# Ecologies of Sound with Regard to *Arrhythmia*

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**The most recent practices in sound art have emerged as pre-eminent spaces in which to question the interaction of sound with its environment. Accordingly, in this article, I envisage *Arrhythmia*, the sound installation by Bosch and Simons with Kostyrko (2019), as a device that helps to outline a horizontal sound ecology. This approach, which takes as its starting point the sound and material vibration in its entirety, implies a positive acceptance of an ontological continuity between the human and the non-human. This, in turn, implies that issues such as biopolitics cannot be reduced to the human realm. With this in mind, *Arrhythmia* emerges as a new kind of singular entity from which relationships with the environment can be conceived in a non-fragmented way.**

## 1. INTRODUCTION

Sounds in themselves and the act of listening have become the touchstone of theoretical enquiry and artistic practice in the fields of music and sound art since before the turn of this century. Our relationship with sound has changed, as has the definition of the emanation of a sound and, indeed, of sound itself. The attention given to the interactions of sound with the medium and with listeners has led to the emergence of what is known as sound ecology, which is understood, in this text, in terms of the relationships that are established between sound and the *οἶκος* – the common home or the world. Sound ecology is an interdisciplinary field; its references are interwoven with the rest of the arts and sciences.

The sound installation *Arrhythmia* – by Peter Bosch and Simone Simons, in collaboration with Sergey Kostyrko (Bosch and Simons 2019) – offers an exemplary illustration of this interdisciplinary approach. *Arrhythmia* is discussed here, not as an autonomous object of study, but as a *dispositif*, or device, a term used by Michel Foucault to describe a complex set of heterogeneous elements that involve explicit and implicit propositions or purposes that may be, among other things, philosophical, artistic or scientific.[1] The device consists of the network established between the different

elements (Foucault 1994a: 299–300). In the case of *Arrhythmia*, the links that comprise this network are formulated within a discursive framework that we situate in the field of new materialism.

As a device, *Arrhythmia* allows us to propose a horizontal – or non-hierarchical – sound ecology. We shall attempt to establish its horizontal character in relation to the following: the notion of vibration (which is addressed in this sound installation); the ideas of John Cage; and the theories of new materialism. The horizontal sound ecology that emerges from this device is postulated as a network in which the different nodes do not entail hierarchies. The connecting threads of this network are formed by the heterogeneity that the device embodies: propositions that involve humans and non-humans, as well as technological elements. The nodes are the relationships between them, and they call attention to the ways in which connections or collaborations are made. This horizontal ecology has no fixed horizon. Although at some point one may infer the delimitation of a thought, of a feeling, or of certain tendencies to create links, such horizons will be considered transitory.

This horizontal sound ecology emerges from the dismantling of the hierarchical ontology which, from a traditional Aristotelian perspective, places human beings at its apex. With this, we can then examine a type of relationship that leads to a non-anthropocentric approach, by which we mean one that does not prioritise the human being as central. This proposal follows the path opened by musicians such as John Cage and thinkers such as Roberto Barbanti, Jane Bennett, Gilles Deleuze and Felix Guattari, or Bruno Latour, who proposed rethinking the position in which human beings place themselves in relation to other beings and the environment.

The title of this article, 'Ecologies of Sound', maintains the plural of ecology in order to highlight the problems involved in this approach that has emerged only recently. There are difficulties with nomenclature – sound ecology, acoustic ecology – and also with practice, ranging from the derivations of the World Soundscape Project initiated at the Simon Fraser University (Canada) by R. Murray Schafer, to others carried out more recently by

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[1]Foucault's *dispositif* is variously translated in academic texts as a device, a deployment or an apparatus. In this text, I shall call it a device.

Jana Winderen.[2] The use of the plural also expresses the need to take an approach that avoids binary thinking that risks focusing on the subjective and/or the objective as if these two things were radically independent entities.

