

## DOUBLES IN THE SONIC REALM: COMPOSITIONAL AND AESTHETIC ASPECTS OF TWO RECENT WORKS

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### Abstract

In this article I focus on two recent works: *Huella y Horizonte* (2015) and *Gyre & Gimble* (2016). Here I examine the technical and aesthetic significance of several musical materials and compositional strategies in the creation of a poetics of duplication. The delineation of audible correspondences, of artificial echoes between two or more instruments, is a recurring procedure in my music. This is normally achieved by using surface transducer loudspeakers and other audio devices that directly interact with acoustic instruments. The fascination with doubles (doppelgängers) and mirrors is expressed in these two works from sonic, spatial, structural, gestural, and poetic perspectives. Both *Huella y Horizonte* and *Gyre & Gimble* are paradigmatic examples of these issues, even if they belong to different genres (chamber music and music theatre) and stem from distinct aesthetic and technical approaches.

**Keywords:** sonic duplication, mirrors, doppelgängers, contemporary music, transducer loudspeakers.

## DOBLES EN EL ÁMBITO SONORO

### Resumen

En este artículo me centro en dos obras recientes: *Huella y Horizonte* (2015) y *Gyre & Gimble* (2016). A partir de estas dos piezas se examinarán las implicaciones estético-técnicas de ciertas estrategias compositivas y materiales sonoros, determinantes a la hora de crear una poética de la duplicación en mi música. La delineación de ecos artificiales, de correspondencias sonoras entre dos o más instrumentos es un procedimiento recurrente en mi obra. En general, esto se materializa técnicamente a través del uso de altavoces transductores de superficie y otros dispositivos que interaccionan de forma directa con instrumentos acústicos. La fascinación por el doble y el espejo se plasma en estas dos composiciones desde una perspectiva sonora, espacial, estructural, gestual y poética. Tanto *Huella y Horizonte* como *Gyre & Gimble* son ejemplos paradigmáticos de este tipo de temática, si bien son obras de naturaleza distinta (música de cámara la primera y teatro musical la segunda) que parten de planteamientos y búsquedas estético-técnicas bien diferenciados.

**Palabras clave:** duplicación sónica, espejos, dobles, música contemporánea, altavoces transductores.

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## INTRODUCTION

The sound must seem an echo to the sense<sup>9</sup>.

The suggestion of echoic structures in my music is generally achieved through the use of surface transducer loudspeakers playing identical materials (transmitting them to the surface of specific instruments/objects)<sup>10</sup>, and/or by the performance of coincident techniques by identical or similar instruments. The role of the transducers as generators of echoic interactions is fundamental in my music. These devices are electronically activated. Therefore, from a sonic perspective, they excite distantly located objects, acoustic instruments, and/or sound boards in a simultaneous manner. They are thus capable of distributing the same sonic materials in space and transforming any resonant body into a potential loudspeaker. They operate as intermediate devices that transform electrical impulses into mechanical energy and eventually, once the surfaces on which they are placed vibrate, into acoustic energy. Even if the sonic results are conditioned by the acoustic characteristics of each specific resonant body, a sense of sonic parallelism, of echoic interrelation, is easily suggested when identical sonic materials are transmitted onto a number of different instruments and/or objects.

Alexander Pope's slightly alliterative quote is particularly revealing. The verb «must seem» (as opposed to «is») suggests a process of emulation; an imitation of the phenomenon of echo as a poetic mechanism, as a tool for suggesting sonic correspondences within the same stanza. Analogously, in my music there is usually a process of emulation of echo as an aesthetic device, recalling its physical effect in an artificial and evocative manner. Nevertheless, reducing the issue of sonic duplication to the properties of echo would be rather simplistic. This phenomenon always implies a certain displacement in time between the sonic source and its reflection, a sense of

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<sup>9</sup> Alexander Pope, *Selected poetry*, Oxford, Oxford University Press, 1998, p. 10.

<sup>10</sup> Unlike standard loudspeakers, surface transducer loudspeakers (from now on generically referred to as transducers) lack a diaphragm that moves back and forth, pushing the surrounding air to create sound waves. Instead, surface transducers incorporate a pad, which conducts the vibration (audio signals transformed into mechanical energy) onto the surface against which they are pressed. In such a way, any particular resonant surface or object can be excited by the transducer's vibration. Consequently, the object's oscillation causes alterations in the surrounding air pressure generating sound waves. In my works, the following models of surface transducers are normally used: <https://bit.ly/3gHV5AO> (diameter: 45mm, impedance: 4Ω, power rating: 5W) and <https://bit.ly/3oLTE7f> (diameter: 28mm, impedance: 4Ω, power rating: 3W).

asynchronicity. However, in my music there are often passages in which sonic duplication is explored in an entirely simultaneous way. This determines a different kind of auditory experience in which duplicated events may be perceived as perfect concurrences. Synchronicity is particularly effective in the demarcation of specific acoustic territories as the duplicated sonic sources operate as concomitant and directly related spatial signifiers. The interrelated relationship between space and the perception of synchronous events was accurately described by Carl Jung:

Synchronicity in space can equally well be conceived as perception in time, but remarkably enough it is not so easy to understand synchronicity in time as spatial, for we cannot image any space in which future events are objectively present and could be experienced as such through a reduction of this spatial distance<sup>11</sup>.

