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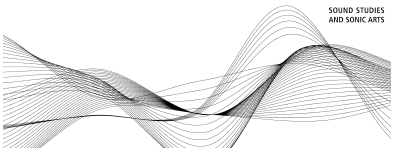

Universität der Künste Berlin, Masterstudiengang Sound Studies and Sonic Arts, Masterarbeit

The Post - Digital Archive As Compositional Material:

A Study on Medical Archives and Internal Body Sounds

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Preface

This paper acts as a theoretical reflection on using audio medical archives as compositional material. Parallel to the research, I have been developing a fixed media composition based on the study of internal body sounds as they are found on online and analog educational archives for students of western medicine. One part informs the other and vice versa.

The written part explores archives as contemporary artistic medium, discusses certain techniques and elements and compares the composer's archival research with the historian's. Moreover, it examines the social and cultural connotations of using illness in an artistic and aesthetic context. The practical part reflects that research and expands further into a musical study of the auscultation process and internal body sounds as well as my own effort to express a third person illness narrative. The composition *Murmurs* is a fixed media composition that translates the medical ear into a musical and personal ear.

As a musician and a theorist, I have been interested in the use of archives as an artistic medium. This thesis constitutes an effort to contextualize my interest, inform my process and explore new ways of approaching archives artistically.

Additionally, I want to thank Hans Peter Kuhn for his guidance and mentoring on the artistic process and Gary Schultz for his insight in audiovisual sources and bibliography and his advice in the writing process. I would also like to thank the committee in advance for their time and interest in my thesis.

Introduction

Archives have many definitions and various characteristics; in general, however, they are defined in relation to their context and subjected to discontinuity and fragmentation.[1] Even in state or official archives, documents can change location, be restored, be re-contextualised and at times destroyed in preference of another one. These actions fracture a once neatly organized administrative working process. In that sense, no archives are entirely stable or fixed.[2] Similarly, archival artistic practices have many definitions and approaches and they can also be defined in relation to their context. In this paper, I am choosing to examine practices related to the Post - Digital Archive. The term is used to describe the archival state in the post - digitalization era where technological developments have increased the fragmentary nature of archives, altered the archival state and created new archival practices and tendencies in Western contemporary (sound) art and music. The term digitalization is used here to describe the way in which many domains of life are restructured around digital communication, digital skills and media infrastructures.

The first chapter briefly describes the aforementioned change in the archival state and its effect on contemporary artistic archival practices. It presents four dominant theories around the latter and how they express the archival change. The first two theories are Post Production Art by N. Bourriaud and Remix Culture by E. Navas. The theories discuss the tendency to sample preexisting material or (online) archives and place the artwork inside complex cultural networks.

From the latter, the discussion on appropriation expands into repurposing current technologies and technological tools as well as into the aesthetics of failure. In that context, I examine Post - Digital Art as an expression of creative errors, followed by the failed futures and alternative realities of Hauntology. The last two terms are ambiguous and difficult to define, however I am mentioning them due to their relation to appropriation, digital sampling and technological misuse. Please note that I am deliberately excluding Hal Foster's text *Archival Impulse* due to his rejection of online material as archival art.

Given the importance of appropriation in archival practices, I am exploring further the technique of digital sampling and its origin and development in African American culture. In the latter, sampling as an oral practice predates recording technology. Driven by that point, I am examining the creative use of medium fingerprints and their connection to contemporary time and culture in the context of Hauntology.

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[1] Dekker, A., (2017), *Lost and Living (In) Archives, Amsterdams: Valiz, 12*

[2] Ibid

Next, I am juxtaposing my archival process with the research process of Arlette Farge. Farge is a French historian who specializes in the study of the 18th century. I am focusing on her book *Allure of the Archives* in which she gives a detailed account of her process and conveys the exhilaration of uncovering hidden secrets and the thrill of venturing into new dimensions of the past. While this might seem irrelevant to this paper, the research methodology developed in the book allows for certain parallels between composer-archivist and historian-archivist to develop.

My choice to sample audio medical archives in a post-digital artistic context invites controversy. Moreover, this choice coincided with the COVID - 19 crisis, which resulted in even more questions regarding the sensitivity and morality of the topic.

To address and overcome this controversial element of my practice, I choose to examine the use of illness in contemporary Western culture. Therefore, the second chapter of the paper opens with exploring illness as a form of narrative, its reception and application in the field of medical humanities. Triggered by the current health crisis, I am presenting briefly the development and proliferation of illness narratives from the mid 20th century to present day. These narratives expand beyond the field of literature to all kinds of contemporary art forms. The complex nature of these works has created dissensus among critics and theorists on how to evaluate and perceive them. In this study, I am focusing on their interpretation and reception from medical humanities scholars. Based on Stela Bollaki's research (*Illness as Many Narratives: Arts, Medicine and Culture*), I am attempting an overview of the discourse around them.

During my research regarding medical humanities, I observed a gap in the discussion. While several contemporary art forms are discussed thoroughly, the sonic element is not as present. Given my research and composition, I decided to dedicate the last part of my paper to discuss music and sound as illness narratives. As a first reference, I am discussing the socially engaged projects of John Wynne with heart and lung transplant patients in the UK. Next, due to my practical interest in internal body sounds, I focused on finding works or artists that deal with these sources as part of a composition. My research resulted in Brent Michael David's Tinnitus Quartet, Smetana's String Quartet no. 1 and the life long work of Milford Graves.

Brent Michael David suffers from tinnitus and in 2005 composed a quartet in effort to convey his experience to the audience. Besides this work, the composer did not continue in exploring musically the condition of tinnitus. The lack of literature about this piece along with its unavailability led me to look for other composers's work

around the condition of tinnitus. The research showcased a more traditional and conventional piece: Smetana's String Quartet no. 1.

The quartet is considered autobiographical and carries the supplementary title "From my life". In the latter, Smetana used a high pitch E to replicate a tinnitus tone. While the two works are different, the association with the condition allows for their juxtaposition in the context of this paper.

The case of Milford Graves differs from the aforementioned composers. Throughout his life, Graves has incorporated the study of the human body in his musical, visual and interdisciplinary work. He has extensively studied the human heart through various methodologies and produced a significant amount of work around it. In 2018, Graves was diagnosed with amyloid cardiomyopathy, a condition currently untreatable. Since then, he has been using his research and skills to monitor and tune his heart while documenting the process at the same time. Graves' research and his current practice/care constitute a breakthrough in the intersection of medical humanities, science and music.

The paper concludes with an overview of the main references and certain observations around them.

The Post - Digital Archive

I. Theoretical Encounters

In Archive Fever (1995), Jacques Derrida claims that technological changes alter both the archival process and its content.[3] What is no longer archived in the same way is no longer lived in the same way.[4] Digitalization has confirmed the latter and has profoundly changed the archival state. Existing archives have been introduced into flexible systems in which content is constantly re-contextualised. While the source can remain intact as in the original archives, its existence is dynamic and under constant change.[5] The term 'living archives' has been coined to describe this new type of archival existence; it implies the open, creative and collaborative nature of archives. In this new state, archives are no longer designed just for long term storage and memory but rather for reproduction and endless circulation between different levels, people, networks and location.[6]

Moreover, the popularization and accessibility of technology and social media platforms have created a new type of archivist: the everyday archivist. In many Western societies, most people have the opportunity to constantly create, collect, document, store, retrieve, resume, categorize, evaluate and produce a significant amount of information and content. Simultaneously, alternative and open source archives appear and are maintained with the support of individuals. In that sense, archives can be created and preserved collectively.[7]

These technological developments have deeply influenced archival and appropriation art. Artists have been using the new state of living archives and archival technologies to create content through the sampling, appropriating and repurposing of preexisting materials, structures and technologies. This type of practice comes in different forms and practices and has been categorized under various terms and movements, such as Post Production Art (Nicolas Bourriaud), Remix Culture (Eduardo Navas), Hauntology (Mark Fisher and Simon Reynolds) and more generally as Post Digital Art.

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[3] Dekker, A., ibid, 13

[4] Derrida, J., & Prenowitz, E. (1995). Archive Fever: A Freudian Impression. *Diacritics*, *25* (2), 19

[5] Ibid, 17

[6] Ibid

[7] Ibid, 15

The change of the archival state can be observed in these theoretical movements and the artists that they discuss. While they derive from different places, the appropriation of preexisting material and tools, archival practices and critical approach of digitalization are at the core of these movements. Subsequently, they encounter, use and create 'living archives'.

Bourriaud expresses it as an increase in the supply of works and interest toward ignored or dismissed forms. Artists are working with objects that are already in circulation on the cultural market and the forms of knowledge generated by the appearance of the Internet. [8] The main characteristic of this state of the art is the wish to use produced forms, placing the work in a network of signs and significations instead of treating it as an autonomous or original form.[9] Post production artists use these forms to decode and produce different story lines and alternative narratives. In this context, the artwork is understood as the temporary terminal of a network of interconnected elements, like a narrative that extends and reinterprets preceding narratives.[10]

Eduardo Navas takes Bourriaud's theory a step further with his theory around Remix Culture. He develops his entire theory on appropriation and archival practices in new media art based on the roots of the music practices of hip hop producers and popular music. The practice of the latter is also present in Bourriaud's text. Navas identifies Remix as a cross disciplinary discourse in art, music, media and culture, where Remix "informs the developments of material reality dependent on the constant recyclability of material with the implementation of mechanical reproduction".[11] This recycling is considered an active process both in content and form and resulted from a long process of experimentation with the diverse forms of mechanical recording and representation.[12] This meta-level in sampling allows the remix culture to thrive on the drive to collaborate, to transform something that exists into something new through personal interpretation, in order to balance between the individual and the collective, creator and audience, creative license and individual rights.[13] In this environment, choice and intention become the decisive elements in new media, since digital tools can be used to support all types of agendas between

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[8] Bourriaud, N. (2007), *Postproduction,* New York, NY: Lukas & Sternberg, 7

[9] Ibid, 8

[10] Ibid, 9

[11] Navas, E., (2012), *Remix Theory,* Springer - Verlag / Wien, 3

[12] Ibid, 5

[13] Ibid, 60

commerce and culture.[14] As remix can be used for means of commodification, it can also be a tool for critical reflection on preexisting and prerecorded material. Like the turntable that became a repurposed object in the 1970s, current technological reproduction tools and tendencies should be subjected to similar reflection and redefinition.[15]

This tendency for repurposing new technologies and tools is also evident in the broader spectrum of Post Digital Art. According to one of the many definitions of the term, Post Digital Art is a rejection of digital perfection in favor of a more human and therefore imperfect touch. This aesthetic developed in part as a result of the immersive experience of working environments suffused with digital technology but also because of the "failure" of digital technology.[16] The latter revealed a large field of experimentation with new tools, instruments, compositional elements and materials. Glitches, bugs, system crashes, on a software level but also hacking, repurposing and mis/re - using on a hardware level. A large amount of these elements resulted from the democratization of technology and its non conventional use by non-professionals who had little awareness or interest in the intended use. This practice extended the non-virtuosity specific experimental/popular music/art and predated its widespread practice via the wave of Youtube tutorials. In that context, the ideas of noise, failure and chance are reintroduced through a new materiality that continues to shape, transform and disintegrate during the first decades of the 21st century. Parallel to the other movements, Post Digital Art reflects and responds to the strong influence of digitalization, which proposed new forms in the production of art by opening access to various mediums and accelerating the spread of information.[17]

This conversation of creative errors expands further into the term of Hauntology and its association with failed futures. Hauntology is a term originally introduced by Jacques Derrida[18] in the 90s to refer to the reappearance or persistence of past elements. Since then it has been invoked in a lot of fields and discussed by many theorists. In the case of music, it has been developed further by Simon Reynolds and Mark Fisher. According to the latter, what haunts the digital dead end of the twenty-

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[14] Ibid, 11

[15] Navas, 31

[16] Cascone, K. (2000). The Aesthetics of Failure: "Post-Digital" Tendencies in Contemporary Computer Music. *Computer Music Journal*, *24*(4), 12-18

[17]Gaikis, L. 2012. "Feeling And Form, Post Digital Art Practice; Redefining Concepts Of Author, Audience And Artwork". PhD, Academy of Fine Arts Vienna, 2

[18] For more on that, see: Derrida, J. (1994), *Spectres of Marx,* Routledge

first century is not so much the past as the lost futures that the twentieth century taught people to anticipate.[19] More precisely he writes:

[…] "The disappearance of the future meant the deterioration of a whole mode of social imagination: the capacity to conceive of a world radically different from the one in which we currently live. It meant the acceptance of a situation in which culture would continue without really changing, and where politics was reduced to the administration of an already established (capitalist) system." […] [20]

In that sense, the future is always experienced as a haunting, as a virtuality that already invades the present, conditioning expectations and motivating cultural production.[21] We live in a time when the past is present, and the present is saturated with the past. Hauntology emerges as a crucial—cultural and political—alternative to both linear history and to postmodernism's permanent revival. In that context, artists react to contemporary time by foregrounding temporal displacements through the use of sampling, lo-fi practices, fragmentation and collage.

What results from the aforementioned theoretical tendencies are certain aesthetics of failure and repurpose. On one hand, Hauntology and Post Digital Art are foregrounding elements of error by using media fingerprints, time stretching, glitch, technological misuse, etc. Alternatively, Post Production Art and Remix Culture are rooting for a "wrong", alternative, and critical use of contemporary cultural production. Regardless of the differences in aesthetics, they all share to some degree sampling and technological appropriation as techniques.

The latter is traced back to the practice of African American Hip Hop artists, which, as Navas argues, has expanded to various levels of contemporary culture. Given the archival nature of hip hop and the heavy usage of sampling in archival art, this study further examines its origins and development in African American Music.