## 2. PRESENTING *ARRHYTHMIA*

> It leads, of course, to the thought about hearing anything in the world since we know that everything is in a state of vibration, so that not only mushrooms, but also chairs and tables, for instance, could be heard. (John Cage, cited in Kostelanetz 2003: 93)

Everything is in a state of vibration and, with the right technology, it can be heard, as John Cage explained in his interview with Richard Kostelanetz. *Arrhythmia* can well be understood within this Cagean concept, albeit expanded not only to take in the acoustic amplification of a given frequency but also in order to obtain a complex system in which several frequencies influence each other reciprocally. This modus operandi is evident in the works of Bosch and Simons that, particularly since 1993, focus on vibration. *Arrhythmia* is a sound installation that was presented for the first time in May 2019, at the Kunstmuseum Moritzburg in Halle (Germany), and as with all the other installations by Bosch and Simons, it has a dynamic character provided by the constant development of sound and movement:

> All our machines are dynamic: sound and movement are in constant development. No trickery is involved. It is just the machines playing largely their own game in a fascinating world somewhere between order and chaos. Our influence is marginal over a process that needs both time and rest to flourish. The movements and sounds created by these machines can change almost imperceptibly from order into chaos and vice versa. In a certain way the machines themselves possess a creative potential. (Bosch and Simons 2005: 103)

The predominant characteristics of their work is that it oscillates between order and chaos in a way that is almost imperceptible, and that their own role is of secondary importance to the final result. This places them in line with what we consider to be some of the major

postulates that shaped the work of the first and second waves of the avant-garde:

1. An artistic work is not the presentation of a world or organism in perfect order. It is situated in an intermediate space.
2. Machines that are not artistic intervene and are creators of the work.
3. The subjectivity of the artist is downgraded, if not nullified.
4. Attention is given to an expansion of perception that reveals, through technology, the inaudible, the invisible, or the imperceptible.

While making allowances for the differences between the Cagean proposal and Bosch and Simons' approach, a tendency towards this continuity between order and chaos can be seen in their work, to which we can also add the suspension of the subjectivity of the artists. The proposals of Bosch and Simons do not stem, however, from a Cagean non-intentionality. For Cage, the artist detaches himself from his desire to listen in order to let sounds arise, thus renouncing self-expression. In this way, the sounds are free from intentionality. In contrast, for Bosch and Simons, the sounds are situated at the border between determination and indetermination, produced from work with the natural, and sometimes also forced, frequencies of the objects involved. In addition, as I will show, there is a kind of immanence that encompasses the non-human (animal, technology) and the human.

The starting point of the installation involves the data collected in the form of video images obtained by Dr Danyla Bobkov and his colleagues at the Institute of Cytology (St Petersburg). It is not the first time that Bosch and Simons have presented projects related to science. Previously, there was the *Electric Swaying Orchestra* (1991–92) and *Wilberforces* (2012–13), which were developed from the parametric pendulum and the Wilberforce pendulum respectively, both of which involve well-known phenomena in the theory of order and chaos.

Dr Danyla Bobkov's line of study explores the different properties of cardiomyocytes, the cells that make up the cardiac muscle. One of the applications of his research is to understand the reasons behind arrhythmic behaviour. This research has been carried out with a wide array of experimental methods, with the heart of a rat being used as the main model. The video images, which were provided to the artists, were created with a confocal laser-scanning microscope of a live rat heart. The contrast of the micrograph images was increased by treating the cells with a fluorescent dye, which made it possible to observe the contractions of the cardiomyocytes. During the research, it was shown that certain chemical factors cause some of the

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[2]R. Murray Schafer's approach in his book, *The Soundscape. Our Sonic Environment and the Tuning of the World* (Schafer 1994), is the authoritative example of a focus on the environment understood as a great musical composition for which we are all responsible. It should be noted, in this regard, that in this book Schafer explains the transition from a pre-industrial landscape to an industrial one in terms of a distinction between a high-quality sound landscape (hi-fi), where the sounds are balanced, and a low-quality landscape (lo-fi), composed of loud sounds that drown out the weakest ones (Schafer 1994: 43). In the case of Jana Winderen, there is a particular focus on the voices of non-humans to show the fragile relationships that are established between all living things (Jiménez Carmona 2019: 164).

cells, independently, to start beating at frequencies different from the original rhythm. The noise from these cells can increase and affect the baseline frequency, producing an irregular heart rhythm.