In my music there is often an alternation between these two usages of sonic duplication: echoic structures and exact synchronicity. Sometimes there is a gradual shift between these two states, determining an often-ambiguous process of transitions and transformations. This often brings the distinction between the two states to a microscopic and almost imperceptible level. In the next pages I will examine the use of sonic duplication in two recent works, mainly focusing on the use of sonic materials and some related notational strategies.

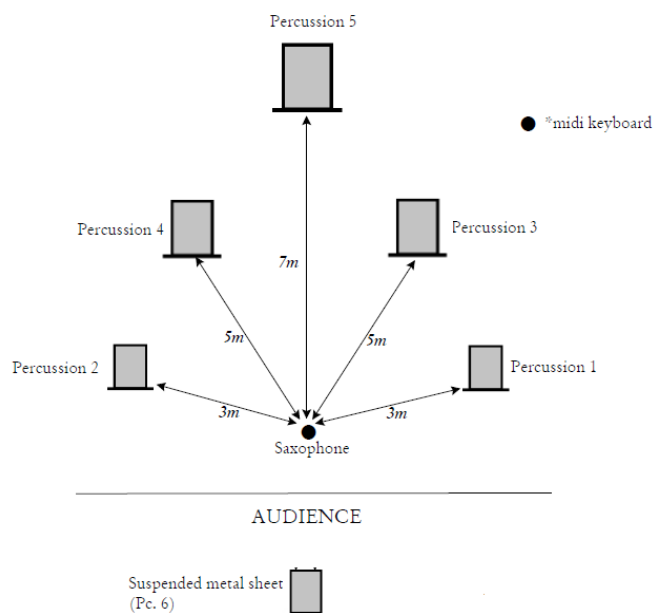
### ***HUELLA Y HORIZONTE: DISTORTING MIRRORS, HIDDEN MESSAGES AND SONIC PALIMPSESTS***

*Huella y Horizonte* is a work for tenor saxophone and five differently sized metal sheets (5 percussionists), which are distributed in a semi-elliptical manner<sup>12</sup>. Most of the sonic materials that define this piece are derived from the saxophone's sonic universe. Its pre-recorded sound defines the material substratum of the majority of audio samples, which are then projected onto the metal sheets through transducer loudspeakers (each sample is triggered by the specific key of a MIDI controller keyboard and distributed in space by a Reaper patch).

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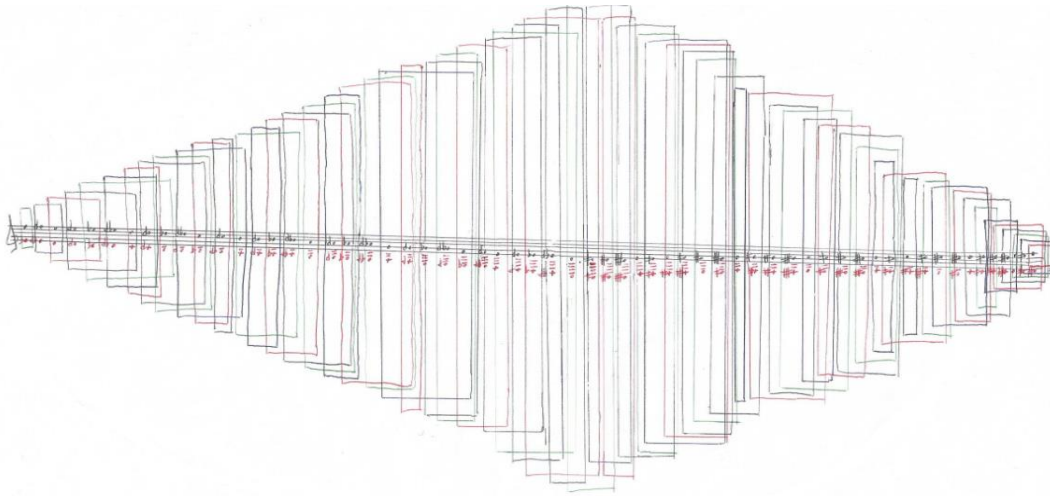
<sup>11</sup> Carl Gustav Jung, *Synchronicity: an Acausal Connecting Principle*, Abingdon, Routledge, 2006, pp. 41-42.

<sup>12</sup> Audio recording of this piece: <https://soundcloud.com/abel-pa/huella-y-horizonte-2>