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[19] Fisher, M. (2013). The Metaphysics of Crackle: Afrofuturism and Hauntology. *Dancecult*, *5* (2), 42-55

[20] Ibid, 42

[21] Fisher, M. (2012). What Is Hauntology?. *Film Quarterly*, *66*(1), 16-24, 16

II. Digital Sampling in African American Music

African American hip hop artists have widely used and developed the art of digital sampling. It is subsequently connected to an African American diasporic aesthetic and tradition, which carefully selects available media, texts, and contexts for performative use. In this context, the idea of sampling is hardly new. The oral modes of African American communities have resulted in composers incorporating oral approaches into their work, long before the development of digital technologies. As Andrew Bartlett mentions :

"… There is a clear continuum in which African American artists have put things learned by listening into action by way of performance…"

He continues by quoting Duke Ellington's explanation regarding the composition process of "Harlem Air Shaft". The composer explains:

"You get the full essence of Harlem in an air shaft. You hear fights, you smell dinner, you hear people making love. You hear intimate gossip floating down. You hear the radio. An air shaft is one great big loudspeaker. You see your neighbor's laundry. You hear the janitor's dogs. The man upstairs' aerial falls down and breaks your window. You smell coffee... An air shaft has got every contrast. . . . You hear people praying, fighting, snoring…. I tried to put all that in my Harlem Air Shaft."

This composition statement points out to a musical actionality that reads context for potential material. In that sense, the composition becomes an evocative interchange, a conjunction of composition, narration and performance, which reaches out to the listener as well. Contemporary hip hop forms a constellation around this expansive idea of musical composition and performance. The multisensory simultaneous contrasts of Harlem Air Shaft are enhanced by the development of digital sampling.

As a multi-sensory approach suggests, the body in the African American history holds an important position. Hip hop is foregrounding this tradition and introduces the body's appropriation of prerecorded music and digital sounds. The beat of the sampled bass and rhythm line cues the automaticity of the bodily appropriation of digital sounds.[22] Through repetition and variation, a short part can be prolonged for the audience to dance to it. Most famous example of this practice are the breakbeats. Originally introduced by DJ Kool Herc, breakbeats are a process of isolating and repeating the most danceable parts of a piece by using two copies of the same record. By applying this technique, the composition stretches over time to give the body space to express itself.

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[22] Bartlett, 399

Sampling has often been criticised as unoriginal, non-musical and lazy. Hip hop artists renegotiated this critique through extended use of record players as instruments as well as growing complexities of their appropriation technique.[23] As Andrew Bartlett puts it:

"... The hip hop archive serves as a miniaturised repository for vast interactive historical material—interactive because all archival material is handled by the archivist, who listens carefully for the beats and snippets which will accompany and be accompanied by vocalised narrative. The pro-active artistic process which utilises and makes functional what is heard backdrops hip hop from start to finish. Indeed, the fascination with sounds of myriad shapes, pitches, and durations that characterises the Chicago avant-garde continuum (including Henry Threadgill, the

Beat maker and producer Madlib "digging" in the crates, picture from VinylFactory

Art Ensemble of Chicago, Anthony Braxton, et al.) ups the aesthetic ante considerably for African American musical aesthetics overall, serving to "archive" an immeasurable range of sonics…" [24]

[23] Ibid, 401

[24] Bartlett, ibid

In that sense, sampling is a high-tech and highly selective archiving, bringing into dialogue even the slightest representation of any production or any random sonic element.[25] However, it should not be regarded only as a product of recording technology. The tradition of selective expropriation is evident throughout the history of African American music. Traces of the original, whether it is sampled or instrumentally performed and improvised, are lost.[26] What remains and goes on are important aesthetic elements and performative appropriations of communal knowledge.[27]

III. The Crackle

The previous subchapter highlighted a tradition of selecting various material for performative use that predates the use of recording technology. Nevertheless, the repurpose of the latter lies on the core of hip hop music and has expanded into many fields. In that context, how does recording technology exist as a creative element in a post-sampling, post-hip hop and post-modern reality? Are there any further connotations besides the creativity of errors and technological misuse when using vinyl crackles, tape hisses and digital distortion?

The majority of media carry audio or visual characteristics that shape their identity. For example, the vinyl crackle is a sonic characteristic inherent to the use of records and their technology. During the first decades of the 20th century, the technology of recording was repressed in the discussion on liveness and authenticity. In that context, the crackle and other media characteristics (e.g tape hiss) functioned as the mediums' fingerprint and nothing more. However, certain musical developments of the mid/late 20th century and the recontextualization of recording technology pointed out the artistic and aesthetic possibilities of the mediums' sonic temporalities[28].

The development of dub music revealed the seam of its recording as a basic part of the composition. The texture and spectrality of sound as a medium were offered to the audience as an aesthetic pleasure.[29] The use of spectrality as a theme and practice became more evident in the work of producers from various backgrounds in

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[25] Ibid

[26] Ibid

[27] Ibid

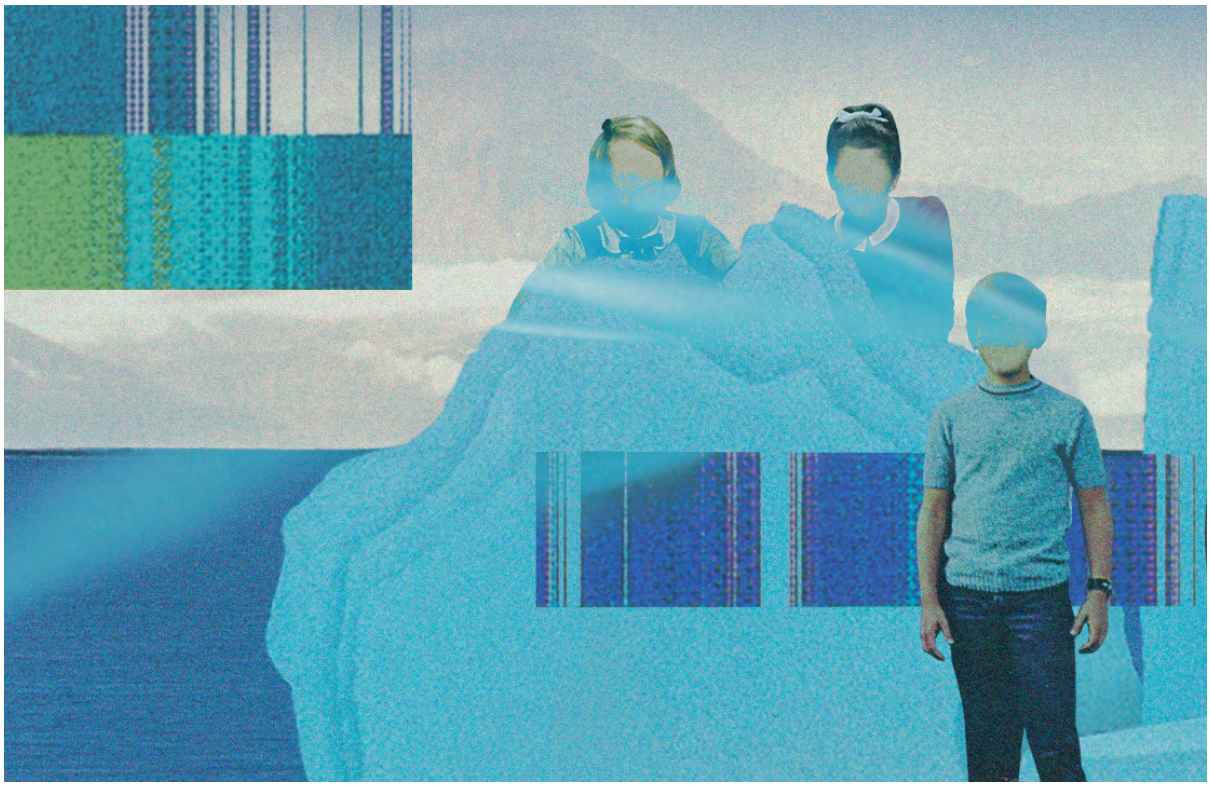
[28] The term temporalities refers here to the inherent characteristics of a medium. For more on that, see Ernst, W. and Parikka, J., (2013), *Digital Memory and the Archive,* University of Minnesota Press

[29] Fisher, M. (2013), 44

the first decades of the 21st century. As discussed earlier, writers Mark Fisher and Simon Reynolds have described this music tendency as sonic hauntology. A rather inconsistent term, it is used to describe a tendency to blur "contemporaneity" with elements from the past, but where postmodernism glosses over temporal disjunctions, hauntological artists foreground them.[30] More precisely:

"... Sonic hauntology is exercised by the problem of memory and its imperfect recovery; a familiar enough theme, but one given an extra piquancy in the context of electronic music, which was for so long treated as a herald and signifier of the future…" [31]

The term is also considered to be similar to Afrofuturism, as the latter liberates futurism from the master narratives of white western modernity and introduces time as plastic, stretchable and prophetic, in which past and future are subject to



The Boards of Canada, *Music Has the Right to Children,*1998*,* album cover

[30] Ibid, 45

[31] Fisher, M. (2013), 46

ceaseless de- and recomposition.[32] Moreover, Afrofuturism blends with the field of science fiction and most specifically with the construction of parallel realities and alternative histories. Hauntology follows a similar path.

These temporal displacements and tensions between past, present and future have been described by Simon Reynolds as dyschronia, as broken time, in which it is no longer possible to securely delimit the present from the past, in which the traces of lost futures unpredictably bubble up to unsettle the pastiche-time of postmodernity.[33] The latter can be defined as the succumbing of historical time to the spectral time of recording devices. Postmodern time entails the presupposition of ubiquitous recording technology but postmodernity screens out the spectrality, naturalising the uncanniness of the recording apparatuses.[34] In this context, hauntology restores the uncanniness of the recording by making the recorded surface audible again and foregrounds the old question of how we hear the recorded voice -- as an embodied presence or as recorded revenant[35].

One of the common compositional elements that the hauntology artists share is the sound of vinyl crackle. The textual discrepancy between the crackly sample and the rest of the recording is more than evident.[36] In this technique, the hauntology authors assign metaphysics about dyschronia and disembodiment. As the crackle disrupts the distinction between surface and depth, time is disjointed and it is audible through the crackles and the hiss.[37] Through the surface noise, the illusion of presence breaks. The sample makes the listener aware of its phonographic revenant and introduces the material condition of recording as content. This disruption makes the audience conscious about the medium and time as a glimpse of the past erupts into the present.[38]

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[32] Ibid, 46 - 47

[33] Ibid

[34] Ibid, 48

[35] In the Hauntological context, the word acquires sci-fi connotations. In the latter, revenant can refer to a dead character returning from the past. The long absence and return of a character imply a sense of anachronism and tensions between past, present and future. In that sense, the past (music or voice) is heard not as it was, as a presence, but through the medium of listening, as a “unnatural” return after a long absence.

[36] Ibid

[37] Ibid

[38] Ibid, 49

In this context, the vinyl crackle transforms from the fingerprint of a medium to an aesthetic reference and paves the way for other lo-fi and distorted media characteristics to emerge. Through the use of the latter, the artists associated with Hauntology construct an extra layer on top of their original source to comment and reflect on past time, realities and media.

IV. Learning from Arlette Farge

"When working in the archive you will often find yourself thinking of this exploration as a dive, a submersion, perhaps even a growing…" [39]

In her book *Allure of the Archives*, Arlette Farge foregrounds the captivating worlds of archives through a detailed narrative of her personal practice and research. More than a personal testimony, Farge's book resulted in a practical guide of research methodology and a literary reflection on the challenges of writing history. The author explores archival research and archives as distinct arrays of experiences (tactile, interpretive, emotional, awkward), while reflecting on the material and its challenges.

Farge's archival process strangely vibrates with my experience in using archives as compositional materials and specifically with this project. While the historian's archival practice differs from the archival practice of a composer, the text's focus on research methodology allows for certain parallels to develop and forms the following question. Can the composer learn from the historian's experience?

The historian describes the archive as a vast entity, an ocean or a forest without clearings while the research is compared to a slow dive, a submersion. The archive's vastness will provoke feelings of solitude and powerlessness when the early excitement of discoveries turns into a monotony of collected events.[40] The latter has a similar structure and feels like a repetition of each other. The importance of the content is evident and its impossibility to capture and decipher it. These contradictions can create feelings of self-doubt, especially when there is a personal approach to the archive. Farge is known for copying by hand her findings; as she mentions, she often questions the value of this industrious and obsessive activity.[41]

Nevertheless, archival research must start off slowly and steadily through banal tasks. For Farge, this slowness and banality are sources of creativity. In her own words:

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[39] Farge, A.,(2013), *The Allure of the Archives,* Yale University Press, 4

[40] Ibid, 14

[41] Ibid, 16

[…] In doing these tasks, a new object is created, a new form of knowledge takes shape, a new archive emerges. As you work, you are taking the preexisting forms and readjusting them in different ways to make possible a different narration of reality. This is not a question of repletion, but of beginning anew, of dealing the cards over again. You do it almost unconsciously, going through a series of motions and gestures, interacting with the material through a joint process of contradiction and construction. […] [42]

There is no standard way to work; depending on the subject studied, the researcher chooses different techniques to perform these banal tasks. Regardless of the technique, gathering and selecting shapes the object of the study through the accumulation of detail.[43] Once these goals are reached, the task is reversed; if findings were selected because of their similarities, now they are examined for discrepancies, ruptures and vice versa.[44] Often, the researcher will encounter a mutiny in the archive, a finding so different that it is only natural to linger toward it, if only to figure out if there is worth in using it.[45]

It is through these processes that you slowly emerge in the archive and you start noticing elements that were not of interest before. The quiet and ordinary documents can lead you off course and take you far from where you had planned to go or even to understand.[46] However, it is important for the researcher to distance herself from the archive in order to draw her own thoughts on it. The alternating tasks of exclusion and reintegration of documents and writing help the researcher's personal style and thoughts to emerge.[47]

Audio archives share the vastness of written archives. The composer confronts the audio files as the historian confronts the documents. Either analog or digital, the composer has long listening days ahead of her, as the historian too has long reading days ahead. The ear, same as the eye, gets tired after the first listenings. The material, although exciting at first, begins to weigh down the ear. At this point, the composer shares the feeling of solitude and hopelessness with the historian. As

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[42] Farge, 63

[43] Ibid, 65

[44] Ibid

[45] Ibid, 69

[46] Ibid

[47] Ibid, 75

clear as the composer's intentions can be, the ear needs time to tune in to the material of the archive to sort out what is worth using and what is not.