Based on these findings, the goal of the artists was to transform the movement of these cells into sound patterns. For this purpose, as Kostyrko explains:

> [they] developed a program that analyzes the video images in real-time, detects the cells beating, and triggers the industrial vibrators. To track the cells beating, we use a phase correlation algorithm implemented in OpenCV library which allows us to measure the movement on video. The installation in Halle consisted of 4 Raspberry Pi 3 microcomputers: each of them played video footage – which was selected arbitrarily from an array consisting of 8–9 pieces, as I remember – analyzed it and sent a trigger to one of 4 industrial vibrators when the pulsation on the video was captured. Each of the vibrators was connected to a video channel which is created in real time and projected onto its own screen. The different temporal behaviours of the cells on those videos, coupled with different resonators through vibrators, resulted in sound with a polyrhythmic texture. Each movie was projected onto one of 4 screens – this gave a visual link with the generated sound. (Kostyrko 2020, personal communication)

The fluorescent dyes with which the scientists treated the samples were captured in the images from the videos of the installation. As this video material is what fundamentally defines the result, work on the installation focused on ways to distribute this material among the four channels, so that the result would have a varied dynamic. Each video channel is created in real time and is projected onto one of the screens, but the videos appear on the screens in random order. Consequently, it may happen that, at a given moment, the same video is projected onto two or more screens. There are also pauses that result in occasionally blank screens. The different temporal behaviours of these videos result in unique polyrhythmic structures, which are made audible by means of the vibrators. In the installation, modifications in the movement of the cells are transformed in real time into energy, in this case, bursts of air that are then supplied to a small industrial vibrator that was placed inside a small birdcage.

Industrial vibrators are usually fixed solidly to another object. In this work they are simply placed, rather than fixed, either on a metal plate at the bottom of the cage, or inside a small metal box. The sound produced is not amplified and, consequently, the overall volume of sound is much lower than in some of the previous works by Bosch and Simons, such as *Último Esfuerzo Rural III* (2017). In *Arrhythmia*, the video images are produced by chance and, consequently, the signals they send and the energy into which they are translated and the sound that is produced can be both regular and periodic, as well as irregular and aperiodic – depending on the moment.

The temporal development of the installation does not follow preconceived rhythmic patterns. Although the duration of the piece is indeterminate, the operating time of these vibrators is much shorter in *Arrhythmia* than in most of their other works, giving it a very different acoustic character and leading to another approach regarding the perception of the work. The work is conceived so that the public can, in about four minutes, gain quite a thorough understanding of the workings of the piece and this is the minimum time required to discover something of the richness and variation that takes place. The software they have built does not usually result in fixed sequences that repeat, so if the public stays for a shorter period, they can only experience a very small part of the many variations that can occur (Bosch 2020, personal communication).

There are, in fact, other approaches hybridising science and art that are also inspired by cardiac arrhythmia. For example, a project led by Elaine Chew called COSMOS (Computational Shaping and Modelling of Musical Structures) studies musical structures as they are created in sequences of cardiac arrhythmia. This procedure consists of adapting the rhythms and certain recurring patterns obtained from them to works from the classical music canon. This novel way of representing data via musical works could contribute, according to Chew, to the understanding of the variable nature of arrhythmias (Chew 2019).

However, *Arrhythmia* differs greatly from such works since there is no medical objective, nor is there any reference to the rhythmical pieces developed in the repertoire of musical works. Instead, there is an exploration of vibratory rhythmic states that are offered at two levels. First, the acoustic, through the polyrhythms generated by image signals transformed into the sounds of vibrators, and second, the visual, through the concurrence of elements that, initially, may seem wildly disparate: video screens, electrical wiring, vibrators and cages. These elements coinciding in the same time and place give the work a power that transcends the installation itself. These small industrial vibrators trapped within cages that originally housed birds are a wonderful audiovisual metaphor:

> A normally lifeless, mechanical object becomes a kind of relic of what once was a living creature, like the isolated rat hearts in the laboratory setting, creating an audiovisual metaphor of a bio-mechanical machine. (Bosch and Simons 2019)

A metaphor is a transposition, or transference (Liddell and Scott 1996: see entry for μεταφορά). In this installation, scientific data in the form of images is transferred along cables and transduced into sounds. But at the same time, we have two modes of capture: the animals in their cages in the laboratory, and

information captured on computer screens and videos. The metaphor works in two directions. First, transference is carried out by translating images into energy in the form of bursts of air which, in turn, produce acoustic vibration. In this case, the air moves a metallic ball within a tube in the vibrator that, being in loose contact with another metallic surface, produces most of the sound of the work. In addition, you can hear the bursts of air and the balls starting and stopping.

Second, transference is achieved by the coexistence of the videos with data and the bird cages containing the industrial vibrators. To this is added the material elements used to carry out the transference: the video screens; the electrical wiring on view to the public; the space-time presentation of the place itself; and the vibrators in cages.