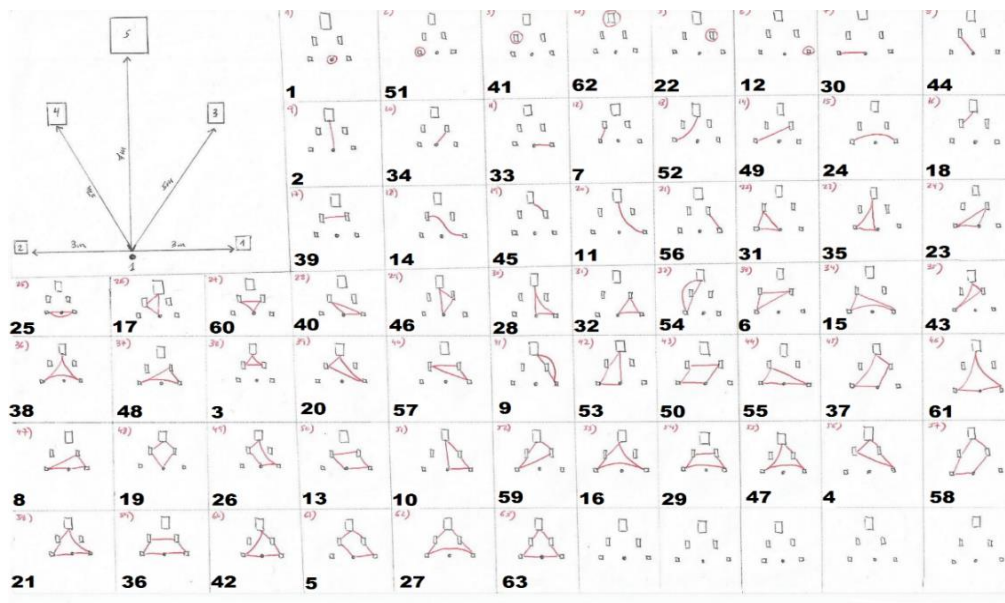


**Fig. 1. Spatial setup of *Huella y Horizonte* (graph by the composer).**

Of the total of 72 different samples played through the transducers, 59 are exclusively based on recordings of the saxophone. The 13 remaining samples are defined by a mixture of speech and discreet underlying saxophone tones. The 59 instrumental recordings can be grouped into different categories: multiphonics (50 recordings), high «teeth-on-reed» tones (6 recordings) and key clicks with air tones (3 recordings). These recordings were carried out during the process of composition and later reworked and readapted for the configuration of each individual sample. In general, the audio samples are organized according to the work's specific pitch distribution. The piece is based on a symmetrical, progressively descending-and-ascending microtonal scale framing an interval of a minor 10<sup>th</sup> (F4-D3-F4). Each of the piece's 63 sections centres on a specific pitch (or on a group of 2, 3 or 4 consecutive pitches). The palindromic nature of this scale also coincides with a somewhat parallel distribution of materials throughout the work. In general, the sections that share the same pitch(es) also display similar materials and character, outlining, to a certain extent, a mirror-like general structure. This also coincides with a symmetrical distribution of setup configurations throughout the piece.



**Fig. 2.** Pitch structure of *Huella y Horizonte* (sketch by the composer)<sup>13</sup>.



**Fig. 3.** Pre-compositional sketch of *Huella y Horizonte* (sketch by the composer)<sup>14</sup>.

The metal sheets operate as true distorting mirrors. Due to the malleability and the flexibility of steel, the materials transmitted through the transducer speakers (metaphorically reflected on the metal surfaces) are acoustically modified when the

<sup>13</sup>Each section focuses on a specific pitch or on a specific number of consecutively ordered pitches. Each individual rectangular box indicates the pitch(es) utilised in a specific section. These rectangles intersect, indicating the number of shared pitches between sections—a maximum of 3 and a minimum of 1, except for the 1<sup>st</sup> and last section, which are independent.

<sup>14</sup>This graph indicates the set of 63 possible instrumental combinations and the order in which they appear in the score.

sheets' levels of curvature are altered. This is generated by the sheet's overtone structure, which is compressed and expanded according to the bending movements. Therefore, and to a large extent, the sonic role of each metal sheet is that of a modulator, shaping the nature of the projected sounds by effecting changes in their concavity and convexity levels. However, the metal sheets produce several sonic effects regardless of the materials projected through the transducers. These can be divided into two categories: sounds generated by the actual motion of the sheets (e.g. thunder-like effects, swishing noises produced by rapid bending movements, etc.) and sounds produced by applying and rubbing different beaters and objects onto their surface (e.g. superballs, porcelain mugs, corrugated plastic tubes, bows, etc.). Eventually, the final sonic results can be defined as a hybridisation between the pre-recorded materials and steel's sonic identity.

During the process of this composition, I was particularly interested in the use of mirrors by different artists, chiefly Robert Smithson and Anish Kapoor. Kapoor's distorting mirrors have a comparable effect, from a visual perspective, to the warped sonic outcome of my metal sheets. Kapoor's large mirroring surfaces reshape the figure of the spectator dramatically and, simultaneously, insert it into the sculpture itself (the observer becomes part of the artwork). Additionally, these mirroring sculptures appropriate the surrounding space. In *Huella y Horizonte* an analogous process takes place. The saxophone could be compared to the spectator in Kapoor's sculptures as it is sonically reflected and misshapen by the changing positions of the metal sheets. The occasional techniques performed on the sheets' surfaces could be metaphorically related to the unavoidable reflection caused by the surrounding space in Kapoor's mirrors. These spaces generate warped visual contexts, specific backgrounds onto which the viewer's reflected image is projected. The extended techniques performed onto the metal sheets create a similar effect: sonic frameworks onto which the pre-recorded sound of the saxophone is superimposed.



**Fig. 4.** Kapoor, H. (2007). *C-curve* [Stainless steel]. Retrieved from:  
<https://search.creativecommons.org/photos/ded087b0-57d1-43c4-9b8f-460c014142ed>

To a certain extent, these processes of distortion could also be compared to the technique of anamorphosis. In painting, anamorphosis refers to the particular technique by which certain images are represented according to a distorted projection so that the viewer must utilize special devices and/or be positioned at a particular vantage point to reconstruct the image. The bending processes applied to the metal sheets could be allegorically compared to this specific technique; the level of curvature operates rather like perspective. In this sense, a straight metal sheet—causing no or almost no sonic alteration in the original samples played through the transducers—could be compared with the exact vantage point from which an anamorphic image should be observed. An increasing curvature creates a growing distortion in the sound, just as the aspect of an anamorphic image becomes more and more deformed once the viewer moves away from the vantage point.