This tuning occurs through repetitive listening, sampling, comparison, analysis of sound sources, transcription, etc. The composer creates her own banal tasks through which she becomes accustomed to the archive's environment. Once the ear adjusts, everything starts to make more sense and details become more evident. Similar sounding files start to differentiate and reveal different sonic qualities. Every now and then, the composer will come across a source so unexpected and impressive that it immediately catches the ear's attention. As the historian, the composer will gravitate around it, (in the case of this project: sample it) and will try her best to include it in the final selection.

Once sufficient materials have been accumulated, the process can be reversed. As with historical archives, there is no standard way to work with audio archives. In the case of this project, the sampled material was chosen based on the complexity and clarity of their rhythmic patterns and their timbre. At this stage, the material is reexamined; the ones that are not as "exciting" are excluded while others start forming groups and connections that were not evident before. Distancing oneself from the archive can be crucial at this point; it allows for the composer's thoughts to emerge and the first sketches of the composition to develop.

Archival research, either artistic or historical, shares certain characteristics regarding the work flow and the research process. However, the two of them are different. While historians work in most cases with institutional archives, such as police records, state records, artists enjoy (in most cases) the freedom of setting their own limits to the archive. In my case, I have chosen certain medical databases and various media based on my own preferences, convenience and time restrictions. I could have chosen less or more; both would have made a difference in the composition. Moreover, I could have stayed faithful to the original source or not, I could have mixed it with other samples, music, material or not. In any case, I can make choices that it would not affect the final result on an ethical working level.

Nevertheless, Farge manages to express an all inclusive and critical methodology that resonates with archival practices outside the realm of history. Based on her practice, she outlines a repetitive, alternating and industrious process that allows researchers to build time and space to their reading of the archive. This process favors careful readings and observations that can point out ignored details or suppressed narratives. By emerging to the subject and developing an involved relationship with it, the historian can retract qualities and information that were hastily documented and archived. In that sense, the composer can learn from the historian's

experience by dedicating time to understand the material and construct an engaged research methodology, like the one developed by Arlette Farge.

Medical Archives & Internal Body Sounds

I. Illness as a narrative

The health crisis of COVID-19 affected the entire world; narratives about the novel coronavirus are flooding the majority of all mainstream media around the world. They range from news reporting on the front line, updates and warnings from the scientific community, government guidelines, health campaigns to individual stories on social media, internet memes, TikTok dances, costumes, celebrity efforts, and conspiracy theories. Parallel to that, artists have started producing work regarding the social changes or the virus itself.

The above is not a surprise nor unexpected; illness narratives have been around for the most part of the 20th century. However, it is worth noting that the Spanish flu outbreak is rather absent from the western literature and media of the time. In the beginning of the 20th century, the flu events were not communicated or documented extensively partly due to the virus' rapid spread and effect on a large amount of the population. The latter resulted in overwhelming and weak governmental, medical and narrative responses.[48] Although the pandemic was horrifying, the war prevailed as the main concern of the time and dominated the media. Moreover, to allay anxiety at the peak of the plague, most journalists throughout the United States and most of Europe downplayed the severity of the virus.[49] The latter did not decrease anxiety as the narrative on the press had no relationship to people's experiences. The silence around the pandemic at that time was observed in other genres of writing as well. According to Catherine Belling, the story of the self was rarely present in public narration or even told at all if it involved private bodily suffering.[50]

In the aftermath of the outbreak, the first steps toward a cultural shift regarding illness narratives were formed. Several types of narratives started appearing frequently in various professional medical journals and occasionally in the press.[51] In their majority, they were professional memoirs by nurses and doctor's narratives of discovery. These constitute the precursors to the patient's own illness narratives.[52]

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[48] Jurecic, A.,ibid, 4

[49] Ibid

[50] Ibid, 5

[51] Ibid

[52] Ibid

They were followed by the sanatorium narratives which were composed and published by tuberculosis patients in the 20s and the 30s.[53] By the 1950s, patients with polio started publishing their own narratives from their isolations. Moreover, medical journals published around the same time articles about the “last illnesses” of famous people.[54] Parallel to these developments, the paperback revolution made books affordable to mass audiences and allowed different genres to emerge. Among others, the therapeutic narratives of self help and popular psychology.[55]

The developments in medical research in the mid 20th century changed the profession radically and consequently the doctor - patient relationship as well. The intimacy shared by the latter was lost and disease became isolated from everyday life since patients were traveling to physicians’ offices and hospitals for diagnosis and care.[56] Sulfa drugs, antibiotics and vaccines marked the end of acute disease in the USA and Western Europe and introduced the age of chronic disease.[57] As medical institutions grew bigger and life became more medicalized, the politicized patient emerged. The women's movement and the outbreak of HIV/AIDS in the 1970s and 1980s and the development of the field of bioethics contributed to the politicization of the patient.

The outbreak of HIV/AIDS and activism movements around it deeply influenced illness narratives and medical humanities. The cultural production and mobilization around the outbreak were enormous and reached out to people outside those affected by the virus. Following the HIV/AIDS narratives of the 80s and 90s, the production of other kinds of illness narratives grew even more. Today, illness narratives take many forms and embrace different genres and media, which intersect with the literary and conventional perception of narrative.[58] The narratives have expanded beyond the literary realm and into the fields of film, dance, performance art, etc.

This large amount of cultural production around illness narratives since the mid 20th reflects the profound need of people to share these stories in an era when religious

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[53] Jurecic, 6

[54] Ibid

[55] Ibid

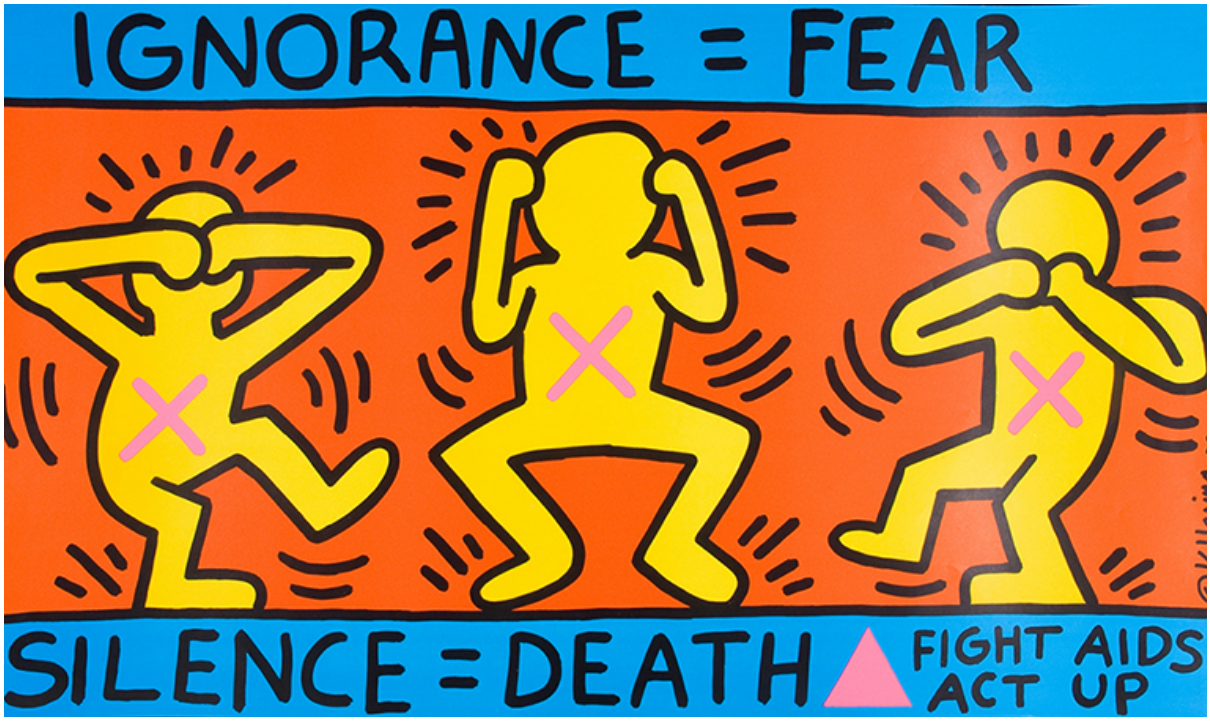
[56] Ibid

[57] Ibid, 7

[58] Ibid, 11

and folk explanations no longer give a satisfying and complete meaning to their experiences and when biomedicine largely excludes the personal story.[59]

Undeniably, some parts of this large cultural production will not qualify as artistic works or they will fall under the prevalent and popular genres within medicine culture such as the epic, tragic and dark comic narratives. These narratives are associated



Keith Haring, *Haring's Silence = Death* (1989), courtesy of the Keith Haring Foundation

with medicine's heroic interventions, emergency and intensive care and a comic insight to medical professionals' everyday relationship with their patients.[60] At the same time, conventional and experimental artworks dealing with illness can be controversial, alienating, superficial or poorly executed. The latter examples can take advantage of the sensitivity and intimacy of the subject and reject criticism.

On the other hand, art critics and the academy have often excluded this type of work, since they disrupt critical expectations and typical standards of judgment. This argument is often the result of the complicated nature of these works and the affective and intimate engagement they can invoke.[61]

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[59] Ibid, 9

[60] Bolaki, S., (2016) Illness as many narratives, Edinburgh University Press, 164

[61] Ibid

It is evident that the relationship between illness and art is complicated. The complexity surrounding the relationship of art and illness is explored further in the field of medical humanities. The latter is more accepting of the emotional and ethical claims that the artists make on their audience and attempts a different approach.[62] Medical humanists attend to the use of illness narratives and focus on their pedagogical and therapeutic values to medical professionals and patients, respectively.

For medical professionals, illness narratives function as a communication channel with patients and a tool for handling unfortunate and unexpected situations. They help bridge the divisions between clinicians and patients, reimagine older techniques (the use of doctor's senses in diagnosis and treatment) using newer technologies and renegotiate the doctor - patient relationship. Alan Bleakley, a scholar of medical humanities and an advocate of aesthetic medicine, has highlighted the importance of working closely with a range of artists.[63] As he mentions, it is important to involve other experts of developed sensory awareness in the medical field to help educate narrative intelligence for close listenings, appreciation and interpretation of patients' stories.[64]

From the patient's perspective, illness narratives in any kind of form is a way to communicate personal experiences in a therapeutic but also political way to the extent that the material is shareable and can, thus, lead to collective empowerment. The latter has been observed with artists' books around issues of women's rights and breast cancer, especially in the work of Martha Hall.[65] Moreover, illness and personal narratives help express everyday life in the post-diagnosis time and provide a structure for meaning when faced with evidence of one's own insignificance.[66]

Medical humanities scholars also examine another type of illness narrative: the third person narrative. The latter is composed and expressed through the experience of a person close to the patient. This viewpoint has been criticized for various reasons. From a critical standpoint, these works evade the ideal of artistic originality since the artists are documenting someone else's experience. From an ethical perspective, they are scrutinized in terms of ways they negotiate power asymmetries and ethical

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[62] Ibid, 12

[63] Bolaki, 82

[64] Ibid

[65] Bolaki, 75

[66] Jurecic, 26

quandaries relating to giving consent and the appropriation of another's story.[67] Especially in works that deal with terminal patients, questions of ethical responsibility have risen surrounding artistic practice and spectatorship. The latter occurs more to the media of cinema and theater where terminal or chronic illnesses and self-destructive behaviors are aestheticized and used as a metaphor for artistic purposes.[68] An example of this controversiality is Wim Wender's film *Nick's Film/ Lightning over Water.* The film, which describes the last months of American director Nicholas Ray's life, has been received with ambivalence by film scholars and viewers as well as Wim Wenders himself since its release.[69] The controversiality of the film is due to the difficulty of the subject it treats and its formal self - consciousness and experimental character, which documents its struggle to come together and successfully settle into one determinate category.[70] Besides the problematic connotations the film has, medical humanities scholar Stella Bollaki has attempted a different reading of it, in which she foregrounds the film's collaborative

Wim Wenders, *Nick's Film/Lightning over Water,* 1981, film still, courtesy of the Wim Wenders Stiftung

[67] Bolaki, 19

[68] Ibid, 138

[69] Ibid, 20

[70] Ibid

nature as a form of terminal care by supplementing medicine's power to largely define how to live one's final days, and presenting us with alternative treatments that can illuminate aspects of both filmmaking and medicine.[71] Moreover, the experimental nature of the film allows for renegotiation and exploration of the tension between images and stories, loss and consolation, dying and its displacement, ethics and aesthetics, illness in the individual and in the cinema as an art form.[72] Bollaki argues that these themes show that illness narratives do not need to be framed only by the context of biomedicine but also by a wider artistic and human context.[73]

In her book *Illness as Many Narratives: Arts, Medicine and Culture*, she examines various forms and genres of medical illness narratives and highlights the importance of attending to them and engaging with several media and methods.[74] Through her research, she attempts to create a more inclusive illness narrative canon that de-centres the literary form as the paradigm of understanding this genre and draws connections between different illness experiences.[75] This opening acts to expand the conventional notion of narrative and enrich debates about cross-disciplinary enquiry, health and illness in contemporary culture.[76]

Nevertheless, sound and music are absent from Bollaki's research. While music as a discipline has been entangled with medicine through various methods since the last century (music therapy, therapeutic listening, hospital soundscapes, neuroscience experiments, etc.), as an illness narrative it escapes the conversation in the field of medical humanities. In the latter, music (mostly Western classical) is studied based on its ability to teach medical students humanistic and listening skills, as well as enhancing their concentration levels. Music therapists have been incorporating performance notions and improvisational techniques of avant-garde and fluxus composers.[77] Other medical professionals and physicians have drawn

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[71] Ibid

[72] Bolaki, 20

[73] Ibid

[74] Ibid, 23

[75] Ibid, 3

[76] Ibid, 23

[77] Wood, S., 2017. "Found Performance": Towards a Musical Methodology for Exploring the Aesthetics of Care. *Healthcare*, 5(3), p.59

parallels between jazz and medicine, with a focus on improvisation as a medical encounter.[78]

All of the above constitute a strong cross-disciplinary interest between music and medicine with positive results on patient's care and medical professions. Given the context of illness narratives, as developed in this text, can music and sound also have a positive impact on conveying personal experiences and explore further fragile matters?

