codarts
rotterdam
Master of Music

Artistic Research Report

Submitted in partial fulfillment of the requirements for the degree of Master of Music

June 2023

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Title of the research: Composing Non-Linearity in Mixed Media Performances

Artistic Research Question: How can the exploration of the integration and interaction of acoustic music with digital media and diverse art forms (theater, visual arts, circus, etc.) facilitate the incorporation of non-linearity within compositional forms?

Keywords: Mixed media, digital media, interactive, nonlinear composition, audience engagement, Walter Giers, Michel van der Aa, Yannis Kyriakides, Wouter Snoei, Rui Pehna, Amy Brandon

Acknowledgements

I would like to express my heartfelt gratitude to my family for their unwavering support. Their encouragement and understanding have been invaluable in allowing me to pursue my academic and artistic endeavors. I am deeply thankful to my research coach, Federico Mosquera Martinez, and my subject teachers Hans Koolmees, René Uijlenhoet, and Josue Amador for their valuable guidance throughout my research journey. Their expertise and insights have played a crucial role in shaping my understanding of multidisciplinary and interactive digital media in the field of music.

I am also grateful to Yannis Kyriakides, Gwyneth Wentink, Wouter Snoei, Amy Brandon, Eleni-Ira Panourgia, Adriana Minu and Adrian Crespo for their contributions and inspiration to my research. Their expertise and insights have expanded my horizons and provided valuable perspectives on the integration of different artistic disciplines and the possibilities of interactive digital media in the creation of music. Their work has been instrumental in shaping my understanding of the transformative potential of multidisciplinary approaches in the field.

Without the support, guidance, and contributions of these individuals, this research would not have been possible. I am truly grateful for their invaluable contributions and the inspiration they have provided throughout my academic journey.

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1 Abstract

This paper aims to explore the potential of merging acoustic music with digital media and other art forms to create non-linear compositional forms. Often, it's difficult to get away from traditional composition processes, make a piece adaptive in form and not strictly bound to time. Through case studies on works by Walter Giers, Michel van der Aa, Yannis Kyriakides and more, I focused on the elements of integration, interaction and nonlinear composition of different media. Looking at their work and through self-experimentation, I noticed that the different media can get dramaturgical meaning and interact live with every element of the performance. Digital media can specifically function as tools for interaction between the performers and the audience. By incorporating playful ideas in the compositions, derived from the world of games and indeterminacy, we can end up in nonlinear processes of performing notated music and allow for interpretation by other artforms. As a result, I composed the pieces *In Medias Res* for musicians, circus artists and interactive media, *Dots* for Pierrot ensemble and visuals, the 15' opera *Aer* and the interactive music game *A poppy blooms*. Through this process, I tried to free myself, as a composer, from specific writing habits and approaches. A new field of possibilities opened up on how to develop music material, notate it and perform it.

2 Introduction

2.1 Motivation and goal

I was always intrigued by sounds, music and their communicative power. Composition, at first, came naturally as a way to express my adolescent thoughts and feelings. Later, I followed Composition studies as a way to understand more about the art of music, its expressiveness and our experience of it as musicians and listeners. In my undergraduate studies, I got particularly interested in composition for performing arts. I combined simultaneously occurring art forms such as literature, theater or video and created music for different settings. In most cases though, I was just accompanying one art form (video or text) with another (music) and didn't follow any specific guidelines on how to combine disciplines to broaden the dramaturgy and the narrative of my pieces. Moreover, I was focused more in instrumental writing and didn't get the chance to incorporate music technology into my pieces, missing out the possibilities to extend the instruments into the digital world.

With this research, I wanted to find a way to incorporate digital technology in my compositions, as a way to create works where acoustic, electronic, video, web, lights, performance and installation compositions are mixed. I truly believe that having the tools as a composer to work both with a symbolic system of notation, but also directly with sound and image, opens up new possibilities. Moreover, the combination of electronic and acoustic sound can be a seamless way to combine live performance with pre-recorded material and gives chances for interaction with the audience. This interdisciplinary approach, encompassing the realms of sound, image, and technology, holds immense potential for pushing the boundaries of musical expression and immersing audiences in multi-sensory experiences that capture the spirit of the ever-evolving nature of our interconnected digital and physical realities.

