisely following a particular type of Synaesthesia described by the researcher Bulat Galeyev called Gravitational Synaesthesia which describes music as the result of a series of particles and forces between them. Then I

[1] Deleuze, G. (1986), p. 16.

[2] Boulez, P., Loyrette, H. Lista M. (2008) p. 31 My translation JJGV: "The artwork is a fragment of space and time and this is valid for painting as well as music".

established an analogy between these forces that constitute the musical structure with the forces generated in a visual composition, in my case drawings. Consequently, the transference or analogy is established in the level or stage in which these forces act. To paraphrase Deleuze, it is an attempt to render musical forces into visual ones. Finally, once established this analogy, I focused on how to develop this analogy with the Boulezian musical concepts of the smooth, striated and fixed time-space. Accordingly, I looked into the specific characteristics defined by Boulez and further developed by Deleuze of these space-times and more importantly, the communication and processes of transformation between them, in order to represent them visually in a series of drawings which is, in conclusion, the final objective of this research.

This paper is divided into three main parts: The first part, defines the key concepts that take part on this research which are: the figure of the composer Pierre Boulez, the relation between the arts through Synaesthesia and the concepts of time and space in the context of Boulez's musical works, as developed by the composer throughout his career. Moreover, in this part it is highlighted the significant role of the visual arts in his compositions and writings. (See Campbell, 2014 pp. 211, 213). Additionally, Gravitational Synaesthesia is defined as a particular case of synaesthesia and it is explained how it is useful to describe the musical structures and relations. Finally, it is clarified what are the smooth striated and fixed space time in relation to Boulez oeuvre.

The second part of the paper focuses on the fundamental concepts that operate as a common *substratum* in his music. Additionally, it contextualises Boulez's approach following Deleuze's philosophical and theoretical development of the composer's musical concepts. Moreover, in this part, I explain the advantages of using drawings and CAD as a useful methodology to better engage with these theories.

The third part offers a series of case studies in which I explain how I gave shape to the research and how I obtained the visual outcomes based on the topic discussed on the paper.

Finally, in the conclusion, I summarise the outcomes and provide a critical evaluation of my research.

Pierre Boulez

French composer and conductor Pierre Boulez was born in Montbrison, France in 1925 and, according to the biography written by Dominique Jameux, he began his musical studies in 1931 with piano lessons.

In 1943 at the age of 18, he decides to move to Paris to continue on a serious study of music. During the following ages he had the chance to meet figures such as Arthur Honegger and was the pupil of Mme Vaurabourg and Mme François. On the following year, he began studying with the master Olivier Messiaen. In addition, his encounter with René Leibowitz (disciple of Schoenberg) introduced Boulez in the apprenticeship of the Viennese master of dodecaphonic music[3]. The musical revolution achieved by Arnold Schoenberg on the beginning of the past century with dodecaphonic music and atonalism was just a ground in which Boulez engaged the musical technique called serialism which is *"based on a series of rows of notes, pitch, dynamics, instrumentation, rhythm etc."* (Scheffer 2005 p. 3).

During the late 1940's he collaborated with Jean-Louis Barrault and Madeleine Renaud's company at the Marigny theatre. During the late 1940's and 1950's Boulez composed several works such as *The first sonata for piano, The sonatine for flute and piano* and his works on the poet René Char, mainly his masterpiece *Le marteau sans maître* which represented his first success not only for the specialised audience of contemporary symphonic music.

At that time, Boulez funded the *Domaine Musical* that allowed him to present and perform his repertoire following his guide. In parallel to his composing career increasingly successfully during 1950's 1960's and 1970's, Boulez started a successful career as conductor. Thus, he conducted masterpieces such as Berg's *Wozzeck*, Stravinsky's *the Rite of Spring*, or Wagner's *Tannhäuser* just to mention a few examples. In addition to his work as conductor with the BBC Symphony Orchestra he founded the IRCAM (*Institut de Recherche et Coordination Acoustique/Musique*) in 1977, with its goal of uniting scientific research and musical creation. Additionally, he founded the *Ensemble Intercontemporain* and continued with his lectures on the Collège de France. But it is during the Darmstadt (Germany) lectures when his interest in the notions of continuity and discontinuity in relation to all the musical parameters forged the genesis of smooth and striated space and smooth and striated time (Campbell, 2014 p. 219).

[3] Dodecaphonic or twelve-note method of composition: Musical technique developed by the Austrian composer and painter Arnold Schoenberg (1874-1951) in which each one of the twelve notes of the chromatic scale relate to each other in the same range of importance, avoiding any tonal center of gravity in the structure of the music.

Additionally, it is worth to mention the group of composers and intellectuals in which Boulez developed his theories and writings, such as John Cage, Luciano Berio, or Karlheinz Stockhausen, to mention a few.

Finally, in Boulez's oeuvre the visual arts have a predominant role, mainly materialised through the study of Paul Klee's works and ideas concerning the analogies between painting and music, He developed these ideas in several written works, such as *Pierre Boulez. Oeuvre: Fragment* (2008) that was released as part of the exhibition dedicated to the relation between visual arts and music at the Louvre in Paris and, more importantly, on his book *The Fertile Land* mentioned above. Finally, it is worth to mention the group of intellectuals and philosophers who Boulez has relation with such as Michel Foucault who appointed Boulez for the Collège de France, and more importantly, Gilles Deleuze, who expanded Boulez's musical ideas and developed some of his concepts about musical time and space in numerous articles and books, for example *The Fold: Leibniz and the Baroque* (1988) or *A Thousand Plateaus. Capitalism and Schizophrenia* (1987) together with Felix Guattari in which one of the chapters (or plateaus) is entirely dedicated to the smooth and the striated.

Synaesthesia

My approach to Boulez's musical oeuvre through the practice of drawing was in a first stage influenced by the concept of Synaesthesia of the Arts. Following the definition given by the artist Bulat M. Galeyev, Synaesthesia could be characterised as:

"a common ability of intersensory association, a particular manifestation of imaginative thinking or a double metaphor, in which the transfer of meaning inherent in metaphor is accompanied by the transition into another sensory modality" (Galeyev, 2007, p. 285)

These transferences of meaning into modalities are framed in a wider system in which exist *"various interactions at a distance, which characterize the process of mutual influence and mutual imitation among the arts; this is called synaesthesia of the arts"* (Galeyev, 1991, p. 455)

It is important to mention that on the definitions provided the core elements refer to imaginative thinking, double metaphor or transfer of meaning. As is can be observed, the definitions given are general and embrace several types of synaesthesia. Thus, among the group of synaesthesia modalities related to the binary aural-visual, we find for instance the phenomenon of "colour hearing" that is the association between musical notes, harmonies or musical scales and colours. The composers Scriabin, Rimsky Korsakov, Messiaen (Galeyev, & Vanechkina, 2001 p. 357) or the contemporary pianist Hélène Grimaud who

has referred to this topic in several occasions (See www.helenegrimaud.com/media/video Sound Tracks: Hélène Grimaud Speaks to Quick Hits 5:53-7:20) are remarkable examples of musicians with this talent.