II. Music and Sound as an Illness Narrative

The first steps in using music to express illness narrative are observed in the efforts of 19th century western European composers to incorporate into their compositions images of medical illness, bodily anxiety and mental health. Composers such as Mahler, Schumann and Beethoven are well-known for their struggle with various health issues and its reflection on their music. Nevertheless, these illness narrative elements were modest and integrated in the musical zeitgeist.

As the 20th century advanced, so did the composers and artists interest in science, medicine and their technology. A significant number of interdisciplinary compositions, installations and video art have been produced in recent decades. While most of these works are dedicated to the intersection of biomedical fields and contemporary art, some artists explore illness narratives by using sound. One example is John Wynne's work. The artist has a diverse artistic background, which includes socially engaged projects as well as site-specific installations and sculptural works. Although his work has a strong visual impact, Wynne's interest in sound leads his practice.[79] For the purposes of this paper, I am focusing on his work with heart and lung transplant patients in the UK. While the artist does not describe these works as illness narratives, works like "Birds I wouldn't have heard" (2019) "Transplant and Life" (2016-2017) "Transplant" (2016-2017), "I Am Not the Cancer" (2013-2015) "Hearts, Lungs and Minds" (2003), could easily contribute to the illness narratives discourse. In these works, the artist documents patient testimonies and experiences regarding various conditions and their treatments, hospitalization, post - diagnosis daily life, etc. In that context, he also explores sound as the main sense patients use to understand the environment and make sense of one's experience.

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[78] For more on Jazz and Medicine see Paul Haidet's, *Jazz and the 'art' of medicine: improvisation in the medical encounter*

[79] MEDinART, "John Wynne - Med In Art", *medinart.eu,* http://www.medinart.eu/works/john-wynne/

John Wynne & Tim Wainwright, *Transplant and Life,* 2017*,* Royal College of Surgeons

Wynne captures these narratives through a diverse sonic practice: a practice between sound and music, documentary and sound art, documentation and abstraction.[80] From recordings of patients, medical professionals and field recordings of the hospital's environment to signal processing and low frequency compositions for immersive installations, the artist proves that sound constitutes an important medium in the discourse of illness narratives and medical humanities. The decision of the Hunterian Museum in the Royal College of Surgeons in London to commission an artwork from John Wynne and photographer Tim Wainwright that would bring the patient voice into the medical museum, a space normally dominated by specimens, clinical hardware and medical heroes, further proves this point.

[80] Wynne, J., 2008, "Hearts, Lungs and Minds", *sensitivebrigade.com*, http://www.sensitivebrigade.com/Hearts,Lungs&Minds.htm

III. Internal Body Sounds

It is more than evident that sound can have multiple functionalities in the illness narrative discourse. Wynne's work highlights mainly two functions; its ability to capture and distribute the patient's voice by using recording technology and its transformation to the most important sense in the hospital environment. However, more than a voice and a sense, sound also exists inside the human body and it can be an indication of someone's illness or survival narrative. For example, a replaced heart valve is audible not only to a medical ear or through a stethoscope but also to a regular ear. In some cases, the high pitch metal sound of an artificial valve is not completely absorbed by the body and travels through the air around the person who carries the valve.

Besides prosthetic and artificial heart sounds, the body produces a vast variety of rhythmic patterns, blowing and wheezing sounds. The latter are not always audible to the naked ear. Organ activity or malfunction can cause these sounds. The medical ear documents and studies those body glitches that can be indicative of certain diseases and conditions. Auscultation is a part of medicine which studies these sounds.

Some composers have been aware of these internal body sounds, either by experiencing them or due to their artistic interest, and have created work around them. In this paper, I will examine two cases of internal body sounds; tinnitus through Smetana's String Quartet No. 1 and Brent Michael's David Tinnitus Quartet, and heartbeats through the life long work of Milford Graves.

Smetana's String Quartet No. 1 & Brent Michael's David Tinnitus Quartet

Tinnitus is a common condition among musicians, composers and sound artists; Bedřich Smetana too suffered from it. His String Quartet No. 1 constitutes an early effort in expressing musically his experience of the onset of deafness via extreme tinnitus.

In that Quartet, the artistic choices made by the composer relate an initial traumatic event to his climatic experience of tinnitus to musical structures that recall and transform that event.[81] As a young violinist, he would have often been exposed to similar loud chords close to his ears. Although research suggests that his deafness resulted from syphilis, Smetana chose to narrate his illness through

[81] Pesic P. & Pesic A.,"The Sound of Deafness: Smetana and Traumatic Tinnitus", *Music & Medicine* 7, 9–13 (2015)

specific musical evocations of sonic trauma and its tragic recurrence. [82] In its majority, the Quartet is a conventional Romantic chamber music composition. However, a high, sustained harmonic E on the first violin in the last movement is an expression of Smetana's personal illness narrative. With that high E, he enables the listeners to share his experience. In the previous movements, he prepares the audience by presenting the traumatic initial shock and his reaction to it before reaching the inevitable shrieking E. According to his writing for the quartet, that E "was a fateful ringing of high-pitched tones in my ear, which in 1874 announced the beginning of my deafness".[83] Although other writings point out that he was experiencing more complex sonic events, that high E renders the experience audible for the audience by recreating a temporary, artificial tinnitus.[84]

Undoubtedly, Smetana tried demonstrating his suffering through the condition. Given the common appearance of tinnitus, it would be interesting to see the audience's response to this type of work at that point in history.

Another composer who has chosen to express his encounter with the condition of tinnitus is Brent Michael David. In 2005, the composer created the Tinnitus Quartet. As the name suggests, Tinnitus Quartet evokes the buzzing and ringing that characterize the condition of tinnitus. The composer's intention was to create a piece that showcases what he hears. According to Davis, he constantly hears a high A; in the piece he reproduces it in an octave lower thought out the piece. The four members of the quartet take turns playing the A for approximately 18 minutes.

The audience's response to the piece has been strong and varied according to the musicians and composer.[85] Some people respond to it while others get distracted by the constant A note. For those who suffer from tinnitus, the work functions as a communication tool with others.[86] Many of them say that they can finally show to their partners, family and friends what they experienced in their minds, an experience they found difficult to express in words.[87]

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[82] Ibid

[83] Ibid, 10

[84] Ibid

[85] Freymann- Weyr, J. 2005, "Composing Music For 'Tin' Ears", Podcast, *All Things Considered,* https://www.npr.org/templates/story/story.php?storyId=5020435

[86] Ibid

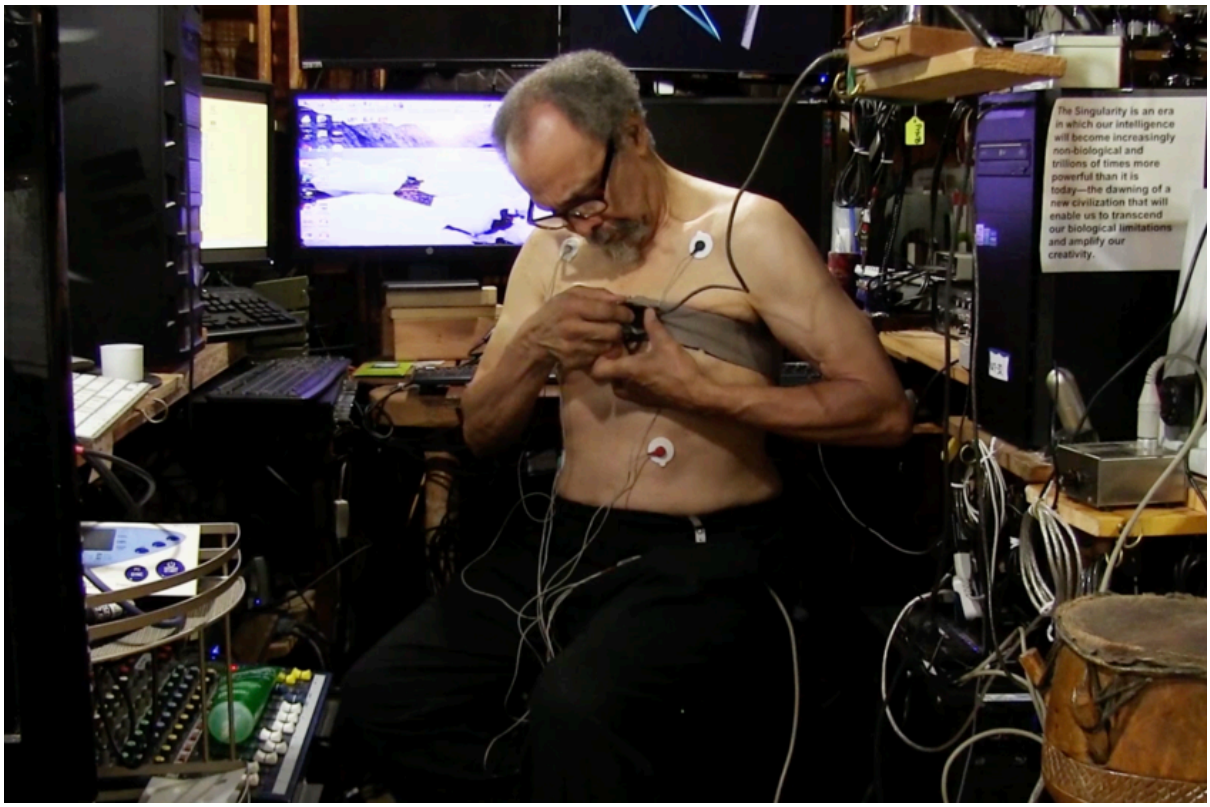
[87] Ibid

Milford Graves, *Beyond Polymath* (detail), 2017, mixed-media installation. Courtesy of the Artist's Institute.

Both composers experienced the condition. While Smetana's approach to the condition is more dramatic and abstract, David's composition remains focused on the sonic phenomenon of tinnitus itself. Both compositions reflected the zeitgeist of their time. Smetana struggled with the lack of medical and technological knowledge of his time on his path toward deafness, while David's approach suggests a more sober and realistic attitude toward the condition. Through the use of the tinnitus pitch, each composer came to terms with it while rendering audible his experience with others.

Biological Music and Pulseology

Milford Graves is mostly known for his avant-garde and free jazz career as a percussionist. Parallel to his musical career, Graves has been engaging with other artistic and non-artistic fields such as visual arts, performance, martial arts, Western and non-Western treatment methods, music and medical technology. All of his activities circulate around a basic involvement in studying the human body and influences of sound on it.[88] More specifically, he has studied the human heartbeat extensively through acoustic and technological means for artistic and medical



Milford Graves in his studio in Jamaica, Queens, photo by the artist's website

[88] Corbett, J., (2015), *Microgroove,* Duke University Press, 71

research purposes. Graves calls all of this Biological Music:[89] music that mutates, adapts, and transforms in the same manner that our heartbeat fluctuates in reaction to our bloodstream or our various organs create a polyrhythm of life processes.[90]

As mentioned on his website, he started recording heartbeats through an electronic stethoscope and listening to the different patterns of those rhythms. As his research advanced and medical technology became more available, Graves started using EKG software and LABview, a graphical programming software that creates virtual instruments. These tools allowed him to record the voltages produced by the electrical pulses of the heart, essentially capturing the frequency at which the heart vibrates.[91] The frequencies are translated into the audible spectrum and analysed as sound or heart music, as Graves describes it.

Moreover, the composer works with volunteers; he listens to their heartbeats through a custom-built stethoscope with sensors that pick up the electrical impulses that cause the human heart to beat.[92] The software then processes the data and allows Graves to focus on the micro-rhythms within a single heartbeat. Through this process and informed by his musical training, the composer has developed his own diagnostic ear; if he thinks something is wrong with the heartbeat, he will proceed to manipulate the tempo through his computer and try nudging the heart toward a more normal pattern by creating a counter rhythm.

The manipulated sounds are received by the volunteers through acupuncture needles or through their ears.[93] The artist has also applied this process on other musicians to help them discover their own sound. Graves maintains that recording a musician's' most prevalent heart rhythms and pitches, and then incorporating those sounds into their playing, would help them produce more personal music.[94]

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[89] Corbett, 72

[90] Mittal, A., 2018, "Milford Graves: Sounding The Universe".,*Newmusicbox,* https://nmbx.newmusicusa.org/milford-graves-sounding-the-universe/

[91] Graves, M., "Heart Music", *milfordgraves.com,* https://www.milfordgraves.com/pageab

[92] Rose, J., 2005, "Music Of The Human Heart May Hold Clues To Healing". Podcast, *Morning Edition,* https://www.npr.org/templates/story/story.php?storyId=4510912.