The way transference is carried out relies in both cases on a common element: vibration. In the first case, a physical vibration becomes audible, the second arises from an articulation of the objects that comprise the installation and which leads, in line with Bennett, to objects appearing as things, as entities, that cannot be reduced to the context in which they are usually located nor to their semiotics (Bennett 2010: 5).[3]

The ousting of the object by a thing also implies a shift in the Aristotelian hylomorphic theory, according to which beings are a compound of matter and form. Matter is conceived as undetermined potential, while form is actual and substantial. This approach has resulted in granting the subject – which seeks the form – the capacity to act, while the object is passive matter that assumes the form given by the subject. In contrast, the idea that all things, as Cage explained, are in a state of vibration takes us beyond hylomorphism and closer to what Deleuze and Guattari call matter-flow. This matter-flow is related to the material and diffuse essences that Edmund Husserl described as 'vagabond, anexact and yet rigorous' and which are distinguished from the fixed, formal and measured essences (Deleuze and Guattari 1980: 507).

This conception of matter-flow and vibration brings us to what is known as new materialism. In the mid-1990s, Rosi Braidotti (1994) and Manuel DeLanda (1996), working independently, coined the terms 'new materialism' and 'neo-materialism'. The aim was to challenge the dichotomy between nature and culture that the old materialism maintained. In this 'turn to the material' (Alaimo 2010), we should also mention, among others, Bruno Latour and his well-known Actor-Network Theory (Latour 2005). For all of these thinkers, it is a question of overcoming the divide between nature and its cultural construction and of a shift from humanised agency to material agency. Matter is thus conceived as dynamic and relational.

Advocating what Donna Haraway calls naturecultures (Haraway 2003), these theorists are continuing a line of thought that began with Spinoza as the main precedent. The influence of Spinoza is fundamental to Deleuze and Guattari's approach to the body, and they, in turn, were referenced by both DeLanda and Braidotti.

At the heart of new materialism is a rethinking, or even an abandonment, of the idea of dualities between nature and culture, between the living and the inert (DeLanda 1996: n.p.), or between matter and meaning (Braidotti 2006: 110). It is along such lines that Bennett presents her 'political ecology of things' as a discussion that inaugurates an ontology that allows for a new enchantment with the world through the relationships established between humans and non-humans (Bennett 2010: 117). Materiality is, for her, 'a rubric that tends to horizontalize the relations between humans, biota, and abiota' (ibid.:112). These approaches reject the idea of matter as a final product and conceive of it as an active factor in future materialisations (Barad 2003: 810). With this, as Barad explains, a new ontology is founded in relation to another way of comprehending epistemology in the scientific and social sphere (Barad 2007: 26).

## 3. ECOLOGIES OF SOUND: BIOPOLITICS AND VIBRATION

> A sound does not view itself as thought, as ought, as needing another sound for its elucidation, as etc.; it has no time for any consideration … Urgent, unique, uninformed about history and theory, beyond the imagination, central to a sphere without surface, its becoming is unimpeded, energetically broadcast. (Cage 1973: 14)

In October 1974, at the Institute of Social Medicine of the State University of Rio de Janeiro, Michel Foucault gave a lecture on the subject of control over the body by the capitalist system. Foucault explains that the control society exerts over individuals is carried out not only by means of the conscience or an ideology, but also by operating in the body and with the body. The body is seen, consequently, as a biopolitical reality and medicine as a biopolitical strategy (Foucault 1994b: 210).

Previously, Foucault had described various techniques aimed at modifying the psychological and body rhythms of an individual, such as certain therapies using rotating machines to cure melancholy at the beginning of the nineteenth century (Foucault 1961: 406). He went on to describe, at the group level, the way in which the religious orders had, for centuries,

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[3]With the word 'thing', I refer to that which exists, whether permanent or transitory, apparent or real, unknown or known. When we apply abstraction to things in order to separate them from the medium in which they are found, we abstract them and convert them into objects. With this theoretical gesture, we separate them from the 'the flow that gives them life' (Ingold 2016: 16).

made themselves genuine specialists of rhythm and regular activities, from whence came the implementation of increasingly precise rhythms in factories and schools so that the passage of time would be useful (Foucault 1975: 151–52).

If, in keeping with Foucault, we reflect on the different actions of people tied to the rhythm and control of the body by the current economic and medical system, then we need to consider how an installation like *Arrhythmia*, having vibration as its centre, leads us to question the ontological hierarchy that places the human at the apex. From a perspective of horizontal ecology, it will be possible to attend to a hybrid community in which the exercise of biopolitics will not be restricted to human beings.