Furthermore, being inspired by some remarkable multimedia works by composers such as Walter Giers (1937- 2016), Michael van der Aa (1970-), Yannis Kyriakides (1969-), Wouter Snoei (1977-) and many more, I examined their way of connecting different artforms, the media they use and their techniques. I then created performances with the aim that the different media used wouldn't just accompany each other, but co- create and interact live with every element of the performance. By focusing on the integration and interaction of the varying disciplines or media involved in every performance I hoped

to end up with more flexible composition forms and shift the creative power from the composer to the audience. I decided to use the term non-linearity to describe a music form that is not bound to a specific timeline but is free to bounce back and forth, stretch and transform, obliging to the concept and needs of every composition. I decided to integrate the disciplines of visual arts, theatre, and circus into my compositions by leveraging my connections with talented individuals actively engaged in these art forms. The collaborative effort was further facilitated by the presence of a circus department at Codarts, where theatre, acrobatics, and dance intertwine, creating an ideal environment for interdisciplinary exploration. Additionally, numerous school projects provided opportunities for collaboration with the fine arts academy of Rotterdam, as both institutions are progressing towards a unified approach.

2.2 Contextualization

The main topic of non-linearity resulting from the use of interactive digital media and multidisciplinary approaches has gained significant attention in contemporary music and art research. This research aimed to explore the integration between technology, interactivity, and multidisciplinary practices, and its impact on the creation and experience of music and art. Through the analysis of various academic publications, a comprehensive understanding of the intersection of mediums and non-linear artistic practices in the digital age can be achieved. Notable papers and articles, such as Yannis Kyriakides' "Imagined Voices: A Poetics of Music-Text-Film"[1], Jonathan Marshall's "Freezing the Music and Fetishising the Subject: The Audiovisual Dramaturgy of Michel van Der Aa,"[2] and Jelena Novak's "Music Beyond Human: A Conversation with Michel van Der Aa"[3], provided valuable perspectives on the integration of music, text, and film within a multidisciplinary framework. On the other hand, to explore the realm of interactive digital media, I delved into publications such as Alistair MacDonald's "Performance Practice in the Presentation of Electroacoustic Music"[4] and Steve Benford's "Performing Musical Interaction: Lessons from the Study of Extended Theatrical Performances"[5]. Furthermore, I explored Alexandre Resende Clément's dissertation titled "Development of Tools for Live Networked Musical Performance System using Smartphones,"[6] which examined the utilization of smartphones as a means to foster live networked musical performances. This research contributed to my understanding of how technology can facilitate audience interaction and participation, leading to non-linear approaches in music performance.

In addition, this research investigates the works of prominent artists and compositions that exemplify non-linear multidisciplinary approaches in music and art. These include Michel van der Aa's compositions such as *Blank out, Up close, Eight,* and *Upload* which showcase his innovative integration of music, video, and interactive elements. Yiannis Kyriakides' *Ask Ada* explores the relationship between music and artificial intelligence. State of the United Arts has produced audiovisual versions of iconic pieces

[1] Yannis Kyriakides, “Imagined Voices : A Poetics of Music-Text-Film” (Phd, Leiden University, 2017), http://hdl.handle.net/1887/58691.
[2] Jonathan Marshall, “Freezing the Music and Fetishising the Subject: The Audiovisual Dramaturgy of Michel van Der Aa,” *Sound Scripts* 2, no. 1 (January 1, 2009), https://ro.ecu.edu.au/soundscripts/vol2/iss1/7.
[3] Jelena Novak, “Music Beyond Human: A Conversation with Michel van Der Aa,” *International Journal of Music New Sound* 55, no. 1 (2020): 7–22.
[4] Alistair MacDonald, “Performance Practice in the Presentation of Electroacoustic Music,” *Computer Music Journal* 19, no. 4 (1995): 88–92, https://doi.org/10.2307/3680993.
[5] Steve Benford, “Performing Musical Interaction: Lessons from the Study of Extended Theatrical Performances,” *Computer Music Journal* 34, no. 4 (2010): 49–61.
[6] Alexandre Resende Clément, “Development of Tools for Live Networked Musical Performance System using Smartphones,” n.d.

like Simeon ten Holt's *Canto Ostinato* and Terry Riley's *In C*, demonstrating the fusion of visual and musical elements. Walter Giers' interactive sound sculptures offer a multisensory experience for the audience, while Rui Pehna's *Cellular* and the participatory concerts by Tin men and the telephone engage the audience in collaborative musical creation. Additionally, the interactive game-compositions commissioned by the Screen Dive platform and Gaudeamus Festival, including Amy Brandon's *Boundary*, Eleni-Ira Panourgia's *Web-canvas*, and Christine Cornwel and Adriana Minu's *Ecstasies of Rooms*, further highlight the potential for non-linear artistic expression in the digital realm.