[93] Ibid

[94] Russonello, G. 2018. "For Milford Graves, Jazz Innovation Is Only Part Of The Alchemy". *The New York Times*, 2018. https://www.nytimes.com/2018/04/26/arts/music/milford-graves-jazz-full-mantis.html

For Graves, his most fascinating discovery comes from hearing the heart sounds of people with various pathologies.[95] Instead of finding harsh results, he discovered that, when converted into melodic information, their heart activities were the most beautiful he had heard.[96] According to his own words;

" When people are ill, they should have fantastic, beautiful melodies…your internal doctor is trying to heal you…" [97]

On a scientific level, the composer's research led him to collaborate with the researcher Carlo Ventura; together they conducted several medical studies around the hypothesis that exposure to the heart music caused unassigned stem cells to develop into myocardial (heart) cells. According to their observations and discoveries, stem cell fate can be remarkably modulated by physical energy and cells can express vibrational signatures of their health and differentiating potential.[98] Their positive results and progress in the research, have led them to the creation of the term "sonocytology". The latter is used to identify a novel area of inquiry based on the fact that, after an accurate process of amplification, the cellular vibrations recorded by an atomic force microscope (AFM) could be transformed into audible sounds providing a thorough assessment of the functional properties of the cell.[99]

In 2018, Graves was diagnosed with amyloid cardiomyopathy, also known as stiff heart syndrome. The condition currently has no cure and the composer was told he had six months to live. Parallel to the treatment of a cardiologist, he has been treating himself with alternative techniques that resulted through his decades long research. Since his diagnosis, he has been listening to his heart through a stethoscope and monitoring it with an ultrasound device he bought on eBay.[100]

Graves claimed his diagnosis invigorated his research and created a challenge for him, a chance to become his own subject of study.[101] Moreover, his daily fight against his disease has turned into a performance project, where his students are

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[95] Corbett, 77

[96] Ibid

[97] Ibid

[98] Ibid

[99] Ventura C. And Graves M., "Heart Sound Melody and Stem Cell Reprogramming". *milfordgraves.com,* https://www.milfordgraves.com/pageab

[100] Kilgannon, C. 2020. "A Jazz Drummer'S Fight To Keep His Own Heart Beating", *The New York Times,* 2020. https://www.nytimes.com/2020/08/05/nyregion/milford-graves-drummer.html

[101] Ibid

documenting and filming his daily activity. This documentation is for the composer's archives and for an exhibition planned to open on the 25th of September 2020 at the Institute of Contemporary Art[102] in Philadelphia.

Milford Graves in his home in Jamaica, Queens, practising the biofeedback technique, photo by Mark Christman for the New York Times

In his daily cardiac listening, the composer says he hears the sound of survival. The disease causes abnormal heartbeats and therefore sounds less elastic and more plodding, with an increased sense of metronomic regularity than before the diagnosis. The latter for Graves is a rigid unhealthy quality in a heartbeat.[103] The composer practices his biofeedback techniques by mimicking the rhythm and melody of his heart by signing and playing on a drum near his recliner.[104] Moreover, he plays recordings of his own hearts sounds on the drumhead with the help of electronic transducers, which turn the drumhead into a speaker.[105] This process has resulted in developing drumming techniques, including adjustments in drumhead tensions and

[102] For more info on the exhibition *Milford Graves: A Mind-Body Deal* see https://icaphila.org/exhibitions/milford-graves-a-mind-body-deal/

[103] Ibid

[104] Ibid

[105] Ibid

new stick styles. For Graves, his condition is still drum practice but with higher stakes.[106]

Collaborators have described the documentation as a record of survival through the creative process.[107] Unquestionably, the multidisciplinary artist has created more than an illness narrative; he has created for himself a musical process and technique for terminal care based on his lifelong interest and research on the effect of sound in the human body and the human heart. Besides prolonging his life, his process and research are pushing further artistic insight in medical research and patient care.

[106] Ibid

[107] Ibid

Conclusion

This paper created a cross-disciplinary environment of references to contextualize my artistic interest in audio medical archives, learn from historian's experience and confront the sensitive nature of using illness for aesthetic purposes.

As a starting point, I chose to examine archives in a post-digital context and their function as an artistic medium. The discussed theories showcased how the relatively recent changes in the archival state have affected the state of contemporary archival work, introduced new tendencies and created new compositional elements. By using the 'living' archive as a source of material, the contemporary archival work acquires a potentially dynamic existence. The work introduces a new interpretation and use of the archive which immediately marks a new part of the archive. The latter is documented and filed as such in the context of the 'living' archive and online presence. In that sense, the work is potentially available as preexisting material for further interpretation, appropriation and recontextualization by other individuals (artists or not) through the proliferation and availability of digital tools.

This potential possibility of sampling anything that was ever recorded or produced created a need to look closer to sampling's origin, its association with African American oral culture and its development in the field of hip hop music. In this frame of reference, Andrew Barlett's research highlights the interchangeable nature of music and its dynamic existence in the conjunction of composition, narration and performance. In that sense, music acquires a 'living' state, where anything can contribute and move it further, even the most slight representation or the most contrasting elements of any type of material.

As mentioned before, Bourriaud and Navas have placed African American hip hop practices in the roots of contemporary archival art. Undoubtedly, we observe the dynamic existence and interchangeable nature of the state of the art in both cases.

Hauntology is also informed by this practice but takes a step back and questions how we listen to this dynamic existence and the interplay of all of this material. Based on the first ethical question surrounding recording technology, hauntological artists remind us of the difference in listening to the voice as (authorized and authentic) embodied presence versus the voice as recorded revenant. Influenced by dub music, they foreground the temporal displacements and reflect on contemporary culture's possibility to store and reproduce anything that ever existed through the use of recording technology, lo-fi practices, fragmentation and collage.

All of the above constitute different approaches in using audio archives as compositional material. While the aesthetic and cultural references differ from field to

field, the importance of this type of practice is found in its ability to create gestures of alternative knowledge, narrative and counter - memory. In that environment, the composer - archivist enjoys an abundance of available material, which through research, selection and active listening can be transformed into new points of departure. The latter can mean different things to different artists: for post production artists, it translates to a critical reflection on mass culture; for hip hop artists, a reconsideration of music history and contemporary culture; for hauntological artists, self awareness, irony and grief of postmodern time. In any case, the various departure points reach out to the listener as well due to their familiarity and relation to a network of interconnected elements.

The notion of the composer - archivist creates a parallel with another type of archivist: the historian - archivist. In search of new narratives, both archivists develop a research methodology and personal tasks to navigate the big archival entities. By incorporating Arlette Farge's detailed account of her work and juxtaposing it with my own process, I attempted to open up a dialog between these phenomenally different practices and highlight the importance of an aware and engaged approach to the sample material.

In the second part of this paper, I focused on researching the sensitive nature of using medical archives and illness as compositional material. That decision highlighted the case of illness narratives, which more recently have expanded into a broader spectrum of contemporary art forms. Medical humanities study these works and highlight the narrative's significance in the training of medical professionals and in the patients' needs to express and deal with illness. Based on the research of medical humanities' scholars, I tried exploring works using internal body sounds as compositional material and their importance as illness narratives. My research showcased that the use of internal body sounds on a musical work can communicate one's experience more precisely than words. In the case of tinnitus, the use of high pitch notes on a musical context resonated with people having the condition and experiencing the work. Given the fact that tinnitus is described as the invisible handicap, this type of work creates awareness around the condition, its effect on people and its common appearance.

In the case of heartbeats, my research featured the work of Milford Graves. His works include a vast variety of media, with music and sound being the leading ones. Due to his multidisciplinary interests, Graver's work should be understood and examined through the intersection of various fields. This study gravitated toward his life long research on heart sounds and his encounter with amyloid cardiomyopathy under the prism of medical humanities and sound studies. In the context of these two disciplines, the artist's work showcased the artistic possibilities of the study of internal body sounds and the importance of music's intersection with scientific

disciplines on a practical level beyond the field of narratives. Furthermore, the limited bibliography on Milford Graves' work opens up research possibilities for the near future.

The use of illness in art can be a sensitive and controversial issue. Nevertheless, the positive feedback by the patients and the western medical and scientific community encourages artists to play a more active role in that field regardless of their medium or approach. In the case of sound and music, the paper showcased the medium's distinct qualities in expressing illness narratives and contributing crucially to patient care and scientific research through the works of John Wynne, Brent Michael David and Milford Graves. The post - digital context and the use of educational medical archives as sample material functioned as departure points to come across and explore all of these references.

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Universität der Künste Berlin, Masterstudiengang Sound Studies and Sonic Arts, Masterarbeit

Documentation

Murmurs

Fixed Media Composition

Kassiani Goulakou
Matrikelnummer: 369397

Supervisors:
Hans Peter Kuhn
Gary Schultz

September 2020
Berlin, Germany

Project Description and Theoretical Context

Murmurs is a fixed media composition exploring the artistic possibilities of the auscultation process and medical archives through the techniques of appropriation, recontextualization and mixed media. In that context, internal body sounds are sampled from digital and analog archives and transcribed as rhythmic patterns and melodic lines for percussion and wind instruments. Samples and transcriptions engage in an interplay between reality and abstraction, construction and fragmentation, recording technology and musical interpretation. The medical and mechanical ear transforms into a musical and personal ear that experiments with the human body as a recorded and transcribed revenant, explores the aesthetics of failure and constructs its own illness narrative in a post digital context.

The use of the word *Murmurs* as the title of the piece showcases this interplay and transformation by indicating the medical term and a softly indistinct sound. The composition is structured in 6 parts of various tempi and vaguely reflects the six stages of the cardiac cycle.

The theoretical context and references of the work have been thoroughly explored in the reflective text that accompanies the composition. The latter is informed from contemporary archival practices such as post-production, post-digital art & hauntology. These references are evident on my decision to use online and analog archives, lo-fi samples, media fingerprints and drum samples. My background as classical musician informs my choice to mix the previous elements with acoustic instruments and compose a minimal presentation of all of this material.

The content of the samples functioned as a departure point to come across the field of medical humanities and illness narratives compositions. My experience with a cardiac patient resonated with that field and encourage my decision to include personal elements in the composition. Moreover, my research on sound and music as illness narratives landed on the work of Milford Graves. I came across Graves' work in the middle of my compositional process and it had a strong impact on it. His observations on heartbeats and their incorporation in his percussion practice made me reconsider my approach to the topic in general. I consider *Murmurs* to be in the intersection of all of these references.

Project info

Research, Composition, Drum Machine: Kassiani Goulakou
Flute, Trumpet, Alto and Tenor Saxophone: Fausto Mujica
Recorded and Mixed At Ribbontail, Berlin

Project Origins

My dive into the world of medical archives and internal body sounds starts with a series of tapes labeled heart auscultation (See Figure) on a doctor's book-self. Produced for educational purposes in 1976, acquired by Barbara Baroutsou (MD, PhD, GFMD, EMAUD) in the 1980s for her medical training, and discovered by me in 2017, these cassette series mark the beginning of my experience in researching the online archives of medical auscultation for compositional purposes.

ΚΑΡΔΙΑΚΗ ΑΚΡΟΑΣΙ, 1976, Tape series, EMI Greece S.A.

The first listening to the tapes revealed a world of low frequency rhythmic patterns with tempo variations. In some cases, the beats are accompanied or masked by blowing textures of various frequencies and lengths, short percussive sounds (e.g clicks) and pitch in some cases (e.g the musical murmur). The discovery of the material was exciting and resulted in the digitization of the archive. However, the initial excitement was gradually succeeded by an uncertainty of what to do with it,

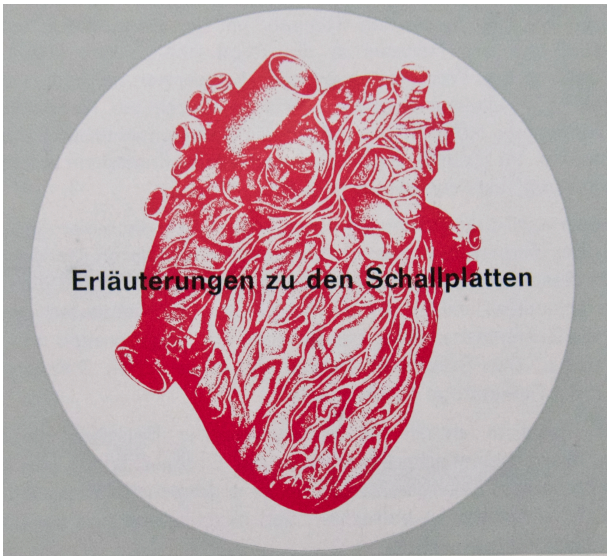
combined with a lack of certain skill sets. I kept the tapes as a fetishized object and hoped for a future use of the material.

Two years later, while working on another composition, a collaborator asked for a heartbeat-like tempo. That request reminded me of the tapes. Due to lack of time, I couldn't go through the volume of an educational series meant for medical students.

Instead, I searched online for auscultation training material, hoping to find similar samples much faster. The search, as one can imagine, unfolded a vast amount of samples from various medical websites and universities. Moreover, the archives contain more information and samples from other auscultation points, such as the lung and abdominal area. The latter opened my perception regarding internal body sounds and their relation to certain diseases as documented by Western medicine. A random listening to the first website gave away samples of different quality and texture, from simulations and from real patient recordings.

The online archives renewed my interest in the artistic possibilities of the auscultation process and medical archives. Soon after that, I acquired another educational series of heart auscultation in the format of 45s vinyls, titled Auskultationsbefunde des Herzens, produced by C. F. Boehringer & Soehne (see Figure). Listening to the same heart conditions, simulated or real, in different mediums (cassette tapes and compressed digital audio) resulted in my interest in researching the capturing and representations of similar conditions on tape, vinyl and digital audio.

A*uskultationsbefunde Des Herzens*. 4 Vinyl Singles



Accompanying booklet of *Auskultationsbefunde Des Herzens*

While the mediums contain similar medical content, the archives require different audio characteristics in each medium. My intention to sample from three mediums (tape, vinyl, digital sources) is to explore the artistic possibilities of adding various sonic textures of different media in my composition.