There is another reasonably different situation in which colour does not have a role within the association process. It is a modality of synaesthesia even more related to the research held which is framed in the associations formed "by similarity"; that is the case of sight-hearing or shape-hearing synaesthesia. In this modality, the parameters of the music (harmonies, melodies, texture etc) are related to graphic elements of form, essentially lines, surfaces and volumes represented on the paper. An example of this could be found on the series of drawings I created in 2012 (See www.juanjoguerra.com/index.php/works/2012) based on Boulez's *Messagesquisse* (1976-1977) for solo cello and six cellos (See figures 1, 2 & 3). Each of the three drawings corresponds to each part in which the musical composition is divided: *Très lent*, *Très rapide* and finally the third drawing groups *Sans tempo, libre* and *Aussi rapide que possible*.

FIGURE 1. JJ GUERRA. 2012

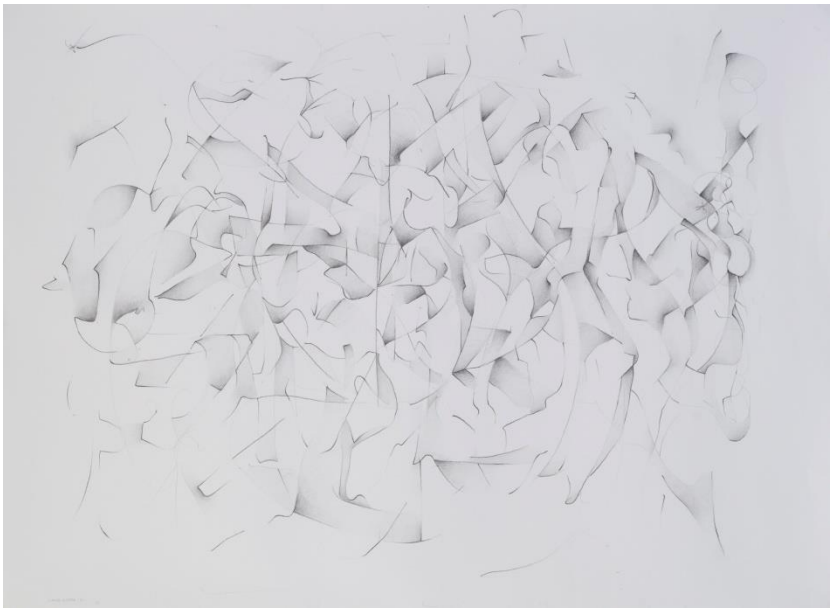

FIGURE 2. JJ GUERRA. 2012

FIGURE 3. JJ GUERRA. 2012

As it can be observed, the three pieces aim to reflect quite different space-time categories. Thus, the first one there are a series of vertical lines and surfaces with configure a deterministic space with proportions and fixed relations between the lines and surfaces suggested. The second piece is on the contrary, a myriad of lines and surfaces interconnected and with no centre of gravity at all. All the elements have the same importance within the composition, there are no fixed relations between them or hierarchies, I aimed to suggest a series of centripetal and centrifugal forces using curved lines. Finally, on the third piece all the characteristics are merged on this composition. At this stage, Boulez's piece seems to condense elements of preceding parts as they appear to be interacting, communicating and becoming one into the other within this final part of *Messagesquisse*.

Regarding examples of artists in which the analogies between the visual and the aural have a predominant role, Galeyev himself provides an example of synaesthesia of the arts referring to the impressionists' composers and more importantly, to the musical paintings of Kandinsky and M. K. Ciurlionis (Galeyev & Vanechkina, 2001 p. 357)

Furthermore, the analogies between the aural and the visual are widely studied and it has considerable significance within the 20th century art. It is essential to bear in mind that artists such the ones mentioned above, Kandinsky and Ciurlionis together with figures such as Frantisek Kupka, Mikhail Matyushin, Xenia Ender, Boris Ender, Mikhail Larionov, Umberto Boccioni, Romolo Romani, Arnold Schönberg (The Lucky Hand paintings), Leopold Survage, Franz Marc, Gino Severini, Vladimir Baranov-Rossiné, Giacomo Balla, Kurt Schwitters, or August Macke devoted his practice to this topic. Among all these artists, the figure of Paul Klee, who was also musician, stands out for the purposes of this research as Boulez himself dedicated his attention in particular.

Concerning synaesthesia, my research relies on two specific modalities: Firstly, Shape – hearing synaesthesia in which, due to the nature of the drawings presented on this paper, colour does not represent a relevant parameter. Secondly, Gravitational synaesthesia which refers to the organisational features of the musicological material, that is, melody, harmony, modality, tonality (or atonality) in relation to a gravitational musical model in which the law of gravity reigns in the same way as it does in the physical world. Let's explain in more detail Gravitational Synaesthesia and its implications.

Musical Gravity

According to the Gravitational Synaesthesia model, music can be explained as a series of interactions between particles (musical notes) and forces that link the particles with a range of intensity values. Thus, *"the evolution of music has involved, to a certain extent,*

the apparent lackening of mode-functional relationships, which, within limits, has resulted in atonality, involving all the tones for complete equality of their rights, and liquidation of whatever tonal center and gravitational pulls exist among them" (Galeyev, 1991, p. 77). In his creative process, Boulez organises these interactions, following a series of compositional techniques derived from those created by Arnold Schoenberg in the early 20th century. Schoenberg revolutionised the compositional methodology and the organisational features of music following the dodecaphonic technique. One of the more relevant aspects of this technique, in terms of the research held on this paper, is that music has no centre of gravity anymore and therefore, there is no fundamental musical tone around which the rest of the musical material has to gravitate. According to Boulez, whereas *"Classic tonal conception is based upon the view of the universe as controlled by gravitational attraction, the conception of serial music [derived from the dodecaphonic one] refers to the hypothesis of a permanently expanding universe"* (Boulez, in Galeyev, 2003 p. 131).

In order to address the concepts and ideas mentioned above through my personal practice, I had to employ a wide range of visual techniques and processes within the drawing with the aim to capture the many different aspects in Boulez's compositions.

I established a parallelism or analogy between musical determinism (serialism) and the use of Descriptive geometry[4] and CAD, as well as between open forms / and free hand drawing.