By critically examining a wide range of sources, publications, and artistic works, this research not only seeks to shed light on the expansive landscape of non-linear approaches in interactive digital media and multidisciplinary art, but also aims to contribute to this evolving field. With my own distinctive artistic vision and potential contributions, I am driven to push the boundaries of this discourse, aiming to deepen the comprehension and implementation of these transformative approaches in the realm of music and art. Instead of replicating the styles and sounds of notable artists and composers, I intended to incorporate their systems and techniques in a manner that reflects my unique artistic perspective and working methodology. Through this approach, I seek to infuse my compositions with originality and innovation while building upon the foundations laid by these influential figures.

2.3 Research question

How can the exploration of the integration and interaction of acoustic music with digital media and diverse art forms (theater, visual arts, circus, etc.) facilitate the incorporation of non-linearity within compositional forms?

2.4 Specific audiences and readers addressed

This research is addressed to music performers, teachers, composers and sound artists that are interested in “nonlinear” composition and performance processes, through integrating multimedia with acoustic sound, different disciplines and artforms.

3 Research Process

3.1 First research cycle

3.1.1 Overview of first research cycle

The first cycle of my research is specifically focused on the integration of different media in a composition, with possible interactive or non-linear character. How do I choose the different elements to incorporate and what are some seaming points and techniques for a mixed media work? How does every discipline inform and embrace the other? How every medium is woven together with the rest of the elements of a performance, adding to the meaning and helping to communicate some message to the audience.

I conducted an analysis of the noteworthy creations of Michel van der Aa, including *Up-close*, the opera *Blank Out*, and the VR installation *Eight*, as well as the opera *Ask Ada* composed by Yannis Kyriakides. In doing so, I explored their ability to interweave diverse elements and media within the performance, effectively avoiding verbosity. The focal point of this examination revolved around their conceptual frameworks and artistic methodologies.

3.1.2 Reference recording

01 Reference Recording 01 (Sofia Bardoutsou) (X-society)

Xsociety (2018)

Performed and recorded at Polytechno (Corfu, Greece) by students of the Music Department of Ionian University on 17th of June 2018.
Concept/ Libretto/ Composition: Sofia Bardoutsou
Singer: Nikoleta Hasikou
Viola: Philippos Ketentzian
Vibraphone, Snare drum: Socrates Trouptsidis, Nikos Grammenos
Conductor: Kyriaki Koudouri
Video projection: Giorgia Perra
Duration of piece: 14’

I chose “Xsociety”, as a reference piece for my research, as it was my first attempt to use mixed media in a work. Being inspired by the multimedia opera *The Cave*[7], by Steve Reich, I used the laptop keyboard as a percussion instrument.

The outline of "Xsociety", is that the singer and main character onstage, is trying to express to a friend, her thoughts about the use of social media (poetic text), sending her messages on Facebook (text that is shown), but she has trouble speaking as she wants, and really and effectively communicating with her friend. The piece premiered also live on facebook making the performance site specific. It's a piece written about social media, premiering on social media and giving the chance to the audience to interact through social media.

[7] Steve Reich, “The Cave - Opera,” accessed June 5, 2023, https://www.boosey.com/opera/moreDetails?musicID=1260.

The video was made based on the music score, where there were also some theatrical instructions included. In order to have the best synchronization with the video, it was decided to have a conductor with a click track on her ear. The fragment I used for my reference recording is the 3rd part of the piece and the climax of the performance.

3.1.3 Feedback and reflection

Based on the feedback I received from my teachers Rene Uijlenhoet and Hans Koolmees, my former composition teacher Dimitra Trypani, as well as my own reflection on the piece, I came to the following remarks:

Media:
-There could be better integration of the concept behind the different media (music, video) used in the piece.
-There wasn't any live/on spot interaction between the different media or with the performers (except from the facebook live streaming that it created some kind of interaction with the audience).
-A mixed media performance today could be something more daring, experimental and based on live action (use of live programming, nonlinearity).

Music:
-Stylistically, it was too close to Steve Reich
-The score was written too strictly to allow some kind of live interaction between the visuals and the music.
-Live- on spot actions can help avoid the use of a click track for synchronization in the performance.

In conclusion, the three focal points of my research will be integration, interaction and non-linearity, concerning the media in collaboration with the music in my work. Integration is about the internal seaming elements of the different media and disciplines (concept, philosophy). Interaction about the live relationship between the different layers of the performance. Nonlinearity is about the compositional process and techniques used in music and the dramaturgy to assist in a more interactive result.