**Fig. 5.** Holbein, H. (1533). Anamorphic skull from *The Ambassadors* [Oil on canvas]. Retrieved from:  
[http://employees.oneonta.edu/farberas/arth/Images/Ambassadors/amb\\_floor\\_large.jpg](http://employees.oneonta.edu/farberas/arth/Images/Ambassadors/amb_floor_large.jpg)

In *Huella y Horizonte*, this metaphorical process of anamorphosis is particularly evident in passages where there is a clear transition between a vertical position of the sheets and other levels of bending. Once the sheets are curved, the pre-recorded sound of the saxophone becomes somewhat warped and distorted. Sometimes, the level of distortion created by the process of bending is such that the nature of the original recording is almost impossible to identify. This anamorphic treatment of the pre-recorded materials creates an oblique link with the original source. In most cases, the materials played through the transducer speakers are coincident with those played by the saxophonist. However, the bending processes determine new relationships with the original, new displacements and extensions of its sonic identity. This is comparable to the role of the anamorphic image in relation to the position of the viewer:

Unlike perspective, anamorphosis does not reduce forms to their visible outline. Rather, it distorts them through a process that projects them outside themselves [...] It implies a displacement of the subject and its reinscription according to a trajectory of obliqueness. Anamorphosis supplants the frontality of the visible, since the position of the viewing subject is now constituted outside the parameters that define visual semblance<sup>15</sup>.

In *Huella y Horizonte*, the use of specific techniques and processes of bending and sonic distortion is often outlined in a parallel, mirror-like manner. As previously discussed, these events are organised either in an imitative, echoic manner or in a perfectly synchronised way. The pre-recorded materials played through the transducers usually coincide with the materials played by the saxophone. This creates a feeling of sonic duplication between the centre of the ensemble and its surrounding satellites.

The shift between simultaneous and imitative bending/distorting processes and other techniques determines different experiential approaches to sonic duplication. In some passages there is a constant process of transfer between these different states, creating an impression of ambiguity in the listener's perception. Interestingly, the discernment between simultaneity and non-simultaneity involves different time intervals in the aural and visual domains. This may perhaps add a layer of complexity to the audio-visual processes in which both gesture and sound are apparently concomitant.

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<sup>15</sup> David Michael Levin, *Modernity and the Hegemony of Vision*, Berkeley, University of California Press, 1993, p. 67.



We perceive audio signals as non-simultaneous if they are separated by an interval of roughly 6 milliseconds. If that separating interval is shorter, we perceive audio signals as being simultaneous. Visual impressions which are separated by an interval of 20 to 30 milliseconds are experienced as non-simultaneous<sup>16</sup>.

**Fig. 6.** Bars 33-37 & 49-51. The first image shows synchronised bending/distorting processes in which there is a coincident use of identical pre-recorded materials (saxophone multiphonics) and equal techniques (irregular tapping with the fingers). The second image displays imitative (echoic) bending/distortion processes and the usage of identical pre-recorded materials (saxophone multiphonics).

Figure 3 shows all the different setup combinations utilised throughout the work. Each of the piece's sections displays a specific combination of instruments and establishes different spatial relationships. The sonic materials explored in each individual section are usually identical between the metal sheets; the transduced materials coincide and so do the actual effects performed on their surfaces. This creates several auditory bridges between the sheets themselves and between them and the saxophone. The sense of sonic correspondence is consistent throughout the score, determining a variable network of echoic structures and acoustic mirrors in the space of performance.

<sup>16</sup> Susie Vrobel, Otto Rössler & Terry Marks-Tarlow (eds.), *Simultaneity: Temporal Structures and Observer Perspectives*, Singapore, World Scientific Publishing, 2008, p. 8.

Interestingly, the notion of acoustic mirrors is of great relevance in some psychoanalytical theories. For Guy Rosolato, the voice operates as an acoustic mirror in between body and language, essential for the development of the subject's personality. In this regard, the voice can be articulated and heard simultaneously, being impossible to ascertain whether it is «outside» or «inside» of ourselves. This has a similar effect to the reflection of an individual in a mirror; his/her image is both in the reflecting surface and outside of it. As Rosolato states in the following quote (translated by Silverman),

The voice [has the property] of being at the same time emitted and heard, sent and received, and by the subject himself, as if, in comparison with the look, an “acoustic” mirror were always in effect. Thus, the images of entry and departure relative to the body are narrowly articulated. They can come to be confounded, inverted, to prevail one over the other<sup>17</sup>.

In *Huella y Horizonte*, the function of the saxophone's sound—both acoustic and pre-recorded—is somewhat analogous to that of the voice in Rosolato's observation. On many occasions, the saxophone executes a sound that is simultaneously heard in the surrounding metal sheets. This often suggests a feeling of sonic continuum between the instrument and its oblong metallic satellites. At times, this sonic continuity impedes the auditory distinction between the original source and its pre-recorded versions, generating a sense of ambiguity and possible auditory misidentifications.

This feeling of uncertainty is often semantically encompassed by the textual elements that constitute some of the work's pre-recorded samples. These recited texts are utilized both as sonic materials (treating speech as a uniform sonic substratum) and/or as almost unintelligible hidden messages within the work's sonic framework. These fragmentary texts (extracted from Amundsen's *South Pole Expedition diary*, Copernicus' *De revolutionibus orbium coelestium* and Melville's *Moby Dick*) focus on issues such as disorientation, the inability of identifying specific geographical spots and discerning between real and imaginary places. «We reckoned now that we were at the Pole. Of course, every one of us knew that we were not standing on the absolute spot;

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<sup>17</sup> Quoted in Kaja Silverman, *The Acoustic Mirror: The Female Voice in Psychoanalysis and Cinema*, Bloomington, Indiana University Press, 1988, p. 78.

it would be an impossibility with the time and the instruments at our disposal to ascertain the exact spot»<sup>18</sup>.