Research Methodology and Selection Process

The limits of physical archives are mostly determined by the walls of a building or the level of access each person can get. Online archives expand perpetually endlessly. One has to determine her own boundaries in order to proceed to the selection process.

For my thesis, I choose to examine and sample from three online medical

Auskultationsbefunde des Herzens, 45s Vinyl

educational archives:

- The Easy Auscultation archive
https://www.easyauscultation.com/

- The ThinkLab archive
https://www.thinklabs.com/sound-library

- The University of Washington Department of Medicine
https://depts.washington.edu/physdx/index.html

There is no greater reason for choosing these archives rather than they were suggested by medical students and the sonic differences in quality and texture between the available samples.

The first round of selection resulted in 5 digital heart samples, 15 digital lungs , 13 tape heart samples, 10 vinyl heart samples from real patient recordings and cardiac simulators. The total amount of samples was 93. I tried to select the most complicated and clear rhythmic patterns and the samples with the most interesting timbre.

List of Digital Samples

Heart

The University of Washington Department of Medicine

1. Non valvular murmurs Ventricular Septal Defect
2. Valvular Murmur Mitral Regurgitation
3. Valvular murmurs Aortic Regurgitation
4. Valvular Mitral Stenosis
5. Friction Rub Pleural
6. S2 split
7. S3
8. S4
9. Friction Rub Pericardial

Easy Auscultation

1. Normal heart sounds, physiologically split
2. First heart sound(Markedly Split)
3. Second Heart Sound with Persistent Splitting
4. Second Heart Sound: Fixed Splitting, Increased Aortic Intensity
5. Second Heart Sound and Late Systolic Click
6. Opening Snap and Second Heart Sound
7. Summation Gallop at 120 beats per minute
8. Aortic Sclerosis (Musical Murmur)
9. Mitral Regurgitation
10. Aortic Regurgitation
11. Pulmonic Regurgitation - Mild
12. Mitral Stenosis - Moderate
13. Tricuspid Regurgitation - Severe
14. Mitral Stenosis Severe
15. Mitral Regurgitation Mild - Rheumatic Origin
16. Aortic Stenosis Moderate
17. Aortic Regurgitation Mild - Rheumatic Origin
18. Acute Pericarditis

19. Ebstein's Anomaly
20. Cardiomyopathy, patient normal speed
21. Mitral Stenosis
22. Prosthetic Heart Sound - Aortic
23. Prosthetic Heart Sound - Mitral
24. Patent Ductus Arteriosus patient, simulated
25. Mediastinal Crunch
26. Ventricular Septal Defect

Think-lab Sound Library

1. Aortic Insufficiency
2. Aortic Regurgitation
3. Aortic Stenosis
4. Atrial Septal Defect
5. Atrial Septal Defect and Ventricular Septal Defect
6. Bicuspid Aortic Valve - Apex 1
7. Blood Pressure: Korotkoff Sounds
8. Complete Heart Block with Trucuspid Regurgitation
9. Congestive Heart Failure
10. Infective Endocarditis Mitral Regurgitation
11. Mitral Regurgitation moderate
12. Mitral Regurgitation Tricuspid Regurgitation - slow
13. Mitral Stenosis - rheymatic
14. Patent Ductus Arteriosus - slow
15. Pericarditis
16. Prosthetic Mitral Valve Closing Click
17. Prosthetic Mitral Valve Systolic Murmur Mid Diastolic Murmur
18. Prosthetic Valve Systolic Murmur
19. Restrictive Apical Muscular Ventricular Septal Defect
20. Takotsubo Cardiomyopathy

Total Amount of Digital Heart Samples: 55

Lungs

Thinklab

1. Crackles and Wheezes - Bronchiectasis in a Patient with Cystic fibrosis
2. Rhonchi
3. Rhonchi* in Patiendt with Uremic Pericarditis
4. Stridor - Infant
5. Wheeze - Asthma

Easy auscultation

1. Crackles - Fine (Rales) / Crackles - Coarse (Rales)
2. Wheeze
3. Pleural Rubs
4. Bronchovesicular
5. Bronchophony
6. Egophony
7. Whispered Pectoriloquy
8. Wheezes, Expiratory, Monophonic, Polyphonic
9. Stridor
10. Scenario cases 1,7 from practical clinical skills

Total Amount of Digital Lung Samples: 15

List of Analog Samples

Tapes

These series contain 12 lessons

1. From the 3rd tape: explanation of how murmurs are produced [1 sample]
2. From the 6th tape: Mitral Stenosis, Mitral Regurgitation, Mid-Systolic Click, Splitting of S2 (regular and irregular), Arrhythmias, S3, Galloping [7 samples]
3. From the 11th tape: Arrhythmias [1 sample]
4. From the 12th tape: Ventricular Tachycardia, Irregular contractions, Aortic Stenosis, Aortic Regurgitation [4 samples]

Total Amount of Tape Samples: 13

45s

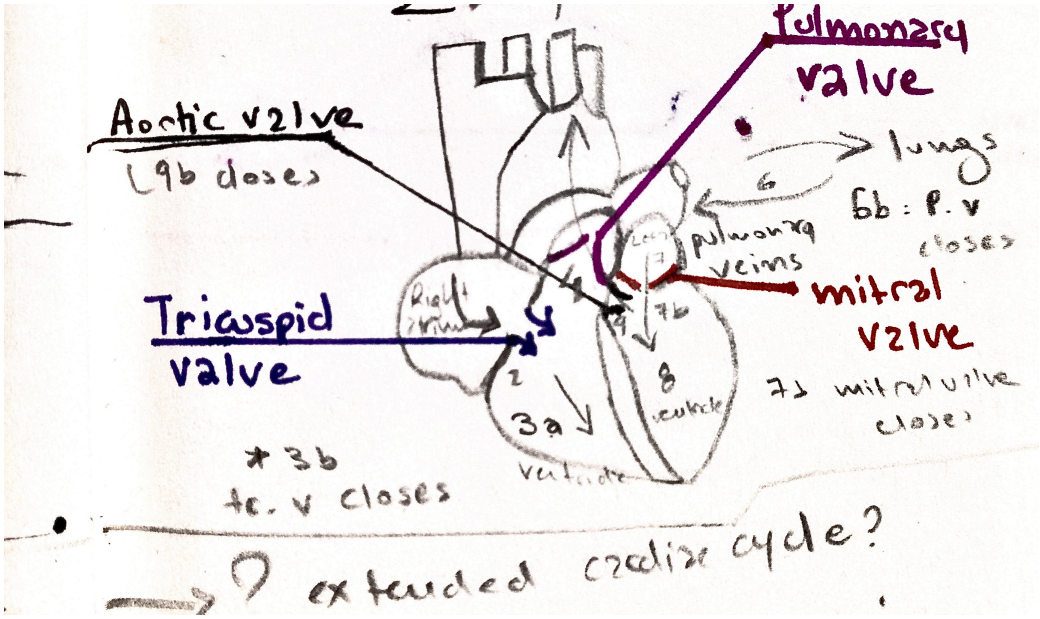
These series contain 6 lessons

1. From the third part: Mitral Insufficiency, Musical Murmur, Aortic Stenosis [3 samples]
2. From the fourth part: Ventricular Septal Defect, Mitral Stenosis (a, b, c, d, e) [6 samples]
3. From the fifth part: Ductus Arteriosus Apertus [1 sample]

Total Amount of Vinyl Samples: 10

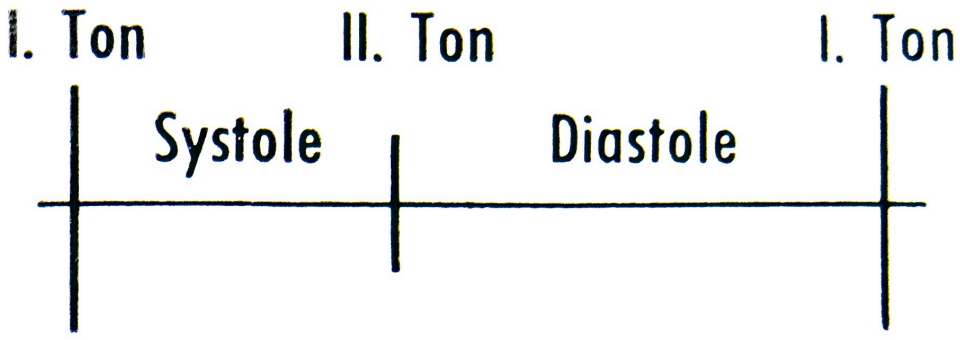
Overall Amount of Analog and Digital Samples: 93

Nevertheless, the first listening sessions revealed that my ear was untrained and unaware of what to look for. In an effort to overcome this, I studied the cardiac cycle and the sound production inside of it.



Notes on the cardiac cycle

A normal heartbeat sound is produced by the closing of the Atrioventricular valves (AV) and Semilunar valves (SL). The former produce the first heart sound (S1) while the latter produce the second heart sound (S2). The murmurs are classified based



Medical Graphical Demonstration of A Normal Hearbeat, from the accompanying booklet of Dr.H.H.Wolter, *Auskultationsbefunde Des Herzens*. 4 Vinyl Singles, Hamburg: C. F. Boehringer & Soehne

on the time of their occurrence in the cardiac cycle either as systolic or diastolic. The systolic murmurs can be described as holo-systolic, mid-systolic, early systolic and the diastolic as early high or low pitched, mid-systolic and pre-systolic. Their intensity is measured in 6 grades.[108]

At this point, it is worth mentioning the vocabulary used to describe the sonic qualities of the different murmurs. In the context of Western medical education and depending on the mechanical problem they produce, murmurs can have a blowing, rumbling, booming or scratchy quality. They can be high or low pitch, musical, harsh, sharp or dull. They can start quietly or loud and develop into a crescendo or decrescendo.[109]

After the study of these characteristics, I tuned my ear accordingly. The secondary listening sessions of the online sample collection, made me aware of the time occurrences of the murmurs and their affects (if any) to the S1 and S2 beats, as well as all the afore mentioned qualities. In the case of real patient recordings, I came to realise that the body always will work as a lowpass filter. In any case, most of the heart sounds entail more info on the low frequencies, therefore it is often suggested to apply a 195Hz low pass filter to digital stethoscopes and recordings.

The lung samples present blowing and crackling quality of high and low pitches. I was surprised to discover a clear melodic line in the case of stridor as well as the auscultation practice regarding the conditions of bronchophony, egophony and whispered pectoriloquy.[110] During the exam, the medical practitioner asks the patient to say or whisper certain things; if the patient is healthy the words or the sounds are not understandable if not the sound received from the auscultation areas through the stethoscope is different from the sound produced from the patients mouth.

The latter listening sessions revealed the reoccurrence of certain patterns' in all three online archives (as well as in the analog ones). The creation of a detailed list of the samples proved that my ear was fond of certain heart conditions patterns. Those conditions were:

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[108]"Techniques - Heart Sounds & Murmurs Exam - Physical Diagnosis Skills - University Of Washington School Of Medicine", 2020, *depts.washington.edu,* Accessed March 19. https://depts.washington.edu/physdx/heart/tech4.html.

[109]"Techniques - Heart Sounds & Murmurs Exam - Physical Diagnosis Skills - University Of Washington School Of Medicine", 2020, *depts.washington.edu,* Accessed March 19. https://depts.washington.edu/physdx/heart/tech4.html.

[110] "Easy Auscultation Training | Heart And Lung Sounds", 2020, *Easy Auscultation*. Accessed March 5, https://www.easyauscultation.com/.

- Ventricular Septal Defect
- Mitral Stenosis
- Mitral Regurgitation
- Aortic Regurgitation

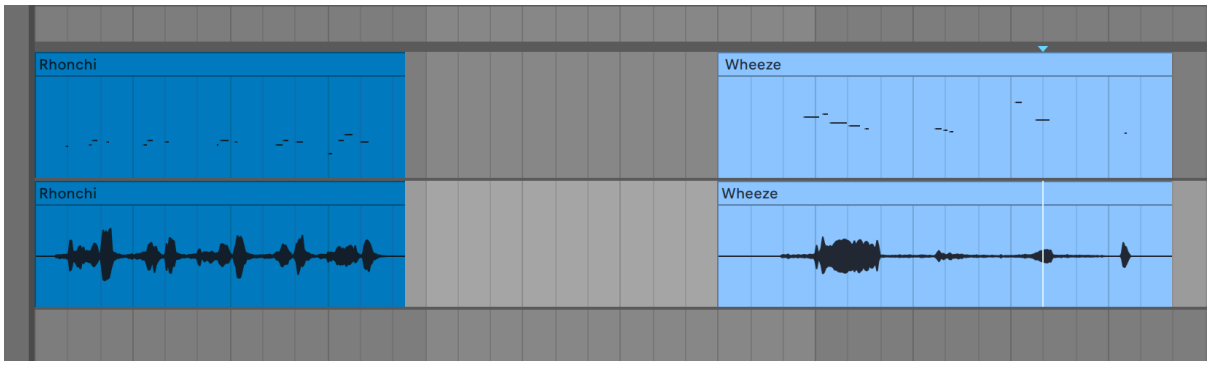
The comparison of the same conditions through different samples brought to my attention the different qualities of the files. The sonic characteristics of the low over compressed internet quality were different from archive to archive and therefore added an interesting texture to the samples. The same happened with the analog archives; identical conditions acquired different sonic characteristics on vinyl and on tape.