3.1.4 Data collection & data analysis

3. 1. 4. 1 Case study 1: Integration of digital media in the music of Michel van der Aa

Michel van der Aa (1970-) is a Dutch composer and very well-known multidisciplinary figure in the contemporary music scene. He studied recording engineering and composition at the Royal Conservatory in The Hague. In 2002 he studied film direction at the New York Film Academy, and in 2007 he participated in a stage direction course at the Lincoln Center Theater Directors Lab[8].

In the work of Michel van der Aa, live or prerecorded media can be combined with live instruments/voices and other disciplines such as poetry, acting and cinema, in an organic way that serves the dramaturgy of his pieces and doesn't distract or tire the audience. By looking at his work, I got

[8] "Biography," Michel van der Aa, accessed March 25, 2022, https://www.vanderaa.net/biography/.

interested in how he achieves such seamless integration between all these different media and disciplines in a performance.

In an article[9] by Jonathan Marshall about the audiovisual dramaturgy of Michel van der Aa, an interview with the composer himself is included. There the composer talks about his concept and philosophical view behind the use of multimedia in his compositions. Even though the article was written twelve years ago, it includes a representative description of the composer's dramaturgy that can be considered valid when looking also into his more recent works.

His compositions often consist of pre-recorded soundtracks and video projections that double the on-stage live performing characters and have them interact with their technologised others (visual alter ego and electronic alter ego). Van der Aa described the different layers of the performance (visuals, electronic soundtrack, live performers), as a way to extend the personality of the main character, shedding light into the mind of the protagonist from different prisms[10]. For that reason, he is in most cases the director and librettist of his compositions, so that he can conceive and develop all three layers at the same time and choose which element should be in the foreground every time[11].

In a conversation with Jelena Novak,[12] Michel van der Aa explains more the use of multimedia in his pieces. With the use of different media, he questions the borders between real and virtual, human and machine, live and mediatized. His ultimate goal is to pass his humanistic themes to the audience and even the use of technology cannot have another function[13]. In his own words: “Maybe by confronting people with what it is to be not human you determine what is human”.[14]

In their conversation regarding the installation *Eight* (2019), we learn about his latest approach on the themes above. In this mixed reality project Michel van der Aa collaborated with the singer-songwriter Kate Miller-Heidke and the Nederlands Kamerkoor, as well as the designer Theun Mosk and virtual reality company The Virtual Dutch Men, to create a unique fusion of musical theater, VR and visual art. In this 15-minute experience the visitor becomes the subject of the opera, as he is the most realistic person there. All the other elements are his reflections. The virtual space is a very important character, since it creates a sense of infinity (thus the name 8)[15]. Luckily, according to the composer, most audience reactions were about their personal journey and not about the technology.[16]

As I can confirm from my visit to the installation in the November Music Festival 2021[17], he chose the material very carefully, so that all these different elements won’t overwhelm the visitor, by simplifying them. One can’t notice every element at every moment, and he took that into account. The experience itself was indeed very immersive, as described in the article. Also, if you had some previous experience with the work of the composer, you could really feel that you were immersed in his world, seeing reappearing objects like a lamp, branches and nature. Also, the music reminded me of a lot of previous works of his, like the digital, interactive song cycle *The Book of Sand* (2015)[18] and other works. It seemed like it was his intention to have that familiarity.

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[9] Jonathan Marshall, “Freezing the Music and Fetishising the Subject: The Audiovisual Dramaturgy of Michel van Der Aa,”.
[10] Jonathan Marshall, “Freezing the Music and Fetishising the Subject: The Audiovisual Dramaturgy of Michel van Der Aa,”.
[11] Marshall, “Freezing the Music and Fetishising the Subject”,18.
[12] Jelena Novak, “Music Beyond Human: A Conversation with Michel van Der Aa,” 7–22.
[13] Novak,”Music Beyond Human”, 12.
[14] Novak, ”Music Beyond Human”, 16.
[15] Novak, ”Music Beyond Human”,14-15.
[16] Novak,”Music Beyond Human”, 18.
[17] Michel van der Aa, “Eight (virtual reality installatie),” November Music - internationaal festival voor actuele muziek, accessed November 19, 2021, https://novembermusic.net/programma/michel-van-der-aa-eight.
[18] Michel van der Aa, “The Book of Sand,” The Book of Sand, accessed March 23, 2022, http://thebookofsand.net/.

In conclusion, in almost all of Michel van der Aa's works, the concept of a main character and his contradictory- technologized alter egos, is the element that justifies the use of the different media layers and integrates them in the dramaturgy of his work. The media used in different pieces are chosen and designed very carefully, to transfer humanistic messages and to challenge the contemporary audience to experience traditional forms of music theater and film in a new- up to date way.