The sonic alteration of the pre-recorded sources caused by the bending process applied to the metal sheets may be metaphorically compared to the impossibility of locating concrete geographical points in a territory. The exact aural identification of a pre-recorded material and, by extension, its accurate amplification, is challenged by the distortion levels produced by the different bending degrees. Reaching this ideal reproduction is often an evasive task, a process challenged by the dynamic alternation of shapes, positions and external effects performed on the metal sheets. In this regard, the intelligibility of the textual materials is variable. Depending on the level of distortion, the extent to which the texts may be comprehended fluctuates. These quotations may be interpreted as concealed messages that occasionally emerge from the sonic framework of the piece. Additionally, in some cases, the accumulation of different speech layers is utilized to create a uniform sonic stratum. This may be perceived as a collection of distant, incomprehensible commentators that, simultaneously, generate a relatively static sonic layer. This is projected onto the surface of the metal sheets, delineating once more a sense of common materiality and acoustic duplication.

On some occasions, the sonic nature of speech is emulated by the techniques performed on the metal sheets, particularly in passages where superballs and bows are utilised. These techniques produce effects that resemble speech in articulation and character. Usually, these techniques are performed when the speech recordings are simultaneously played through the transducers. Somehow, this could be interpreted as a particular “sonic palimpsest”; speech-like sounds “imprinted” onto a surface, which in turn is sonically excited by pre-recorded speech. Ironically, the application of these techniques obliterates to a large extent the comprehension of the underlying words played through the speakers. This process of effacement is inextricably related to the nature of palimpsests. However, in these passages, there are sometimes noticeable emanations from the pre-recorded stratum. These may be perceived as sonic traces or remnants.

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<sup>18</sup> Roald Amundsen, *South Pole: an Account of the Norwegian Antarctic Expedition in the Fram, 1910-1912*, Padeborn, Salzwasser Verlag, 2010, p. 302.

Acoustic palimpsests often involve sounds that we weren't supposed to hear: sounds related to the body, to technological mediation, to the neutral background, to the inaudible politics that undergird all sonic situations. The palimpsest metaphor encourages us to listen for the quietest of sounds, and to imagine erased sounds stubbornly pushing back through the threshold of audibility as well<sup>19</sup>.

The levels of sonic distortion generated by the different metal sheets are often configured in a coincident or correlative manner. This evidently coincides with the symmetrical degrees of curvature applied to the metal sheets. Only minor sonic deviations and dissimilarities may be perceivable due to the metal sheets' size differences (the ones located at the front of the setup are smaller than the ones in the back and middle positions). The cases in which coordinated sonic distortion processes coincide with a parallel configuration of the sheets' bending degrees fulfil the audio-visual contract in a particularly apparent manner. This emphasizes the predominant sense of symmetry and audio-visual duplication suggested throughout the piece.

The image displays a musical score for three percussion parts: Perc. 1, Perc. 3, and Perc. 5. The score is divided into three systems. The first system features Perc. 1 and Perc. 3, with time signatures of 5/4 and 5/8. The second system features Perc. 5, with time signatures of 5/8, 5/16, and 5/8. The score includes rhythmic notation, dynamic markings (ppp, pp, p, mp, mf), and performance instructions such as 'Rub small superball'. The Perc. 5 part includes a section labeled 'JAMUNDISEN'.

**Fig. 7.** Bars 102-107. Sonic palimpsests: combination of pre-recorded speech (played through transducers speakers) and speech-emulating effects (superball rubbing motions).

<sup>19</sup>Martin Daughtry, *Acoustic Palimpsests*, Middletown, Wesleylan University Press, 2017, p. 78.

Fig. 8. Bars 222-230. Coincident levels of sonic distortion achieved through identical bending processes and the use of the same techniques.

### GYRE & GIMBLE: THE VOICE AND ITS DOUBLE

In the chamber opera *Gyre & Gimble*, the voice of specific singers is utilised to excite different instruments and objects through transducer speakers<sup>20</sup>. Each of the four rooms that constitute the work's spatial setup is associated with the voice of an individual singer. Therefore, each room's sonic identity is not only defined by these singers' vocal features but also by the acoustic qualities of the instruments populating these demarcated spaces.

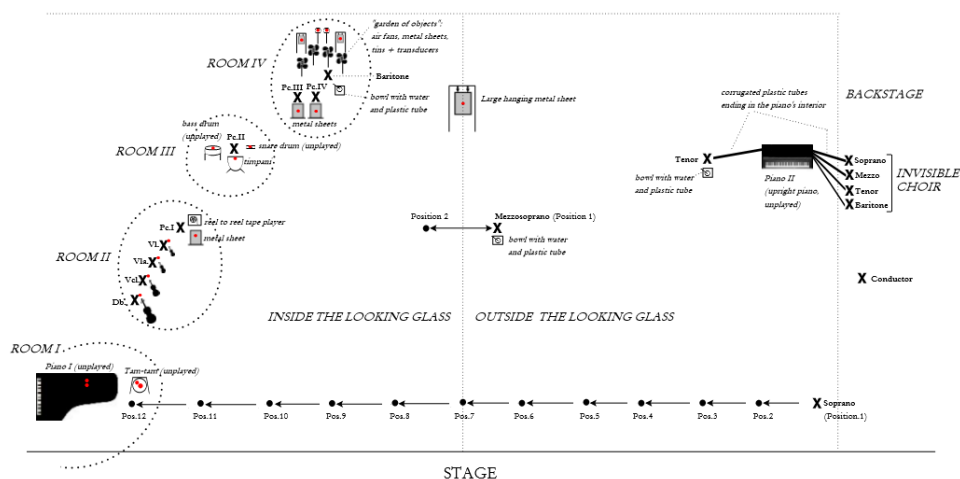


Fig. 9. Setup of *Gyre and Gimble* (graph by the composer).