The Smooth and Striated Space-Time

Among the numerous elements that give shape to Boulez's musical oeuvre, there are a series of concepts that appear to be persistent on his career. That is the case of the Smooth and Striated time-space, ideas *"of special importance for the composer, in both theoretical and compositional terms"* (Campbell, 2014 p. 219).

In addition, Deleuze & Guattari, in their work *A Thousand Plateaus. Capitalism & Schizophrenia*, expand the concept of The Smooth and the Striated in a wider context. They define general properties and application of these concepts and they offer a series of models in which the smooth and striated are applied. One of the models offered by Deleuze & Guattari refers to music: The Musical model. In this *plateau*, they explain that Pierre Boulez is the composer who created *"these concepts and words in the field of music, defining them on several levels [...] Boulez says that in a smooth space one occupies*

[4] Descriptive geometry: Branch of Geometry developed by French mathematician Gaspard Monge (1746-1818) that studies the projections of three-dimensional objects in two dimensional surface (plane).

without counting, whereas in a striated space-time one counts in order to occupy" (Deleuze & Guattari, 1987 p. 477).

On one hand, *"the striated (pulsed) is that which intertwines fixed and variable elements, produces an order and succession of distinct forms, and organizes horizontal melodic lines and vertical harmonic planes".* (Ibid. p. 478). As it can be observed in my works *Hybris I*, Hybris *II* as well as *Medusa* (See Fig. 5, 6 & 10), the striated space-time corresponds to the computer generated image.

On the other hand, the smooth space *"is the continuous variation, continuous development of form; it is the fusion of harmony and melody in favour of the production of properly rhythmic values"* (ibid. p. 478). The free hand drawing on every work developed on this research is a vestige of the smooth space. For example, in *Hybris I* (Fig. 5) the smooth is represented on the right side of the piece, by using free hand drawing.

Furthermore, Boulez states that *"the neumatic system [of musical notation] is better suited to the representation of smooth [lisse] or amorphous time and the proportional system to pulsating, or striated, time. […] I regard the two categories – the smooth and striated time – as capable of reciprocal interaction, since time cannot be only smooth or only striated. But I can say that my whole formal time system is based on these two categories and on them alone"* (Boulez, 1986 p. 87). Additionally, what interests Boulez is the communication and transformations that take place within this particularly binary (amorphous-striated).

In this sense, musical graphic notation has been very useful for the research held in relation to the visual approach and the communication between the aural and the visual, in relation to Boulez's neumatic / proportional system of notation. In particular, Theresa Sauer's project *Notations 21*, who further developed John Cage's work *Notations*, remained particularly useful as it compiles a considerable amount of contemporary composer's graphic scores and it is especially representative of the role played by the visual in representing music.

An example of the process of becoming, or transformation in flux is represented on the triptych entitled *Osmosis-Polyphonic* (2014) (Fig. 7) in which I have combined different techniques with the aim of materialising the communication process mentioned above. Thus, the triptych presents the two spaces strongly linked to each other as they seem to relate in a more profound level thanks to the modification of a space which crystallises and melt and in which a solid volume becomes transparent and mingles with other elements, therefore creating alternative paths to look over the drawing. In other words, *Osmosis* has created a *polyphony* of spaces within the drawing.

THE PERMEABLE GEOMETRY OF TIME: GRAVITATING TOWARDS BOULEZ

This section focuses on the musical and visual concepts used to approach Boulez's musical oeuvre, seeking to establish a preliminary link between the aural and the visual arts, which is further developed throughout my study and practice. In doing so, I associate the composer's musical works with the visual process of drawing.

Diagonal and Blocks

Boulez's concept of the Diagonal is a key element in his musical universe in relation to the smooth and the striated. Thus, Boulez *"drew attention in the early 1950s to a new spatial dimension in his aesthetic, which transcends the traditional axes of harmonic (vertical) and the monodic (horizontal) [...], this new dimension has come to be identified as a 'diagonal', as 'a kind of distribution of points, blocks, or figures' within the sound space."* (Campbell, 2014 p. 221).

Consequently, it can be argued that, through the concept of the Diagonal, Boulez aims to create a musical world which transcends the linearity of melody and harmony and conceive the surface or even the 3-dimensional musical space in which the composer traces (or places) a series of points or blocks that will ultimately give shape to his music.

Deleuze further illuminates this topic by stating that *"[the diagonal] is like a vector-block of harmony and melody, a function of temporalization [...] [it] allows the succession of points seen and the movement of point of view to dissolve in a block of transformation or duration"* (Deleuze, 1998, p.70).

However, are these points and blocks exclusive to music or could they be applied to other arts as well? As Deleuze explains, *"Cinema tells stories with blocks of movement/duration. Painting invents an entirely different type of block. They are not blocks of concepts or blocks of movement / duration but blocks of lines / colors. Music invents another type of blocks that are just as specific"*.(Deleuze, 2007 p. 318).

FIGURE 4. JJ GUERRA. STUDY OF VISUAL BLOCKS, BUBBLES AND TRANSFORMATION. COMPUTER 3D MODEL, 2014

THE SMOOTH STRIATED AND FIXED TIME-SPACE: BLOCKS AND BUBBLES

This section reflects upon the key Boulezian ideas of the smooth, striated and fixed time-space and how I engaged with these ideas through drawing. Thus, this part is divided into two sub-sections: the first introduces and defines the central concepts my study focuses on, while the second explains how I incorporated these ideas in my personal practice using case studies.

Definitions

What would be the shape of Boulezian musical blocks and bubbles explained in the preceding section? Is it possible to find a *substratum* of ideas that explain this in his oeuvre? Campbell remarks that *"in pulsed or striated time, regular durations are associated with chronometric time as signposts, while in amorphous, non-pulsated or smooth time there are no regular pulses or landmarks"*. (Campbell, 2014 p. 233). According to this, Boulez offers a possible answer to these questions: the smooth, striated and fixed time-space. Deleuze defines the striated as *"that which intertwines fixed and variable elements, produces an order and succession of distinct forms, and organizes*

horizontal melodic lines and vertical harmonic planes", while *"the smooth is the continuous variation, continuous development of form; it is the fusion of harmony and melody in favour of the production of properly rhythmic values, the pure act of the drawing of a diagonal across the vertical and the horizontal"*.(Deleuze & Guattari, 1986, pp. 477, 478).

Transformations

A new question emerges here; how can the striated be transformed into the smooth? According to Deleuze*, "the striated and the smooth, is less valuable as a separation than it is as a perpetual communication: there is an alternation and superposition of the two space-times*". (Deleuze, 1986, p. 71). Therefore, we are dealing with two conceptions of time-space and a process of becoming or transformation between the two as *"they may act on each other by osmosis, thus following a biological process"* (Boulez, 1986 p. 87).