However, the concept doesn't seem to be the only way that helps the integration of different media in his work. Looking at some of his scores we can see that the multimedia used are written in detail in the score and function themselves as instruments, interacting with, or accompanying the voices and acoustic instruments. The piece *Up-Close* (2010), written for solo cello, string ensemble and film, is a perfect example of the composer's ability to combine his interests and knowledge on the fields of classical composition, electroacoustic sound and film direction, to create an innovative music theater performance, that is actually a cello concerto.

In the performance notes of the score,[19] van der Aa introduces a scoring system specifically for the synchronization of the pre-recorded soundtrack he uses in the piece.

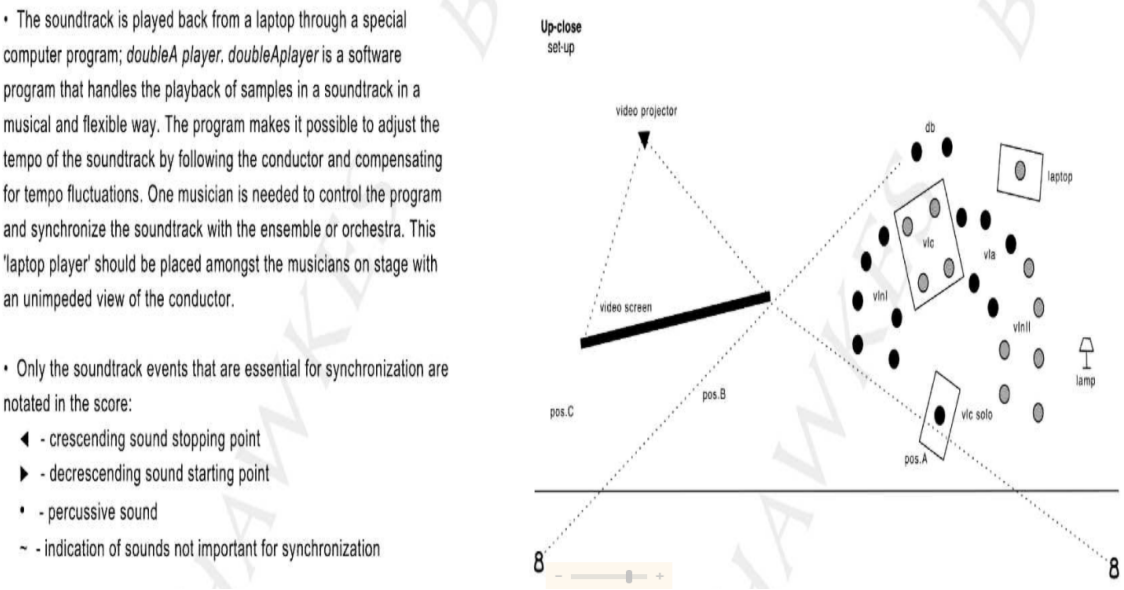

Figure 2 Performance notes for *Up Close* (2010)

He requests the use of a specific computer program (doubleAplayer), for the playback of pre recorded samples and synchronization with the ensemble. The program is controlled from a laptop and makes it possible to adjust the tempo. One musician is assigned to control the program and synchronize the soundtrack with the live orchestra, following indications in the score and the conductor. The position of the musician on stage is also indicated in detail in the performance notes. The composer seems to include in the score both musical and staging instructions.

[19] Michel van der Aa, "Up-Close for Solo Cello, String Ensemble and Film," 2010, https://www.boosey.com/cr/perusals/score?id=19316.

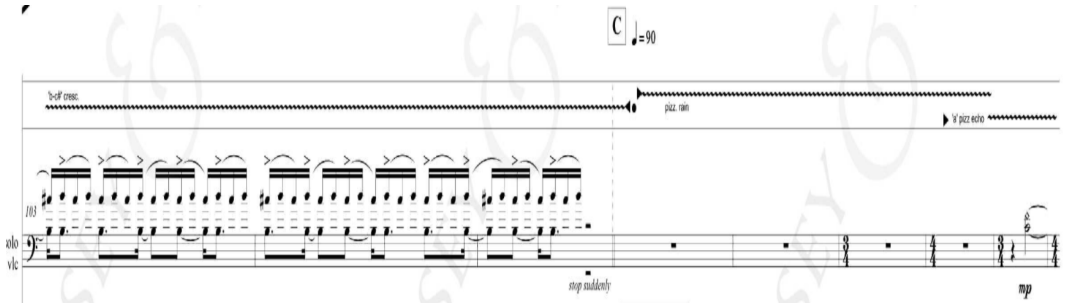

Figure 3 Indications for controlling the soundtrack with doubleAplayer in *Up Close* (2010)[20]

The composer seems to follow the same system for the soundtrack synchronization also in his 3D opera *Blank out* (2015)[21]. In this work for soprano, baritone (film), choir (film), surround soundtrack and 3D film projection, van der Aa uses the same notation system for the soundtrack synchronization.