<sup>20</sup> Video recording of this piece: <https://www.youtube.com/watch?v=6rsjUGzwcVo>

During the process of composition, a vast number of recordings (more than one hundred) were carried out. These generally involved long tones and speech fragments sung and spoken by the mezzo-soprano, the tenor and the baritone. The pitched materials were based on long tones, framing the syllables of the following words: «idea», «memory» and «look» (these are, in fact, the only words sung throughout the entire score). These long tones were also sung into plastic tubes ending in water bowls—operating as primitive vocal filters—and recorded accordingly. The use of this sort of vocal filter is also particularly widespread throughout the score.

The speech recordings were based on some short passages from Carroll's *Through the Looking Glass*, read aloud by the aforementioned vocalists. Crucially, the vocalists in charge of these recordings were the same ones that took part in the first and only performance of the piece. Paradoxically, this is an element of great importance in the delineation of a feeling of sonic duplication throughout the work and raises relevant questions regarding the feasibility of future performances by alternative vocal ensembles.

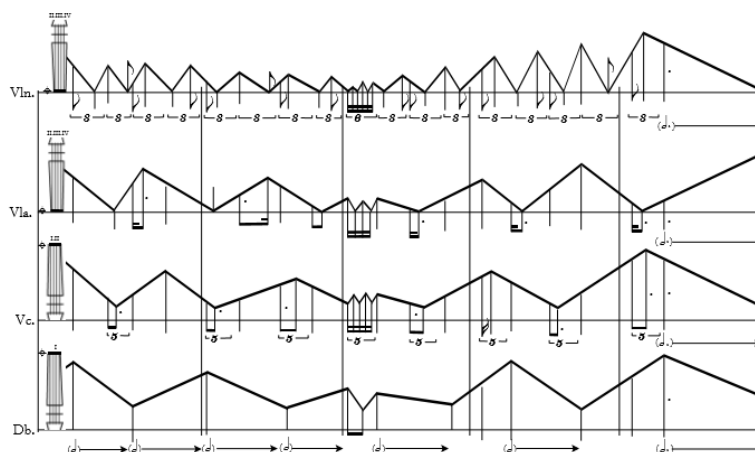
The definitive audio samples utilised in the performance (which were ultimately controlled by a Reaper sampler patch and a MIDI keyboard) were the result of an intense process of experimentation. The original recordings were transferred through transducers to the surface of different objects and instruments with the aim of studying their unique acoustic behaviours and sonic outcomes. Eventually, a unique distribution of the materials was outlined, defining a limited number of instrumental families. These were divided according to common acoustic properties and similar sonic results. Each of these instrumental families defines the individual sonic identity of each of the four rooms that constitute the work's setup.

Room I is characterised by highly resonant instruments: tam-tam and piano (with the sustain pedal depressed). These instruments amplify recordings of all the singers' voices except for the soprano, who does not sing until the very end of the work. The resonance of these two instruments is never stopped or altered. Thus, they usually keep sounding for a few seconds after the transducers cease to vibrate.

Room II is defined by the presence of a string ensemble: violin, viola, cello and double bass. This room is mainly associated with the mezzo-soprano's voice. The strings and

other areas of the instruments are rubbed with transducer speakers in several ways (linear and circular movements, tapping on the bridge, etc.). In this work, the materials transmitted through the transducers are fully based on the mezzo-soprano's voice, determining a set of hybrid instruments in which her vocal identity is intertwined with the sonic universe of the strings. In general, there is a substantial difference between the resonating properties of small instruments (violin, viola) and those of large instruments (cello, double bass). The strings of the cello and double bass create more friction against the transducer and provide larger sound boards. This allows a more explicit process of hybridisation between the pre-recorded materials and the sonic identity of the instruments than in the case of the violin and viola. In general, the rubbing processes are imitative, showing a relatively coordinated intervention of all the string instruments.

Consequently, this produces a unified texture in which the same audio file (played simultaneously through the four transducers) blends in with the residual sounds generated throughout the rubbing processes. As opposed to Room I—in which the aural recognisability of the original voices is enhanced by the well-resonant attributes of the piano and the tam-tam—in Room II the auditory identification is challenged by the friction and constant movement of the transducers on the strings. The result is crossbred, leaving the aural identification of the mezzo-soprano's voice in an ambiguous area. Ultimately, this generates a complex but unitary texture, a unique and intricate form of sonic syncretism.



**Fig. 10. *Gyre & Gimble* (bars 6-10). Rubbing movements of the transducers on the strings.**

As previously mentioned, room III is defined by several membranophones—timpani, bass drum and snare drum—with transducers fixed to their drumheads. In general, these instruments are highly effective in propagating the materials transmitted through the transducers (in this case recordings of the tenor’s voice). While the bass drum and snare drum operate as static resonators, the individual timpani is manipulated by a percussionist, using the pedal as a modulator. The materials transmitted through the transducer are sonically transformed as the head’s tension increases or decreases according to pedal changes. This modulating effect may again be compared to the process of zooming in or out with a camera. Depending on the level of optical magnification certain images are properly focused while others become out of focus. Similarly, specific frequencies from the pre-recorded materials are highlighted depending on the timpani’s actual tuning.