Compositional Process and Sketches

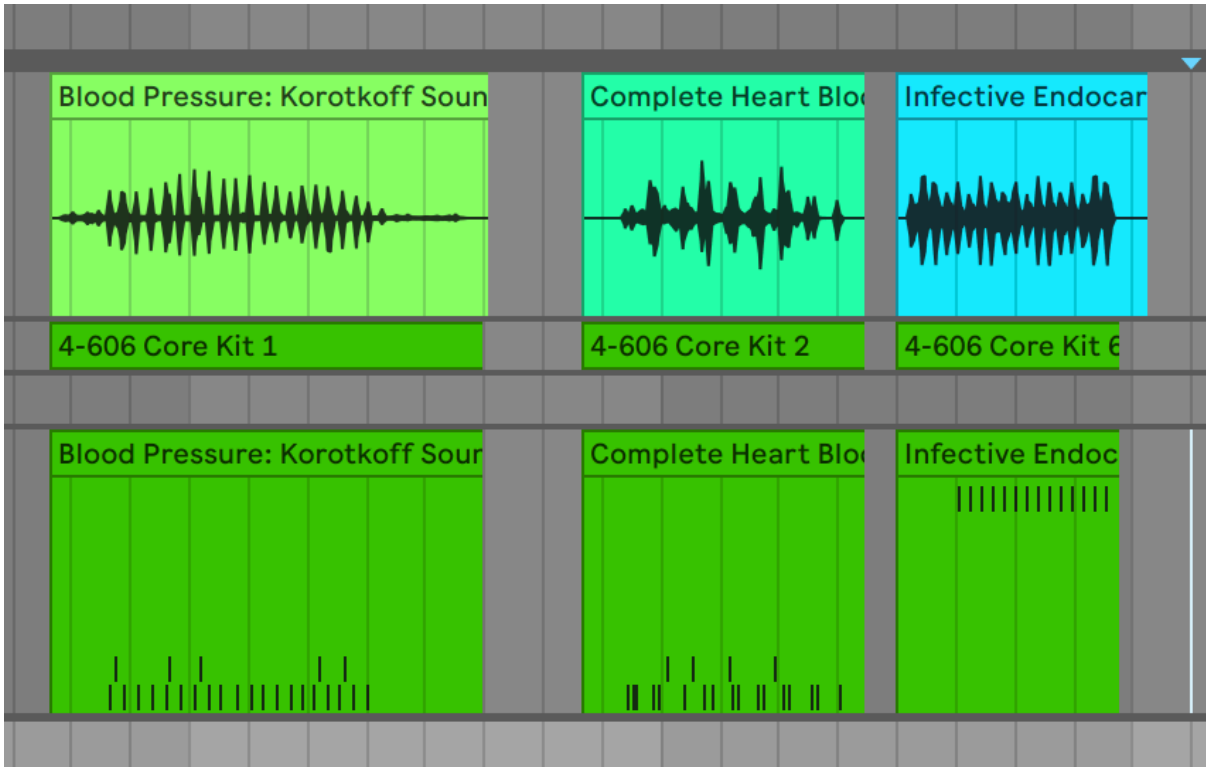
The original compositional idea was to create a piece using samples from the aforementioned archives in combination with a personal narrative. The latter resulted from my experience with a cardiac surgery patient, his recovery and post surgical life. The first compositional sketches were developed around this idea.

Nevertheless, the low, oversaturated and noisy quality of the online samples became an issue for my personal aesthetics and goals for this piece. The initial compositional sketches using only those samples foregrounded this problem.

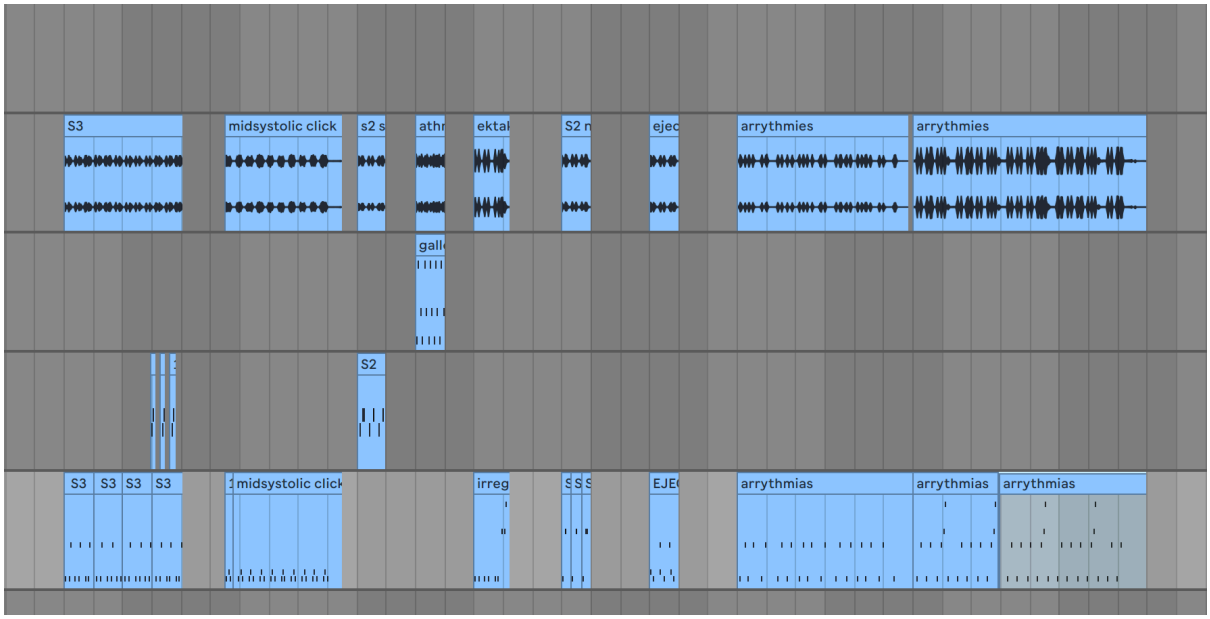
To overcome this personal obstacle, I started transcribing the samples into drum patterns and melodic lines.



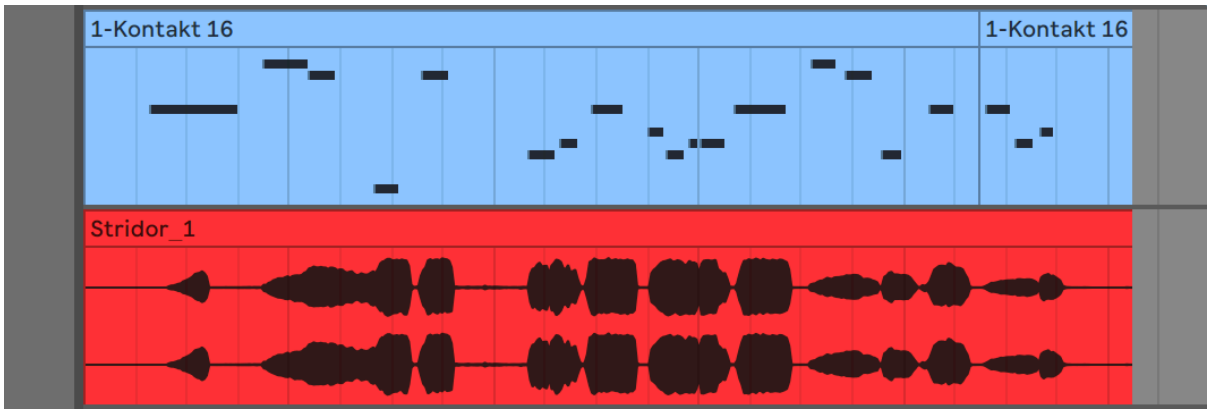
Transcription of Rhonchi and Wheeze (lungs) sample into melodic lines in DAW Ableton Live



Transcription of Korotkoff Sounds, Complete Heart Block and Infective Endocarditis in DAW Ableton Live



Transcription of the samples S3, Mid-systolic Click, S2 (normal and irregular), Irregular contractions, Ejection Click, Arrhythmias into drum patterns in DAW Ableton Live



Transcription of Stridor (lungs) sample into a melodic line in DAW Ableton Live

However, the question around the size of display of the archives and the percussive arrangements were still pending; How could I organise all of this material in a creative and at the same time clear way? And how could I avoid the characteristic low frequency sound of a heart beat without undermining the original sources?

In an effort to answer the first question, I decided to distribute the transcribed samples into three parts; the first one would contain auscultation findings and conditions without murmurs. The latter are; the third heart sound (S3), galloping, arrhythmias, splitting of the second heart sound (S2), irregular contractions, mid systolic click. The second part would contain the patterns related to the aforementioned conditions of Ventricular Septal Defect, Mitral Stenosis, Mitral Regurgitation and Aortic Regurgitation and the different sonic textures they acquire in different mediums. The third part would explore the sounds of prosthetic valves from post surgery recordings and simulations and other condition patterns. Parallel to that, I composed three images reflecting my personal experience with cardiac patients that would be incorporated with the samples.

To explore the second question, I tried out a range of different drum machines and percussions in Ableton Live. The most interesting selection to me was percussion samples used by 9th Wonder and the BBC Orchestra plug in.

The transcription process had interesting musical results and the second phase of the compositional sketches was dedicated in exploring them further. At the same time, I was experimenting with vinyl crackles, lung crackles, tape sound and language deconstruction as compositional elements to reflect on the archival nature of the piece and the origin of the recordings. This part derives from the theoretical research on Digital Sampling and the Crackle as developed in the paper *The Post -*

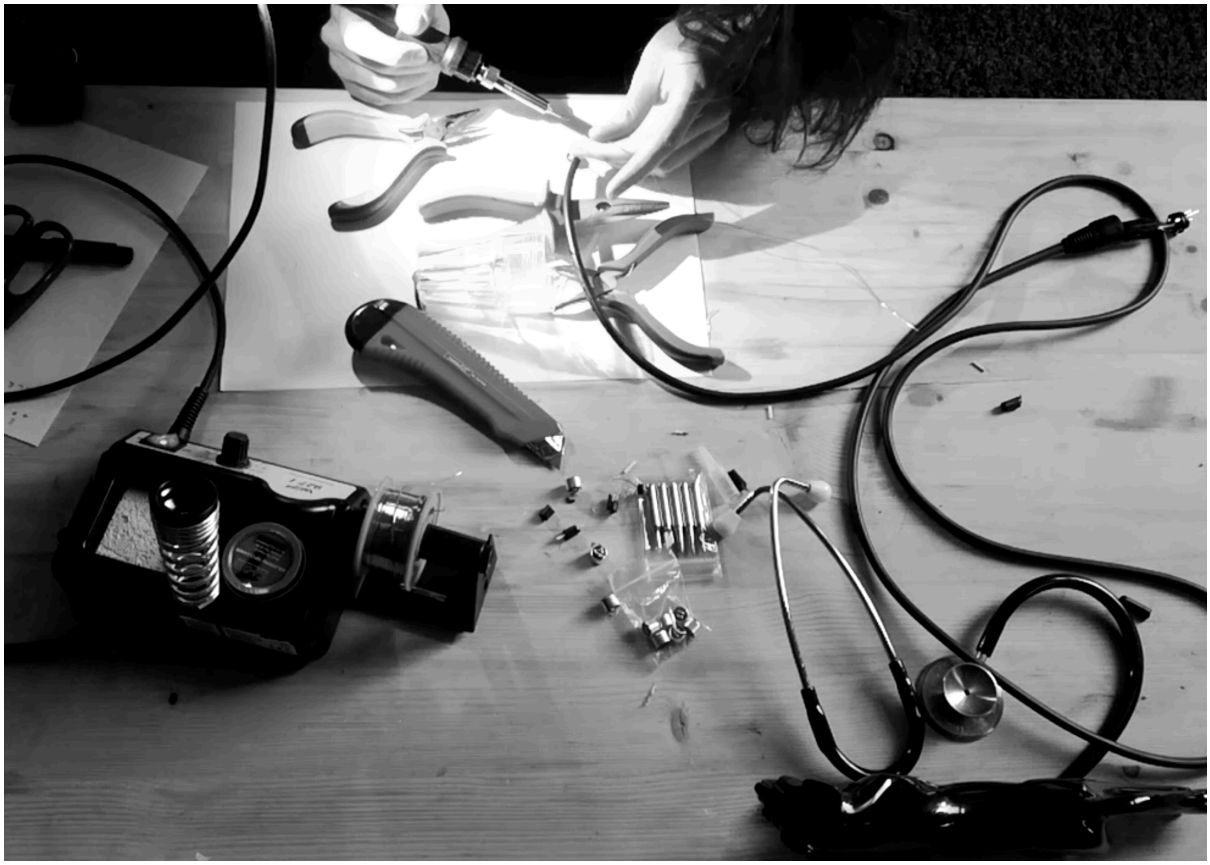
Beside this part, the compositional process was at that point a musical approach of the heart patterns and lung melodies of the various condition. All of these sketches were using medical archives as source of musical inspiration. This practice excluded the elements of disease, system failure and sampling, which were central to the project initially. After meeting with my supervisors, it was clear that I needed to go back and reconsider my structure and approach.

That decision marked the third phase of the compositional process were I attempted to combine the two previous approaches (samples and transcriptions) into one. I decided to keep the three part structure and the personal element while reconsidering and deconstructing the transcriptions and juxtaposing them with the original sources. I decided to use the low quality files as they showcase the samples' origins and characteristics. These files were recorded for educational uses from medical practitioners. They used medical technology and distributed the recording through accessible and popular mediums of the time. Moreover, internal body sounds are by nature of a "lower" quality since there is always a filter applied: the human body.