During this osmotic process, music would need to show itself *unfolded* in time in order to be perceived or acknowledged. In other words, it would need a *chronological dimension*. Analogously, drawing needs a spatial –physical, as well as conceptual - extension in order to be developed, unfolded and unveiled.

Consequently, there would be a shared *ground* where musical and visual paths meet or even share trajectories regarding their perception, and could communicate with each other in a spatial-temporal dimension.

Accordingly, Music and Drawing would correspond to gradients, instead of categories. They would function as aggregates of space-time as they would dissolve and crystallise alternatively one into the other. Furthermore, they would share a permanent state of flux over a common path of communication (the space-time). As Deleuze & Guattari pointed out,*. "When Glenn Gould speeds up the performance of a piece, he is not just displaying virtuosity, he is transforming the musical points into lines, he is making the whole piece proliferate"* (Deleuze & Guattari, 1986, p. 8).

Hybris I

Hybris I represents my first attempt to engage the smooth and the striated in the context of Boulez's ideas. On this drawing, there are two areas. On one hand, the one on the left depicts the striated. It is a 3D computer design based on the structure of the Peano[5] curve which has the property of filling a surface or a space. On the other hand, the right side of the composition represents the smooth by a free-hand drawing which tries to shape the space defined by the striated. It tries to curve the straight lines as well as sculpt the plane that separates the drawing in the centre of the image. Finally, as it can be observed, there is no space around the figures. Instead, we find expanding figures within an expanding space. Thus, the aim of this composition would be, on one hand, to explore the relation between the smooth and the striated and on the other hand, to reflect on a hypothetical homogeneous space prior to this binary.

[5] Giuseppe Peano, Italian mathematician 1858-1932 See Biographical Dictionary of 20th Century Philosophers, pp. 604,605

FIGURE 5. JJ GUERRA. HYBRIS I, DIGITAL PRINT AND PENCIL ON PAPER, 2014

Hybris II

Following the purpose of *Hybris I*, this drawing explores the materialisation of the smooth and the striated, as well as the interaction and communication between them. Unlike *Hybris I*, this drawing outstands by the homogeneous space that supposes a third neutral space in which the two spaces are embedded. The aim of this drawing is to reflect on the origin of the smooth and the striated and it addresses questions such as: Is there a space above and beyond these two? Could this be a representation of the void/silence?

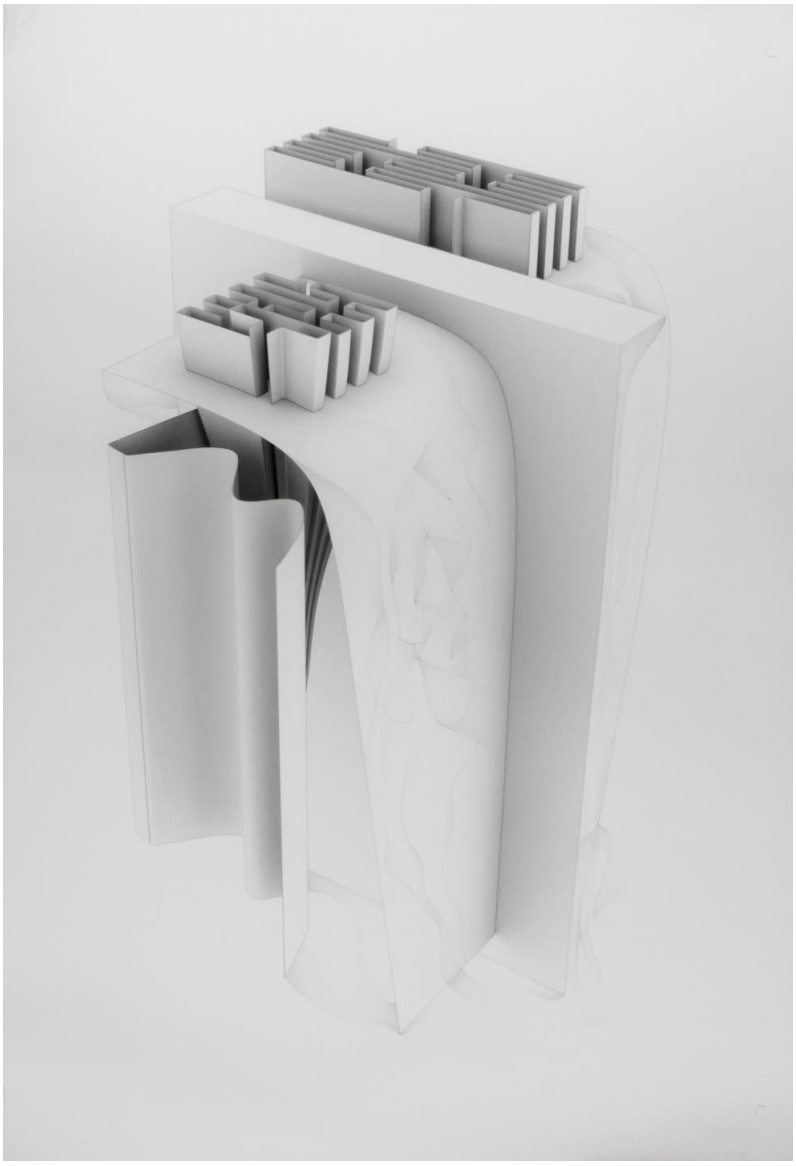

FIGURE 6. JJ GUERRA. HYBRIS II, DIGITAL PRINT AND PENCIL ON PAPER, 2014

Osmosis-Polyphonic

The triptych *Osmosis- Polyphonic* (2014) would offer an example of depicting the process of becoming, or the transformation in flux. In the triptych, I have combined different techniques with the aim of materialising the communication process mentioned above. Thus, *Osmosis-Polyphonic* presents the two 'spaces' strongly linked to each other as they seem to relate in a more profound level thanks to the modification of a space, which crystallises and melts, and in which a solid volume becomes transparent and mingles with other elements, therefore creating alternative paths to look over the drawing. In other words, *Osmosis* has created a *polyphony* of spaces in the composition.

This approach relies on the use of CAD in combination with conventional tools, such as ruler or compass, and free-hand drawing. Additionally, the role of the line as a product of the intersection between planes on the drawing surface is fundamental for the development of this idea, in which the chiaroscuro functions as an element of *demarcation* as well as *rarefaction,* giving thus shape to a kind of drawing in which the mathematically determined surfaces and volumes represented dissolve and mingle, following a process of dissolution *by saturation*.