Some supplementary techniques are performed on the timpani’s head, adding an extra layer of complexity to the sonic identity of the instrument and blurring, to an extent, the recognisability of the materials played through the transducer. These techniques are mainly defined by rubbing superballs and hitting different beaters on the instrument’s head. These are often carried out simultaneously with the pedal changing processes and operate as additional modifiers of the timpani’s acoustic properties.

The figure shows musical notation for three elements in Room III. The top staff is labeled 'Timpani head (transducer)' and contains a melodic line with notes and rests, with dynamics *p*, *mp*, and *pp* indicated. Above this staff is a technique 'Rub superball on membrane' with notes and rests. The middle staff is labeled 'Pedal' and shows a line with dynamic markings *(d)* and *(s)* and arrows indicating movement. The bottom staff is labeled 'Unplayed percussion (Bass drum + membranophones) (transducers)' and contains a percussive line with notes and rests, with dynamics *(p)* and *(pp)* indicated. The entire notation is grouped under the label 'ROOM III' on the left.

**Fig. 11. Gyre & Gimble (bars 15-18). Notation of the timpani’s part and other elements in Room III.**



Room IV is characterised by the use of metal as a resonant material. The transducers are fixed to several metal sheets and empty metal tins. Most of these objects are utilized as installational elements, hanging at different heights from several strategically situated frames and stands. For practical reasons, during the first performance of the piece the metal tins were replaced with small metal sheets to achieve a better sound projection. These metal sheets are remarkably diverse in size and shape (the dimension of the largest one is 2 x 1m while the smallest is 20cm x 1m). The different sizes produce slightly diverse reverberating qualities but do not hinder the clear aural recognition of the original sound materials (consisting almost exclusively of recordings of the baritone's voice).

In this room, two additional metal sheets are physically manipulated by a couple of percussionists. The materials played through these sheets' transducers are coincident with those transmitted to the hanging sheets. These sheets are utilized in an analogous manner to those in *Huella y Horizonte* by the application of bending, wobbling and rubbing actions. This adds a layer of complexity to this room's overall sonic framework. This space is consequently divided into two halves from a sonic and performative perspective. On one hand, a static collection of metal sheets vibrates almost imperceptibly once the transducers transmit their mechanical energy onto their surfaces (without significantly altering or obscuring the nature of the pre-recorded materials) and, on the other hand, dynamic processes of sonic warping generated by the active manipulation of individual metal sheets. In such a way, and from an allegorical point of view, two kinds of sonic mirrors—static and distorting—are simultaneously suggested.

In this work, there is a constant echoic interaction between the singers and the objects/spaces onto which their voice is transmitted. These echoic relationships take place constantly throughout the score but are often concealed by the distortion processes produced by the acoustic properties of each individual instrument and the supplementary techniques applied to them.

Occasionally, this impedes a clear aural association between the original sources and their related sonic satellites. Nevertheless, the process of echoic displacements is a fundamental factor for the work's structural configuration. The singers' pre-recorded

voices are utilised as sonic exciters that induce the acoustic response of otherwise inert objects and instruments. This determines an almost dialogical relationship between each singer (except for the soprano)<sup>21</sup> and the specific rooms in which his/her pre-recorded voice is amplified. The interventions of each individual singer usually coincide with the sonic activation of his/her associated room (and therefore with his/her corresponding ensemble or installation). Similarly, the specific vocal techniques performed by the singers on the stage—long-tone singing, singing into water bowls, speaking, etc.—usually coincide with the pre-recorded materials played through the transducers.

Ultimately, the sonic identity of the piece is fully dependent on the individuality of the singers' voices, on their little inflexions and vocal features. The nature of these voices also animates sonically the objects and instruments located in the adjacent rooms. Each singer's vocal peculiarities (individual timbral and articulating characteristics) are then transmitted and multiplied by using transducers. Ideally, these vocal specificities should form part of the identity of the piece, which raises significant questions regarding the suitability of the original electronic part for future performances of the work.

This interrogates, as mentioned earlier, the extent to which the feeling of duplication would prevail if different singers were involved in a new version of the piece or, contrarily, whether a complete re-elaboration of the electronic part should be carried out before any new performance. Further questions arise regarding the definitive version of the piece if the electronic part would be constantly reformulated, namely the extent to which the structural framework could consolidate the work's overall identity if the nature of the pre-recorded materials changed frequently. Consequently, this work will always be in a potential state of modification, depending upon the singers' own vocal features and particularities.

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<sup>21</sup> The soprano is not related to any specific room. As discussed before, she wanders across her fellow singers' territories in the course of her stage journey.

**Fig. 12: Gyre & Gimble (bars 34–43). Baritone’s part and his associated room. The pre-recorded materials transmitted through the transducers to the metal sheets largely coincide with the vocal techniques performed simultaneously by this singer.**

The soprano’s role is also interesting from a point of view of sonic duplication (also potentially variable depending on the specific rendition of the piece). Her function is defined by a process of mimicry; she shapes her mouth and facial expression according to the materials played through her loudspeaker. These materials are based on relatively modified recordings of her counterparts’ voices. This creates an uncanny sense of duplication by which the rest of the singers may hear their own voices in an illusory manner once she starts fake-singing (or fake-speaking). The recordings played through her loudspeaker always refer to the other singers’ vocal identity. However, in most cases, these recordings are considerably transformed and distorted by using high and low pass filters, white noise, etc. This often places the aural recognisability of the original source in a fragile, ambiguous territory.