Building of a stethoscope microphone

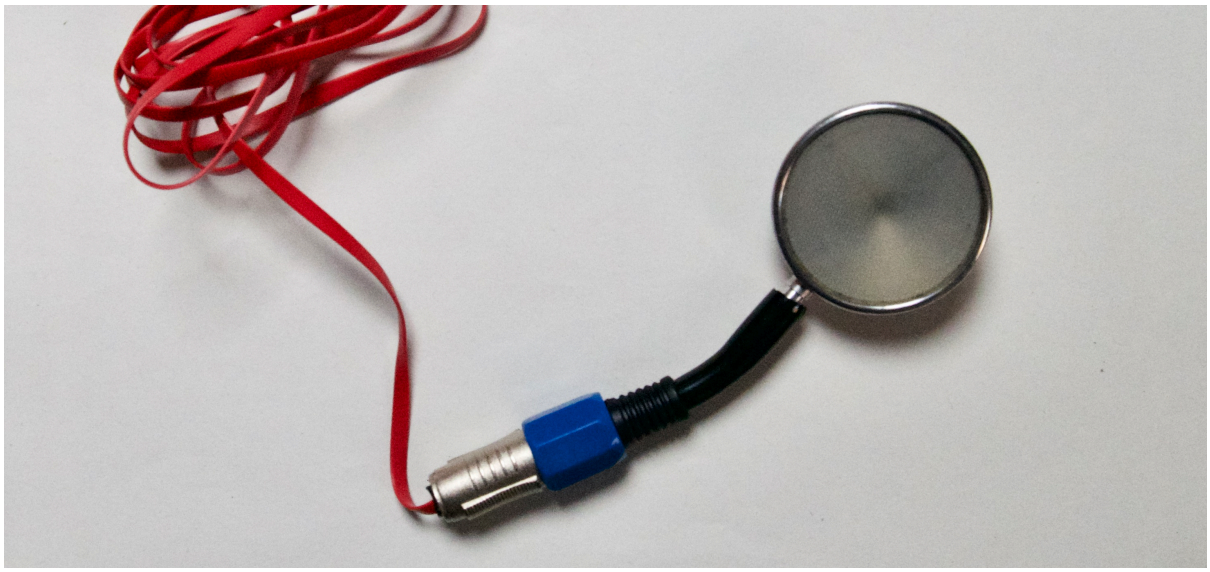
Parallel to the research and compositional experiments, I built a stethoscope microphone using an old stethoscope's stem and chest-piece. The stem is the metal part of the stethoscope that connects the stethoscopes tubing to the chest-piece. Aside from connecting the two components of the stethoscope, it also allows the user to switch/click between the chest-pieces diaphragm and bell by turning the chest-piece and clicking it into place via the ball bearing. The chest-piece or head of the stethoscope is composed of the connected stem, diaphragm and bell. The chest-piece part is used to listen to patient sounds by placing the diaphram or bell end of the chest-piece on the patients chest, back or stomach.

To build the microphone, I purchased a condenser microphone capsule which I soldier to a mini TRS cable. Then, I created a joint out of protective cable parts (1 plastic and 1 metal) and I placed the capsule at the bottom of it, securing it with hot glue. On the other end of the joint, I placed a PVC tube. Next, I placed the stethoscope stem on the other end of it. By turning the stem left and right, you can

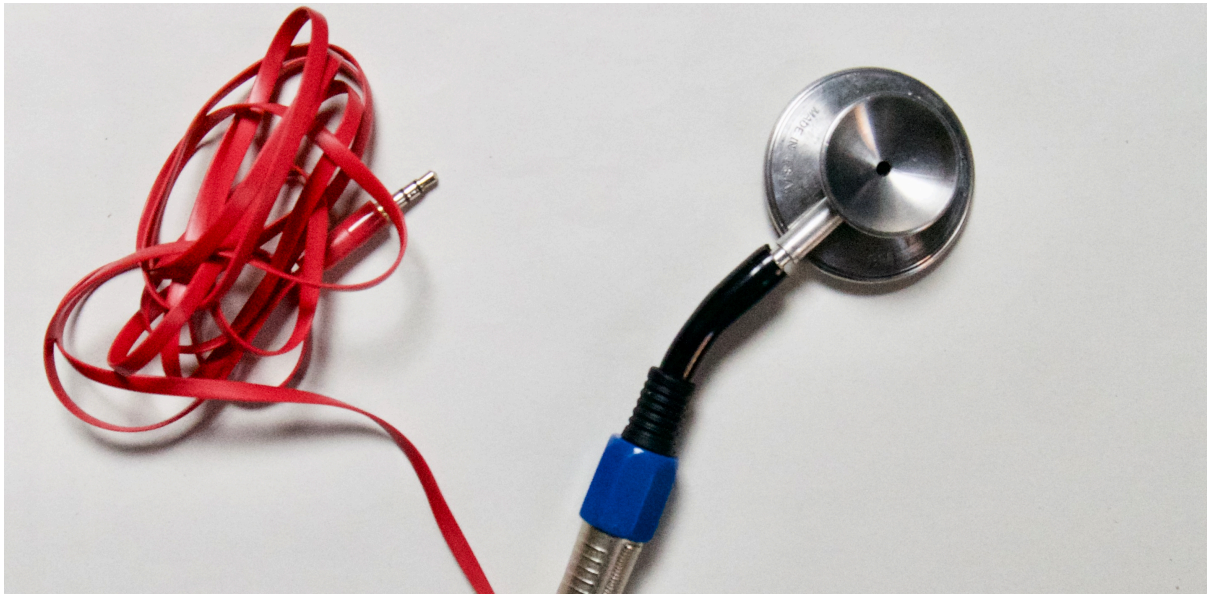


Building process of a stethoscope microphone

alter between the diaphragm and the bell. The microphone works better when using the bell end on someone's chest and back.



DIY Stethoscope Microphone, Diaphragm



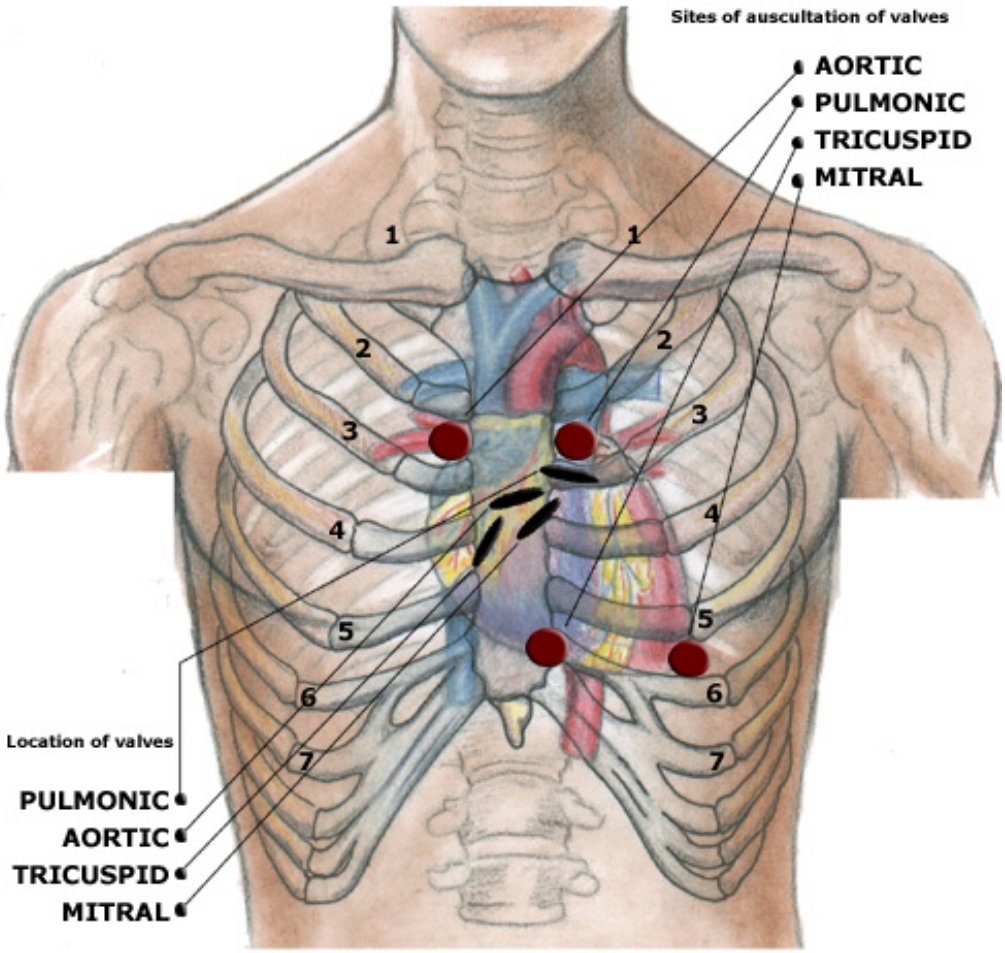
DIY Stethoscope Microphone, Bell

The microphone requires a phantom power and therefore works with devices that can provide it. I have tested the microphone with an H6 zoom recorder by connecting it to the stereo input of the device. With the microphone I recorded my own heart

from the various auscultation points and a cardiac patient's heart with a metal aortic valve. Through the recording process, I noticed the fluctuation of the heart tempo that Graves is highlighting in his research.

Recordings from the Pulmonic, Tricuspid and Mitral Auscultation Sites

The recordings were made based on the following medical demonstration of the location of heart valves and their auscultation sites:



Medical Demonstration of the cardiac valves and their auscultation sites, image from: http://www.stethographics.com/heart/main/intro.htm

1. Pulmonic

2. Tricuspid

3. Mitral

Final Composition Structure

The final structure of the composition is a result of all of the above. It follows the initial third part structure, while adding three more parts, keeps the personal narration, makes use of the transcribed material and juxtaposes them with the raw online and analog samples and heart recordings.

In that context, the final composition explores the sonic and rhythmic qualities of the following conditions and elements, the interplay with their musical counterparts (percussion and wind instruments) and the fingerprints of their medium as well as the fragmentation and deconstruction of both.

Intro:

Aortic Sclerosis - Musical murmur / Wheezes, Expiratory, Monophonic, Polyphonic / Egophony

I.
Mid-Systolic Click / Splitting of S2 (regular and irregular)/ Arrhythmias / S3

II.
Mitral Stenosis, Ventricular Septal Defect, Mitral Regurgitation, Aortic Regurgitation, Aortic Insufficiency, Valvular AR

Archives

Crackles - Fine (Rales) / Crackles - Coarse (Rales), Vinyl Crackles, Tape Sound, Speech, Scratching

III.
Takotsubo cardiomyopathy, Prosthetic Heart Valve, Complete Hear Block with Trucuspid Regurgitation, Bicuspid Aortic Valve, Systolic Ejection Murmur, Pericarditis, Prosthetic Heart Sound Mitral, Prosthetic Heart Sound Aortic, Friction Rub, Wheeze

Outro

Pulmonic Regurgitation, Cardiomyopathy, Ebstein's Anomaly, Prosthetic Heart, Bronchovesicular, Prosthetic Heart Aortic Sound

Instrument Selection and Recording of Wind Instruments

The selection of percussion samples and wind instruments (flute, trumpet, alto and tenor saxophone,) results from the percussive and blowing sonic qualities of the internal body sounds, which were studied in this project. For the percussion samples, I tried to avoid low registers, since the heart samples are characterised by low frequency range sounds, and focused more on middle and high registers (pitched and unpitched). The wind instruments were selected according to their register.

Flute

Alto Saxophone

Tenor Saxophone

Trumpet

Medical Sources

Online Sources

e*asyauscultation.com,* https://www.easyauscultation.com/

"Egophony Breath Sounds Training Lesson”, Accessed March 19 2020, e*asyauscultation*.com, https://www.easyauscultation.com/egophony.

depts.washington.edu, https://depts.washington.edu/physdx/index.html.

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"Techniques - Heart Sounds & Murmurs Exam - Physical Diagnosis Skills - University Of Washington School Of Medicine”, *depts.washington.edu,* Accessed March 19 2020. https://depts.washington.edu/physdx/heart/tech4.html.

"Techniques - Heart Sounds & Murmurs Exam - Physical Diagnosis Skills - University Of Washington School Of Medicine”, Accessed March 19 2020, d*epts.washington.edu,* https://depts.washington.edu/physdx/heart/tech4_systolic.html.

2003, *thinklabs.com,* https://www.thinklabs.com/.

"Lung Sounds | Over 50 Lessons, Reference Guides And Quiz”, Accessed March 19 2020, e*asyauscultation.com,* https://www.easyauscultation.com/lung-sounds.

Other

Dr.H.H.Wolter, *Auskultationsbefunde Des Herzens*. 4 Vinyl Singles, Hamburg: C. F. Boehringer & Soehne

ΚΑΡΔΙΑΚΗ ΑΚΡΟΑΣΙ, 1976, Tape series, EMI Greece S.A.

The Cardiac Cycle, Animation, 2017, Video, Alila Medical Media

List of USB drive data

Folder 1: Murmurs_Fixed Media Composition: 1 .wav file

1. Murmurs

Folder 2: Written Part_Online sources : 1 .pdf file and 1 subfolder

- Pdf file: List of Online Sources
- Subfolder **Sources**: 9 .pdf files

1. Freymann- Weyr, J. ,Composing Music for 'Tin' Ears _ NPR
2. Graves, M., "Heart Music"
3. Med in Art_John Wynne
4. Milford Graves_ A Mind-Body Deal_ 2020
5. Mittal, A., "Milford Graves_ Sounding the Universe"_ NewMusicBox
6. Rose, J., 2005, "Music Of The Human Heart May Hold Clues To Healing". Podcast, Morning Edition
7. Ventura C. And Graves M., "Heart Sound Melody and Stem Cell Reprogramming". milfordgraves.com
8. Wynne, J. _ Artist
9. Wynne, J., 2008, "Hearts, Lungs and Minds", sensitivebrigade.com

Folder 3: Documentation_Medical Online Sources: 1 .pdf file and 1 subfolder

- Pdf file: List of Medical Online Sources
- Sources: 5 .pdf files

1. Egophony

2. Lung Sounds

3. Techniques - Diastolic

4. Techniques - Systolic

5. Techniques - Heart Sounds & Murmurs Exam - Physical Diagnosis Skills - University of Washington School of Medicine

Folder 3: Digital Abstract: 1 .word file

1. Goulakou Digital Abstract