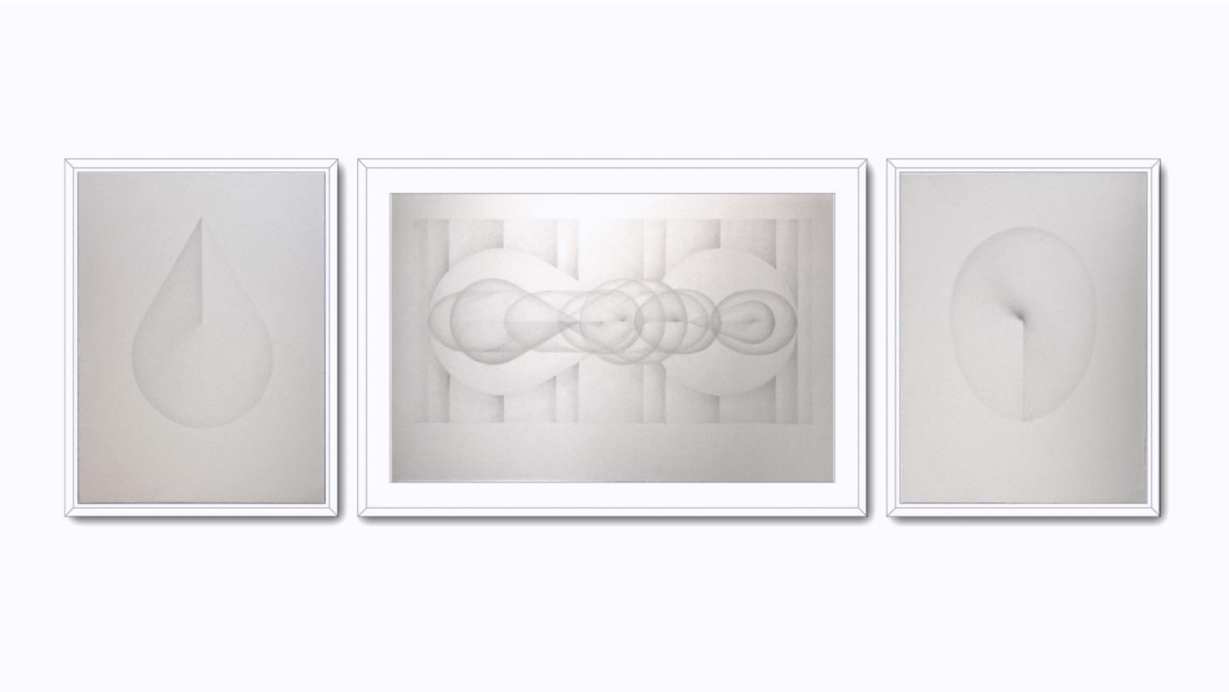

FIGURE 7 JJ GUERRA. *OSMOSIS-POLYPHONIC*, PENCIL ON PAPER, 2014

As mentioned above, *Osmosis-Polyphonic* is formed by three pieces. On the left side of the triptych we find a geometric object called Oloid. The Oloid is formed by two perpendicular circles. In the drawing, this object is represented on top view. The result is a shape that combines straight lines and a tangent circle. In addition, the Oloid's most significant characteristic is symmetry, broken only by the use of chiaroscuro, which gives volume to the object.

The object represented on the right side of the triptych is a cross-cap. This is a geometrical object fundamental in Topology, and it is related to the Moebius strip, which is a surface that has only one side. In the cross-cap *"the border between the inside and the outside is subverted"* (Ragland & Milovanovic, 2004, p. 101). It is still a geometric body, but the concept of the inside and the outside is *in flux.* The geometric place in which the outside and the inside meet and interchange is the self-intersecting line. In fact, *"the words 'inside'*

and 'outside' have lost their raison d'être since they are no longer in opposition but rather continuous" (Ibid. p. 101).

The transformation from the linear (Oloid) into the cyclical flux (cross-cap), would take place in the central piece of the triptych. The Oloid starts its process of rotation, overlapping with the rotation of the Cross cap. Thus, the Oloid *becomes* the cross cap in a process depicted in the centre of the drawing. As a result, this drawing condenses the process of becoming within the context of smooth and striated space-time. This drawing would deal with two different forces: smooth and striated forces.

Regarding the creation process, a feeling of disorientation would invade me while I was drawing, as I could not perceive with clarity how to continue the drawing, even though the location of the geometrical figures was perfectly determined; they had been measured and geometrically studied. This disorientation seems to be caused by the complexity and interweaving of the lines and shadowing. However, immediately after this feeling, I would find an intersection of lines; a sort of graphic buoy that would allow me to continue with the drawing, as planned. Analogously, as Boulez himself states: *"I have certain key markers which enable me to find my way wholly intuitively".* (Boulez, 2000 in Sommer: Pierre Boulez. Eclat / Sur Incises [DVD])

Moreover, these graphic buoys could be represented as handles, pillars or graphic centres of gravity. Indeed, they remain immobile within the laminar and turbulent musical flow. These points or structures display a protective semi-permeable membrane of their own existence. Furthermore, their force fields partially exclude other space-time categories. Thus, the buoys function as fixed or polar stars; points of reference on the everlastingly expanding musical cosmos. In the same way, Boulez explains how he uses a series of fixed musical structures as a guide or an anchor in order to avoid disorientation among the audience. Explaining his masterpiece *Sur Incises* (1996 / 1998), Boulez specifies that:

> *[…] Yet what creates the effect I like in there isn't just virtuosity, satisfying though it may be. It's just that, one is unable, due to the speed, [of the music] to grasp what's going on. You know it's very logical, […], but you can't figure why it's out of sync.*
>
> *[…] the gestures are the same and you'll recognise them […] instinctively because of the sound envelope, as it's called, the instantly recognizable basic sound curves. Even if we don't know the detail of an object we do know its direction"* (Boulez, 2000 in Sommer: Pierre Boulez. Eclat / Sur Incises [DVD])

In addition, the background/time in which this transformation occurs is displayed by vertical marks with very precise proportions, an attempt to represent the striated or pulsed time. Moreover, as it can be observed in the drawing, there are two silhouettes (the cross-

cap and the Oloid sections) that embody a negative space in which striated time does not have any influence. Thus, the fixed points or vertices are grouped under two spherical membranes that operate as a negative space around the striated/chronological time. These *bubbles* protect against the effect of the smooth space-time and, consequently they allow the transformation process. Accordingly, the transformation is framed in a third fixed space which is also related to the smooth and striated space-time. This third space allows the communication between the smooth (chaotic) and the striated (regular).