*Arrhythmia* is presented as a sound installation in a museum space, in which sense it sets itself apart from the context that marked the origin of sound installations, Max Neuhaus's *Drive-in Music* (1967). This work took place on a broad public avenue in Buffalo (New York), where motorists became improvised interpreters of their radios. In *Arrhythmia*, the piece does not exist within a dialogue or direct interrelation with the place in which it is created, and yet it makes itself doubly present in the venue, the Kunstmuseum Moritzburg. First, there is the physical space in which the installation is physically situated and which is enhanced through sound. Second, there is the imaginary or virtual space to which we are led by the video images and the cages within which the vibrators resound.

This installation works, as we have said, on two levels with regard to something captured: the computer data of rats' hearts and the cages of captive birds. All this is reinforced by the manner in which various technologies from different times are employed and left lying around in full view of the public: the screens with colourised images of computer data; the industrial vibrators inside the birdcages; the electrical cables snaking between power supply and videos and vibrators; and the presence of cages of different sizes and materials. All these elements, as Cage explained, are in vibration in that common house that is the world, or as Spinoza would say '[all individuals], though in different degrees, are nevertheless animate' (Spinoza 1910: part II, prop. 13, scholium).

Considering matter as active allows us to turn our attention to how all the elements of the installation are articulated, and how they resonate with other times and places that contribute to an interrogation of the present in all its complexity. Approaching *Arrhythmia* from a perspective that reclaims the idea of the immanence of the inhuman to the human, we move away from an interpretation that reduces the physical presence of the work to a mere presentation of objects. By proposing this, we are acknowledging a horizontal ecology that accepts the human and the

non-human, along with the artistic, philosophical and scientific proposals involved in this device; this *dispositif*. Consequently, it is an approach that points towards an idea of ontological continuity (Barbanti 2020), which can be derived from Spinoza's theory of bodies and their affective encounters and one which, as Bennett argues, should inspire current environmental thinking (Bennett 2010: 118).

In this sense, one could speak of Latour's idea of a 'collective' to refer to an ecology of human and non-human elements (Latour 1999: 198). In *Arrhythmia*, this ecology includes all the elements of which it is composed, in situ, and all those from which they originate, such as the rats in the laboratory and the birds once captive in the cages.

From a perspective of horizontal sound ecology, this installation can be considered as a new type of singular entity, of something that can be perceived – materially and immaterially – and, as such, a device that maintains transversal relationships at different levels with science, art, history, ecology, the production of subjectivity and so on.[4] From here, we may ask: what is a sound? Where does it begin and where does it end? It does not cease as it reaches the ears in audible form, but rather, the answer must take into account the relationships between the sounds and the rest of the elements that accompany it: people or other bodies. In short, therefore, it addresses the transversal relationships established between the artistic, the social, the political or the scientific in their biopolitical constitution and with an ecological sensitivity.

*Arrhythmia* allows us to put to work an ecology of what exists as vibration and this implies, in turn, devising 'entities with uncertain limits' (Latour 2004: 36); or the matter-flow espoused by Deleuze and Guattari. Analysing the two presences – one in the physical space in which the installation is materially located, the other in the imaginary or virtual space to which we are guided by the images of the videos and the caged vibrators – would lead to the establishment of a hybrid community (Lestel 2004), which emerges from the immanent and horizontal conception that

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[4]By 'singular entity' we do not mean to say that *Arrhythmia* should be considered as a seminal work with no relation to other artistic installations, but rather, it is to emphasise how it can be considered as a device, that the piece is a 'thing' in the sense proposed by Bennett (2010: 5). Nevertheless, as a sound installation that maintains the aforementioned transversal relationships (e.g., with science, art, history, ecology, the production of subjectivity), one could point out its affiliation with proposals such as the *Rainforest* series (1968–73) by David Tudor. Consequently, it would be pertinent to consider whether the horizontal ecology described in this text might be aligned with the 'electronic ecology' described by Tudor in reference to *Rainforest IV* (Tudor and Hultberg 1988). This would, however, oblige us to deal with the non-separation between human and technological components, with the function of vibration and resonance, and with an analysis of the type of listening that each proposal favours. Unfortunately, this exceeds the goals of this text, although it will certainly be a good basis for subsequent investigations.

the vibration allows us to articulate. In this text, we will expand on only one type of presence, the virtual, although we will first dedicate a few lines to give an outline of a work that would concentrate fully on the physical presence.