The echoic relationships established between the singers and their related hybrid instruments do not always follow an expected dialectical order of appearance—first the original sources (singers) and then their sonic replicas. In some passages of the piece, this specific order is inverted so that the pre-recorded materials are heard first, anticipating their actual materialisation on stage by the singers. This is particularly evident in the first bars of the piece, where the tam-tam and the piano amplify the

recording of the mezzo-soprano's voice approximately twenty seconds before she begins to sing. This inversion responds to the intention of creating a feeling of temporal reversibility, of altering the somewhat hierarchical relationship between the sonic source and its reflection. As Humphries observes,

Echo...points to a loss of the Logos, a deferment of origin through the ever repeated, always provisional postulation of a primal anteriority. The first "voice" or origin is always displaced by its own repetition [...] What is being repeated or echoed are other echoes. The question of chronological priority is really moot in this perspective<sup>22</sup>.

The echoic interactions are often multiple and simultaneous throughout the score, leading to the concurrent «sonic activation» of several rooms throughout the performance. This creates a complex effect: the aural association between related sources is relatively hindered by the accumulation of sonic events but at the same time reveals the manifold nature of the echoic interactions present throughout the work. Tangentially, this variety of acoustic reflections —produced by the surface and sound boards of different objects and instruments— finds some resonance in some of Plato's notions. The Athenian philosopher observed the distinct sonic reflections caused by the texture of different objects and described the phenomenon in *Phaedrus* and *The Republic*: «and just as a breeze or perhaps an echo, springing from smooth and solid objects, is borne back whence it set forth»<sup>23</sup> or «the echo of the rocks and the place in which they are assembled redoubles the sound»<sup>24</sup>.

Another relevant element of this work (also from a perspective of sonic duplication) is defined by the presence of a small choir in one of the extremes of the stage. The singers of this vocal ensemble (whose register matches that of the main singers on the stage: soprano, mezzo-soprano, tenor and baritone) operate as almost concealed and static sonic sources and are sonically related to their scenic counterparts. Their voices are transmitted through long corrugated tubes into the interior of a grand piano with the sustain pedal depressed. The choir's voices are thus dislocated, always heard inside the piano. This lateral choir operates as a halfway element between the actual live vocal performance and the partially acousmatic hybrid universe of the transducers.

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<sup>22</sup> Quoted in Robert M. Strozier, *Saussure, Derrida, and the Metaphysics of Subjectivity*, Berlin, Mouton de Gruyter, 1988, p. 207.

<sup>23</sup> Plato, *Phaedrus*, Ithaca, Cornell University Press, 1998, p. 61.

<sup>24</sup> Plato, *The Republic*, New York, Anchor Books, 1989, p. 183.

Occasionally, the choir retakes materials or passages previously sung by the main singers or played through the transducers. Alternatively, in other passages, the choir creates the effect of a distant sonic palimpsest, performing similar materials to those simultaneously executed by the main singers. In both cases, these interactions may be perceived as echoic effects.

Fig. 13. *Gyre & Gimble* (bars 145-148). The choir retakes the materials being played through the transducers in Room I, generating an echoic effect.

Fig. 14. *Gyre & Gimble* (bars 204-205): simultaneous performance of similar materials (speech) by the main singers and the hidden choir.

The choir may also be regarded as a group of doppelgangers that operate as immobile versions or representations of their active counterparts. From a poetic point of view, they may be perceived as external commentators or perhaps as somewhat immaterial extensions of the main singers' psyches. They belong to a static, inaccessible parallel realm, which is only sensed by the onstage singers through the piano's resonant aura. This instrument works as an amplifier and as a connector between two disconnected realms. The only main vocalist that enters the hidden choir's territory is the soprano right at the end of her journey across the stage. Eventually, and from a theatrical perspective, she becomes one more member of the choir, symbolizing the conclusion of a progressive process of objectification. From a different perspective, platonic resonances are evident in the disconnection between the choir and the stage. In the well-known Allegory of the Cave, Plato describes the dissociation between the echoed voice of the passers-by and the shadows observed by the prisoners. These prisoners do not know any other form of reality than the one suggested by the shadows projected on the wall from objects passing in front of a fire behind them, and by the echoes of voices in the distance. «And suppose further that the prison had an echo which came from the other side, would they not be sure to fancy when one of the passers-by spoke that the voice which they heard came from the passing shadow?»<sup>25</sup>.

A similar phenomenon occurs in *Gyre and Gimble*. The main singers on the stage are only able to apprehend elements from the parallel realm—the lateral choir—by means of sonic displacement. The choir remains physically detached; the voices are poured into the piano, but these singers do not create any visual contact or physical interaction with their counterparts. The choir voices are perceived as disembodied, ethereal echoes by the main cast, pretty much like the materials transmitted through the transducers onto the different instruments and objects on stage. The link between these two parallel spaces is only unidirectional; the choir voices are channelled into the piano and consequently into the stage realm (the onstage tenor occasionally sings into a corrugated tube, but his voice also ends in the piano's interior, without reaching the choir). Therefore, the presence of the choir's parallel, alternative space is only aurally acknowledged by the main singers, without establishing any kind of communicational process with their counterparts.

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<sup>25</sup> Plato, *The Republic*, p. 206.

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