Performance notes

- Accidentals apply throughout the bar, but not to the note's octave transpositions. Cautionary accidentals are placed to facilitate reading. When repeated notes occur, only an accidental for the first note is notated.
- The vocal parts should be sung in Baroque style with regard to vibrato, clarity of tone and expression. The part should have an intimate feeling to it.
- Only the soundtrack events that are essential for synchronization are notated in the score:
  - ◂ - crescending sound stopping point
  - ▸ - decrescending sound starting point
  - ● - percussive sound
  - ~~ - indication of sounds not important for synchronization
- Duration 70 minutes

Figure 4 Performance notes for *Blank Out* (2015)[22]

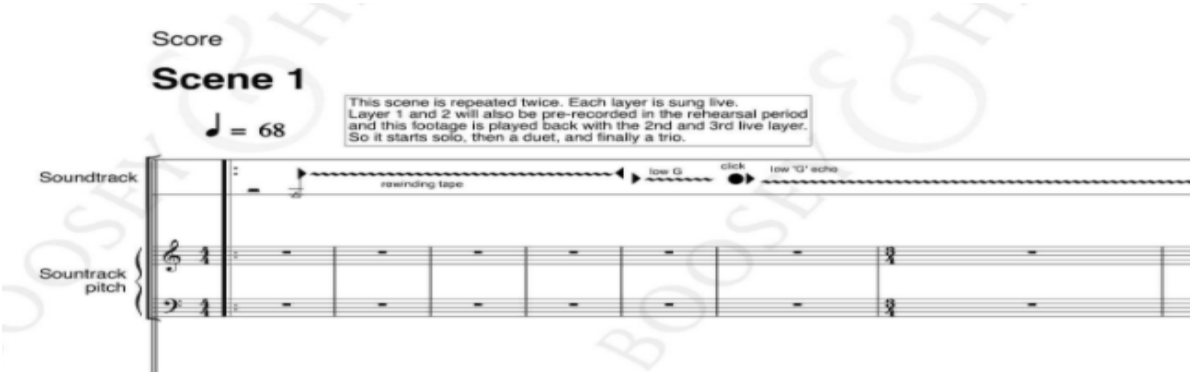

Figure 5 Soundtrack score indications for *Blank Out* (2015)

[20] Van der Aa, "Up-Close, 3.
[21] Michel van der Aa, "Blank Out Chamber Opera for Soprano and 3D Film," accessed February 16, 2022, https://www.boosey.com/cr/perusals/score?id=38701.
[22] Van der Aa, "Up-Close, 2-3.

Unfortunately, some of the scores for van der Aa's later pieces are not available on the Boosey & Hawkes website, but I could look at the scoring information of his latest opera *Upload* (2019-20)[23]. In this film- opera, the composer seems to still be using the doubleAplayer program to synchronize the soundtrack with the other media. This shows that he is staying consistent on his strategies for the performance of the pre-recorded soundtrack. His way for smooth integration of different media in a performance, other than his concept, seems to be the incorporation in the score- together with the traditional music notation- of a new scoring system for multimedia. The conductor's score takes a new form and combines musical and staging instructions. All the different disciplines are considered part of one complete work.

3. 1. 4. 2 Case study 2: Integration of digital media in the music of Yannis Kyriakides

Yannis Kyriakides (1969-) is a composer and sound artist, born in Cyprus and based in the Netherlands since 1992. He studied musicology at York University, and composition with Louis Andriessen and Dick Raaijmakers. He is currently teaching composition at the Royal Conservatory of Music in The Hague. Like Michel van der Aa, Kyriakides uses hybrids of media in his pieces. His work in the last years, is based on the idea of an imagined or inner voice, exploring different relations between words and music, through the use of systems of encoding information into sound, synthesizing voices and projecting text to music.[24]

I came across his latest music theater work *Ask Ada* (2021), for voice, six instruments (violin, viola, cello, harp, piano, percussion), five music boxes, electronics and video. Based on Ada Lovelace, daughter of Lord Byron, who is considered to have written the first algorithm for computer in 1843, it was commissioned and broadcasted by the National Opera of Greece in the autumn of 2021[25]. In my conversation with Yannis Kyriakides, he explained the concept behind his choice of media in this work.