Finally, it is worth mentioning that this process of *becoming*, is bidirectional and thus, it could start both from the Oloid to the cross-cap or vice-versa. This bi-directionality aims to create an endless flux as the smooth and striated are, in Boulez's words, *"the two categories capable of reciprocal interaction, since time cannot be only smooth or only striated"* (Boulez, 1986 p. 87).

FIGURE 8. JJ GUERRA. DETAIL OF *OSMOSIS-POLYPHONIC*, 2014

Heterophony

Following the processes involved in the study of the Cross-cap and the Oloid, *Heterophony* points out some lines of work, regarding the transformation between forces.

"*Heterophony is a musical recourse of the 20th century that consists of superimposing various aspect of the same melodic line*" (Arnaldo, 2003 p. 401).

Additionally, Boulez defines Heterophony as the *"superposition on a primary structure of a modified aspect of the same structure;…In Heterophony, several aspects of a fundamental formulation coincide […]; its density will consist of various strata, rather as is several sheets of glass were to be superposed, each one bearing a variation of the same pattern"* (Campbell, 2014 p. 210).

Heterophony is developed upon the same principles of *Osmosis-Polyphonic*'s central drawing: the superposition of structures in order to create alternative paths or figures. Additionally, it is based on the *Oloid* and the *Cross cap* as main structures. Thus, this work was created as an expansion of the concepts explored in *Osmosis-Polyphonic*.

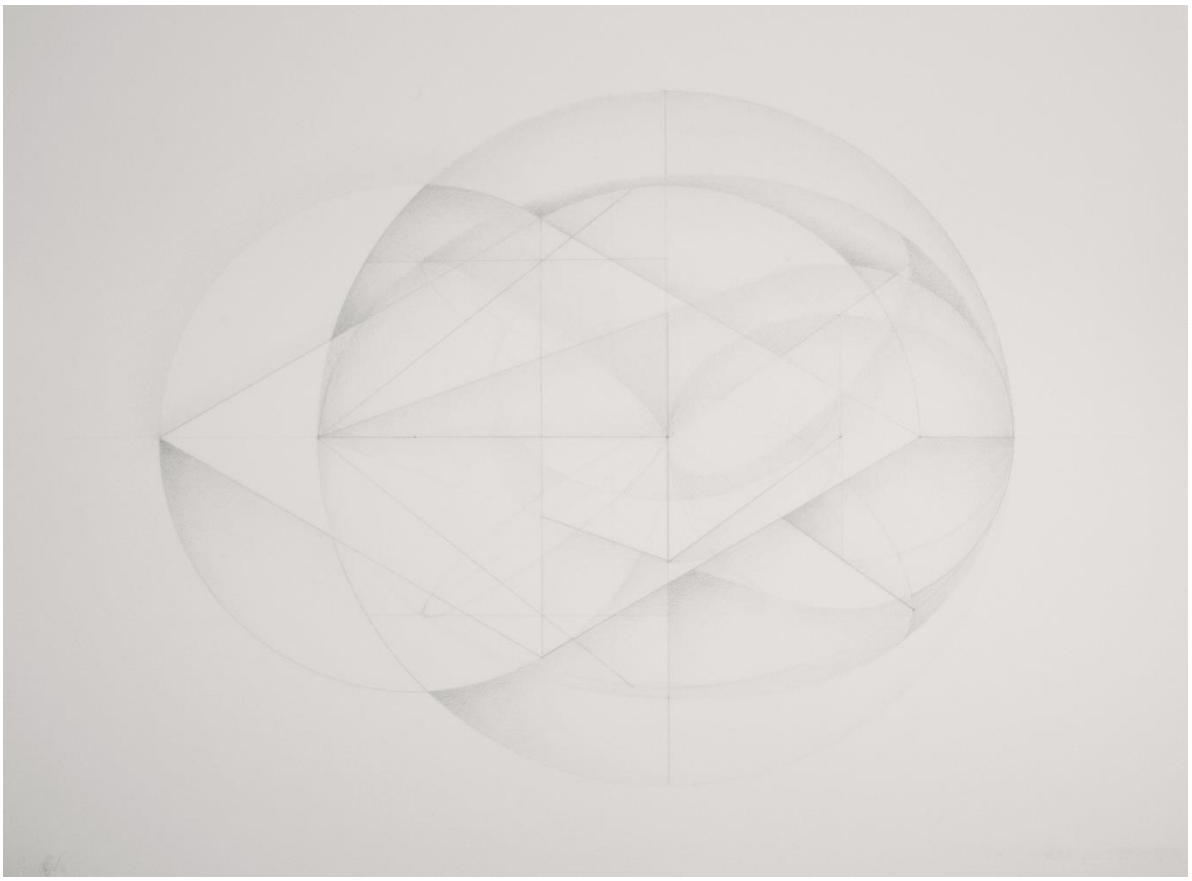

FIGURE 9. JJ GUERRA. HETEROPHONY 2014

Medusa

The aim of this drawing is to represent the process of becoming involved in a volumetric symmetrical structure within a homogeneous meta-space. This volume, generated by computer, is progressively transformed into surfaces which interlace and interweave together, forming a flow.

However, as it can be observed, this stream of lines and surfaces returns and regenerates the volume, sustaining it on a cyclical process of synergy.

The starting point of this process would be located on the top of the drawing. The order and symmetry of the 3D computer model becomes progressively disorder, chaos and untraceable turbulence. Furthermore, Medusa follows a process analogous to magmatic fluid. It seeks to depict an infinite process alternating the crystallisation of structures and their melt down into a tangle of lines and turbulent flows that travel through the surface of the paper (See detail figures 11, 12).