### 3.1. Physical presence and immanence of the technique

The device created with *Arrhythmia* is like a machine situated between life and death, in continuity. The audiovisual metaphor brought about by the images of the videos, the cages and the vibrators, contains this continuity. The artefacts they use (the vibrators) respond and react to stimuli (the ongoing images), weaving a kind of sensitivity that could be called technique, a sensitivity irreducible to what is human, which would correspond to the 'mode of existence of technical objects'– to use the title of the book by Gilbert Simondon (1989). This sensitivity, which arises from the interaction of the elements that participate in the installation, amounts to an audiovisual circuit. In turn, this circuit enhances the place, through sound in particular, in which the installation is located, as well as the presence – sensitive and intelligible – of the attending public. The vibration does not die out in the industrial devices making their sounds. The vibration occurs in the installation as a whole and in its relationship with the place and the public. This approach would lead us to an extended discussion beginning with Gilbert Simondon's notion of transindividuality via John Dewey's notion of transaction (Dewey 1989: 96–102; Simondon 2013), but which is beyond the scope of this text.

### 3.2. Virtual presence and immanence of the non-human animal: from the rats to the cages

In the same way that Walter Benjamin explained that, unlike the eyes that open onto a 'consciously explored space', the movie camera opens onto an 'unconsciously penetrated space' (Benjamin 1974: 461), the device that comprises this installation also allows us to explore a virtual space that is latent in the elements that compose it.

The hearts of rats isolated in the laboratory, but whose audiovisual aspect is brought into the artistic environment, clearly show a procedure that, without doubt, can be subject to controversy, but one which is well-rooted in our behaviours and relationships both with other animals and the medium of art.[5] We adhere to the ways of understanding animals – perhaps all

organisms – established by classical anatomy, which conceives the organism as a whole, but formed by separable parts. The conception of man as a machine undoubtedly contributed to this approach. This applies to dead as well as living organisms, which are, in fact, treated medically, in accordance with this separability of the different organs.

The first anatomical theatres, such as the one at the University of Padua inaugurated in 1584, call to mind the links established between medicine, art and morality. The spectacle of a dissection, Mandressi explains, was subject to well-established sequences and rhythms: the anatomist entered once the audience was settled in the gallery and the candles had been lit, and the dissection itself was preceded by the performance of some musical pieces, which apparently helped attract larger audiences (Mandressi 2013: 61). The corpse had to be, preferably, of some rootless commoner, with executed prisoners being the best option.

The relationships that can be surmised in bringing together the corpse of an executed prisoner, a musical performance, the dissection and the attending public demonstrate not only why these elements can coexist, but also the way in which the functionality of each one of these elements contributes to the workings of a mechanism in which the social and moral hierarchies are placed at the service of attaining knowledge which will be, at the same time, an exercise of power: a modelling of bodies that goes beyond the dissection of the hanged man and ends up with the hearts of laboratory rats.

We may ask where the vibrations of *Arrhythmia* fit into all of this. A simple extrapolation, or genealogy from the heart of the rat and the birdcages in this installation, might serve as a good example of how we can follow the physical and virtual vibrations of *Arrhythmia*. It could lead us to Jack Black, Queen Victoria's rat catcher and breeder of 'fancy rats'. Apart from supplying the queen, Black sold domesticated rats to women who, following the fashion of the time, wanted them as pets. Black also walked the streets of London with a cart carrying a poison of his own design and a cage full of rats to demonstrate his handling of these animals, and he would poison one of them for all to see. He is also believed to have bred the albino strain of *Rattus norvegicus*, which he sold to French scientists in 1856. Hypothetically, then, he provided the ancestor of the Wistar rat, the rat bred in the laboratories of the same name (Edelman 2002: 3–4; Sullivan 2004: 23). The hearts providing the data shown on the screens in the sound installation could well be from the descendants of rats from this practice initiated by Black.

In Bosch and Simons's installation, the arrhythmia induced in the hearts of rats is made visible in the coloured images used by scientists in the laboratory and

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[5]In this respect, we are reminded of the transgenic art initiated by Eduardo Kac in the 1980s and various works denouncing laboratory practices on animals perceived as mere objects by, for example, the duo Marion Laval-Jeantet and Benoît Mangin, who formed Art Object Oriented.

these, in turn, are transformed into vibrations within cages – sounds that seem to sing other songs. A diversity of polyrhythms is created as the different industrial vibrators are activated, simultaneously, from the video images.