> (…) When she wrote the algorithm in one of the notes, it's just called the famous Note G, she said that in the future we might use these machines to do things other than mathematics. We might be using them to do music. She gave music as an example. That is what's so brilliant about what she did. She had this vision, where it could go. So that also gave us the idea, really to deal with where we are now with that. Where are we now with algorithms? (...)[26]

Firstly, he mentioned the historical concept and the fact that he wanted to refer to the Victorian era and technology. Ada worked with Charles Babbage's analytical engine, an engine that looks a lot like a music box. That's how he got the idea to include music boxes in the piece. Then there was the fact that Ada historically played the harp. This explains his choice to use harp and give it a main role in the composition. Finally, he mentioned the choice of vintage synthesizers that played pre-programmed material as something that refers to the first computers. The use of autotune, something that he uses often in his works, is used to give Ada different voices for different parts of her narrative.

In *Ask Ada*, Kyriakides doesn't just present a monologue by a singer- protagonist, sharing her story. He creates conversations with different layers of voices that symbolize her inner voice, her subconscious and technology itself, since the piece revolves around the creation of the first computer

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[23] "Michel van Der Aa Upload - Opera," accessed April 13, 2022, https://www.boosey.com/pages/opera/moredetails?musicid=103739.
[24] "Yannis Kyriakides : Biography," accessed April 4, 2022, https://www.kyriakides.com/bio.html.
[25] Yannis Kyriakides, *Ask Ada*, accessed October 6, 2021, https://tv.nationalopera.gr/en/mousiko-theatro/ask-ada/.
[26] Interview with Yannis Kyriakides, April 6, 2022.

algorithm.[27] The text that is sung, spoken, processed or projected, becomes the narrator and seaming point between all the different media used. In the score of *Ask Ada* with a libretto by Theodora Delavault, Kyriakides mentions seven different ways of encoding voices. The libretto is constructed with different writings from Ada, Byron and her algorithm itself.[28]

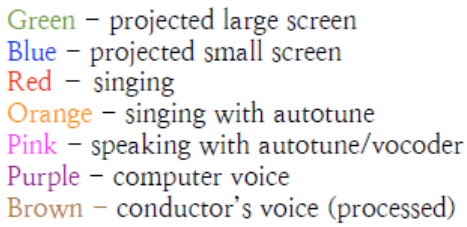

Figure 6 Coding of voices in the Libretto of *Ask Ada* (2021)

In his poetics of Music, Text and Film[29] Kyriakides is talking more about his different strategies for the use of text in his music. He divides the strategies into four main sections: the Internal Monologues, the Unanswered Questions, the Voiceprints and the Interactive Scores. Some of these strategies like the "Internal Monologues" and the "Voiceprints" are functioning more as a way to expand the understanding of his main character/subject, taking the role of someone's inner voice or the subconscious. In the case of "Internal Monologues" through the words of a singer and projected text he creates more layers of expression and perspective in a monologue. The same effect has in "Voiceprints" the use of autotune that creates the idea of another voice and layer of text. The other two strategies:" Unanswered Questions" and "Interactive Scores", have to do more with the structure of the music material, by encoding text into sound or turning projected text into notation for the musicians.[30] Looking at the score of *Ask Ada* (2021) and having in mind the information that Kyriakides shared with me, I tried to locate some examples of his strategies in this work.

Unanswered Questions

With this strategy the composer explores question and answer structures and whether music functions in the same way as language. Usually, a question is either translated from words to music and vice versa, going through other media by using different encoding methods[31]. In Chapter 16[32] called "Fare the(e) wel"l 4 (1:36 O), Kyriakides encoded the text from the famous poem by Lord Byron to the material of the music boxes. As he explained, each music box had different modulations and verses of the poem. It is difficult, of course, to locate the poem in the notes, but each type of translation of material has a quality to it. It's kind of structured with its own rules and that communicates something to the listener. According to the composer, each kind of different type of information has a different voice to it, that he likes to make use of.

[27] "Yannis Kyriakides : Ask Ada," accessed March 23, 2022, https://www.kyriakides.com/ask-ada.html.
[28] Yannis Kyriakides, "ASK ADA : Music Theatre for Voice, Ensemble and Multimedia," 2021, https://webshop.donemus.com/action/front/sheetmusic/20223/ASK+ADA, 6.
[29] Yannis Kyriakides, "Imagined Voices : A Poetics of Music-Text-Film".
[30] Kyriakides, "Imagined Voices : A Poetics of Music-Text-Film.", 146- 147.
[31] Kyriakides, "Imagined Voices : A Poetics of Music-Text-Film.",167.
[32] Kyriakides, "ASK ADA, 53.