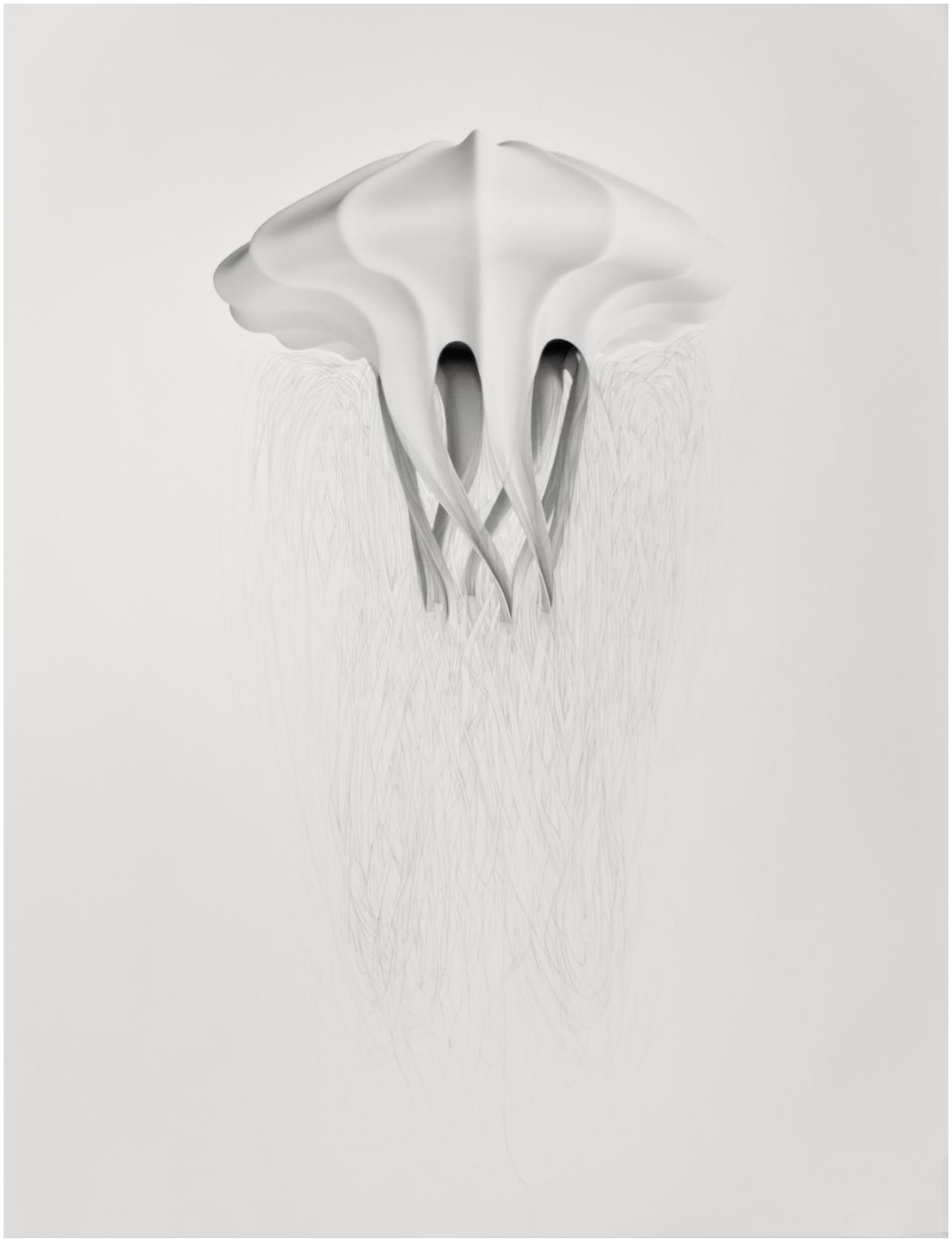

FIGURE 10. JJ GUERRA. MEDUSA DIGITAL PRINT AND PENCIL ON PAPER, 2014

FIGURE 11. JJ GUERRA. MEDUSA (DETAIL) 2014

FIGURE 12. JJ GUERRA. MEDUSA (DETAIL) 2014

Chaos (Χάος)

This drawing approaches the link between space and time and its possible common origin.

The structure presents a gap or abyss which symbolises the unknown that may have existed previous to the formation of space and time. Furthermore, this drawing gives shape to a series of concepts that refers to Chaos and its different definitions. Thus, for instance the drawing is primarily based in the ancient definition of the word chaos, etymologically defined as gap, void or abyss preceding the formation of the Universe or Cosmos.

Rosi Braidotti refers to Deleuze's concept of chaos as a generative force in the following terms: *"Deleuze defines chaos positively as the virtual formation of all possible forms. The generative force of Chaos is the source of its vital elemental powers of renewal and transformation"* (Braidotti, 2011 p. 213), whereas the common use of the word relates to disorder in opposition to Cosmos or *"a state of total confusion with no order"* (Cambridge Dictionary). Following Braidotti's statement, this drawing would represent conceptually the origin or *substratum* of the rest of the drawings developed on this research

In conclusion, this drawing refers to the common link between arts following Deleuze's statement (Deleuze, 1986, p. 16) in which the constitution on space-times is the common link of the different artistic disciplines, a "bond" or generative force through which the communication between the aural and the visual arts become possible.