The audiovisual metaphor presented by the artists envelops the public. The arrhythmias produced in the heart of the rats are made visible in the videos, made audible through the energy of the bursts of air in the vibrators and the metal plates in the cages and reach the public who share the installation. The way they view and listen, the way they wander around the room is a continuation of the installation, making of them simultaneous vibrators that, with their observation and movement, generate other polyrhythms.

In this transposition or transference, what function do the cages have? From a genealogy now engendered from the cages and the birds kept in them, this installation transports us to an investigation of the first known evocations of bird songs (around the thirteenth to fourteenth centuries), and to this imposing sound from industrial technology. The fact that the vibrators are in cages brings to mind the practice of keeping birds in captivity which is, in turn, linked to practices relating to discipline and the body – in birds and human beings – and to musical composition.

A musical instrument is a device for making sound consisting of two components: one that vibrates coupled to one that resonates. The vibration in the industrial vibrators used in *Arrhythmia* is generated by the movement of air, which would classify them as wind instruments, and they are placed on metal plates or inside metal boxes in the cages, which act as resonators. In terms of optimal sound propagation, these cages are far from ideal as resonators, since the resulting sound in the installation is only weakly amplified. However, the inappropriateness of industrial vibrators in bird cages also reflects the inappropriateness of raising birds in captivity in order to teach them to produce sounds that were alien to them as a species (Kreutzer 2019: 103).

In the seventeenth and eighteenth centuries, teaching a child or a bird seems to have adopted the same form: timetables, attention, repetition. This method of learning also mirrors that of the musician rehearsing pieces for a concert. While teaching birds to replicate the frequencies within the human range and those of our musical instruments, no one thought to ask why we refer to the sound of these birds as song. Nevertheless, there was at least some transference from animal to human. People also tried to sing the natural melodies of birds and introduce them into their musical compositions. They can be heard in *Le Chant de l'alouette* (1520) and the *Chant des oiseaux* (1528) by Clément Janequin (*c*.1485–1558), as well as in the beginning of the third movement (Allegretto–Presto)

of Mozart's Piano Concerto No. 17 in G major (K453), along with the virtuoso birds of the baroque music of Vivaldi, or the gallant birds of Haydn's classical works.

Each type of music captures song in a different way and produces a listening experience that is different to the song of birds and to music itself. In the present day, music and sound practices are open to listening/capturing the songs of other organisms and *Arrhythmia* is a good example of this movement.

## 4. CONCLUSION

The departure point of *Arrhythmia* is the noise produced by the cells of a rat's heart altered in a medical laboratory. This rather singular detail has led us to contemplate this sound installation as a *dispositif*, a device that has established an ontological continuity that leads to a further proposal: a horizontal – that is, a non-hierarchical – ecology.

If the first and second waves of the artistic avant-garde professed the continuity between art and life, a large proportion of today's artistic practices now compel us to consider an ontological continuity. It is a continuity that implies, in the case of *Arrhythmia*, that all of the elements comprising the artistic process that is the installation can be considered as central. In this case, the physical and virtual facets of this continuity are vibration, thus manifesting that the elements that intervene in the installation have uncertain limits.

The origin of the sound in *Arrhythmia* can be traced back from the metal plates of the cages to the vibrators, to the bursts of air, to the screened images and to the noise of muscle cells from hearts that, like the birds that once occupied the cages, are not present in the installation. It is a continuity that has made it possible to affirm a horizontal ecology from which it has been shown that biopolitics cannot be restricted to the human being.

The horizontal ecology has, as a common background, the οἶκος. In this sense, *Arrhythmia* invites us to listen to this common background as it converts the museum space into a resonance box in which sounds and images – of what is present and what is absent – vibrate around and through our bodies. This box is only a small part of this great house that we call the world. In this house we are reminded that, as in *Arrhythmia*, everything is in vibration and that if we allow ourselves to feel the material and virtual vibrations, a horizontal ecology of sound is made possible. This means, quite simply, attending to the world for what it is: a common home for which we are responsible and not an aggregation made up of fragmented parts.

For all this, affirming a horizontal sound ecology implies a transformation of listening into something that corresponds both to the consideration of the environment and to the production of hybrid and/or permeable subjectivities and communities.

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