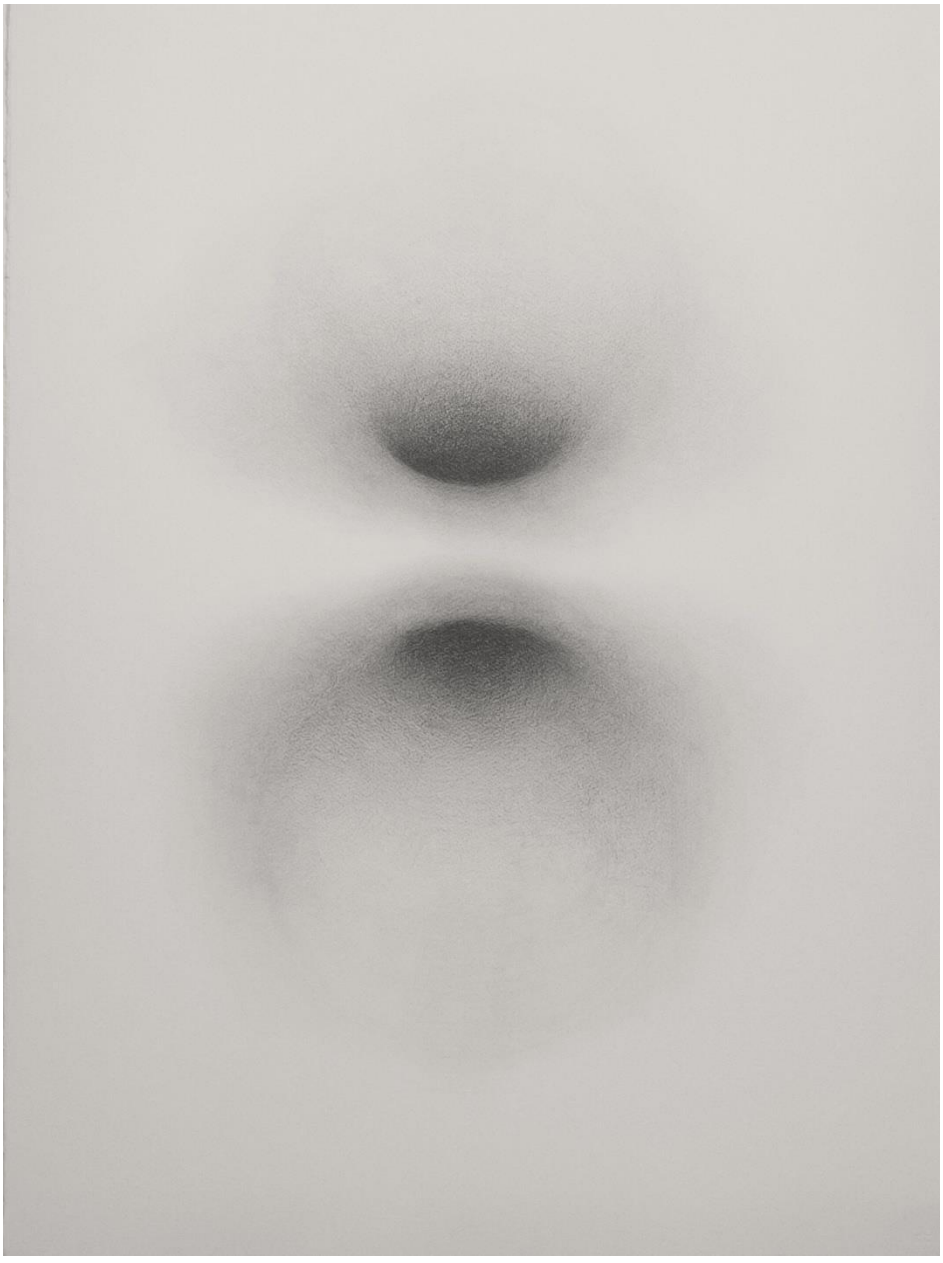

FIGURE 13. JJ GUERRA. CHAOS, 2014

CONCLUSION

The topic of the relations between drawing and music has been the core of my artistic practice for more than a decade. I found that Boulez's music is the one in which I found a particularly profound connection and through which I consider I explored more thoroughly the link between the aural and the visual.

Having in mind the examples shown created on 2014 together with other pieces referred to Boulez's music I have worked in previous years, I followed different approaches. Thus, on the works chronologically older my approach was focused in prioritising the process of listening to the pieces and memorising them without considering any other previous information, study or writing related to the piece.

However, in the recent works such as *Osmosis-Polyphonic*, *Medusa* or *Hybris I & II* the approach is different as my goal was to establish a more complex and profound relation between the music, the theories behind the music and the visual approach through drawing. Accordingly, the drawings presented do not refer to any musical work in particular and at the same time, they engage with many of them. Thus, as it has been explained above, the works from 2014 focus on the Smooth and Striated, concepts that appear several times in many works of Boulez such as *Sur Incises*, *Messagesquisse*, *Éclat*, etc.

The results of my research can be summarised in the following points:

Firstly, the exploration of Synaesthesia in relation to music, the study of Boulez's musical oeuvre and the theories linked to his practice developed by Boulez himself and Deleuze have allowed me to reach a deeper understanding of his music. In particular, the concepts of the smooth, striated and fixed time-space have proved fundamental in establishing a link between his music and my own artistic practice.

Secondly, through my study and practice I have emphasised the useful parallelism between the musical theories of the smooth, striated and fixed space-time, and the processes involved in the creation and development of a drawing. The use of analogical techniques in combination with CAD offers a wide range of possibilities in order to engage visually with these theories.

In conclusion, I have argued that the linkage between visual arts and Boulez's music is a fertile ground worth exploring further. Moreover, it is possible to establish a communication between the aural and the visual through the constitution of a model based on forces either musical or visual. In fact, the transference or the osmosis between the aural and the visual is possible if we assume that drawing and music are ultimately constituted by forces which would form the *substratum* or common ground of these arts.

REFERENCES

Arnaldo, J. (2003) Analogías Musicales. Kandinsky y sus Contemporáneos. Madrid: Fundación Colección Thyssen-Bornemisza.

Boulez, P. (1986) Orientations. London: Faber and Faber .

Boulez, P. (1989) Le pays fertile. Paris: Gallimard.

Boulez, P., Loyrette, H. & Lista, M. (2008) Pierre Boulez. Oeuvre: fragment. Paris: Gallimard.

Brown, S., Collinson, D. Wilkinson, R. (1996) Biographical Dictionary of 20th Century Philosophers, Routledge.

Braidotti, R. (2011) Nomadic Theory. The Portable Rosi Braidotti. Columbia University Press.

Campbell, E. (2013) Music after Deleuze. Bloomsbury.

Campbell, E. (2014) Boulez, Music and Philosophy. Cambridge: Cambridge University Press.

Deleuze, G. (1986). Having an Idea in Cinema. *Deleuze and Guattari: New Mappings in Politics, Philosophy and Culture*, pp.14-20.

Deleuze, G. (1998) Boulez, Proust and Time: 'Occupying Without Counting' *Angelaki: Journal of the theoretical humanities* 3:2 pp. 69-74.

Deleuze, G. and Guattari, F. (1987) A Thousand Plateaus. Capitalism and Schizophrenia. Minneapolis, London: University of Minnesota Press.

Deleuze, G. (2007) Two Regimes of Madness: Texts and Interviews. Semiotext(e) New York.

Galeyev, B. M. (1991) The New "Laokoön": A Periodic System of the Arts. *Leonardo*, Vol. 24, No. 4 pp. 453-456.

Galeyev, B. M. (1993) Synaesthesia and Musical Space: On Yavorsky's Forgotten Hypothesis and a Proposal for an Experiment in Zero Gravity. Leonardo Vol 26, No 1 pp. 73-78.

Galeyev, B. M. (2003) Evolution of Gravitational Synaesthesia in Music: to Color and Light!. *Leonardo* Vol. 36, No 2, pp. 129-134.

Galeyev, B. M. & Vanechkina, I. L. (2001) Was Scriabin a Synesthete?. Leonardo Vol. 34, No 4, pp. 357-361.

Grimaud, H. <http://www.helenegrimaud.com/media/video> [accessed Feb 20th, March 9th]

Guerra-Valiente, J.J.<http:// www.juanjoguerra.com/index.php/works/2012> [accessed Jan 15th, March 10th]

Jameux, D. (1991) Pierre Boulez. Harvard University Press. Cambridge, Massachusetts.

Ragland, E. and Milovanovic, D. (2004) Lacan: Topologically Speaking. New York: Other Press.

Sauer, T. and Cage, J. (2009) Notations 21. New York; London: Mark Batty; Thames & Hudson [distributor]

Pierre Boulez Sur Incises (2000) Directed by Andy Sommer [DVD].