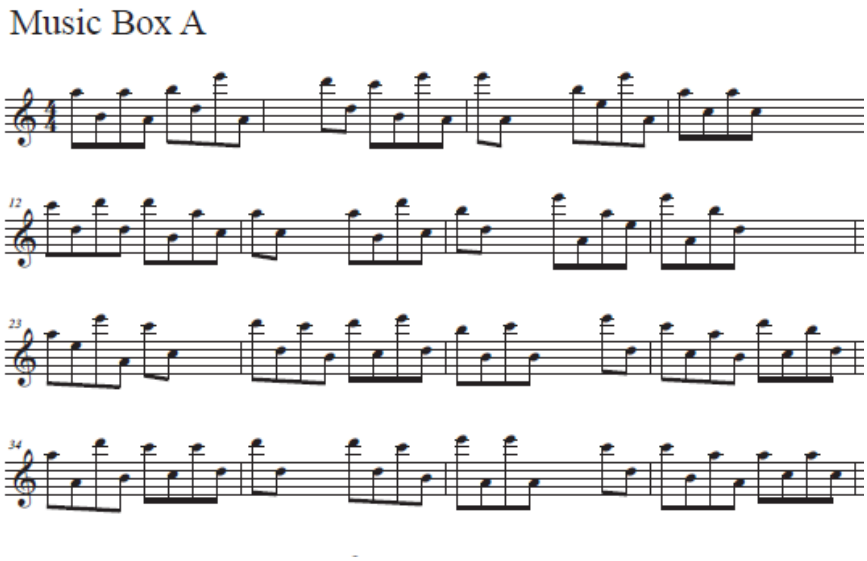

Figure 7 Encoding of text in the music boxes from chapter 16 of the score of *Ask Ada* (2021).

Internal Monologues

A strategy inspired by the inner voice, the private commentary that tries to make sense of the information that flows in our minds. As Kyriakides states in his PhD thesis, “The 'absent' voice acts as a bridge between two barely conscious private spaces: the mind of the mnemonist or dreamer and that of the reader/listener”.[33] In *Ask Ada* (2021) the singing text interchanges with projected text, giving it two functions. One as the inner voice of the singer, revealing her inner thoughts and secondly it gives the opportunity to the audience to use their inner voice and participate in the narration of the text.

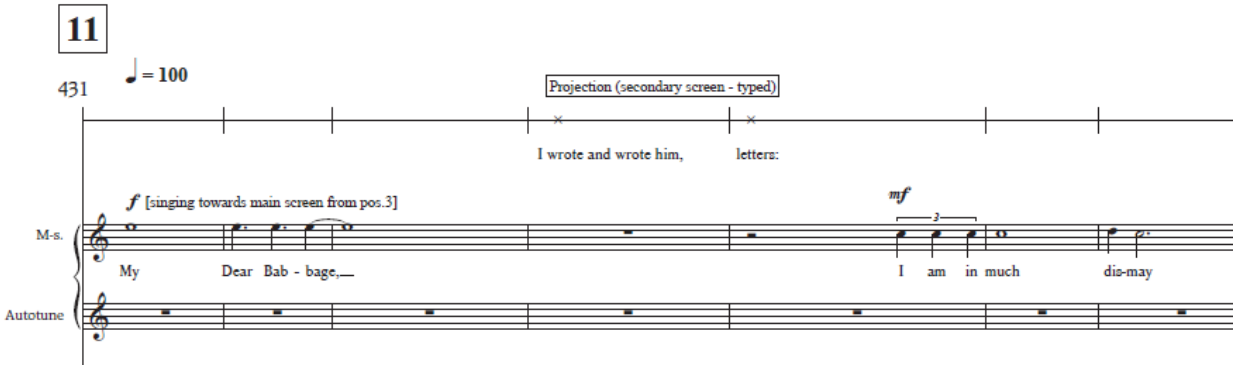

Figure 8 Internal monologue example from *Ask Ada* (2021) score.

[33] Kyriakides, “Imagined Voices : A Poetics of Music-Text-Film.”, 141.

Voiceprints

Mainly with the use of autotune, in this work the composer expands the voice of the main character. With this strategy he removes the semantic content of speech, by editing or recomposing it to underline something about the identity of the speaker. “In practice, voiceprint authentication involves not only comparing a sample voice to a database of voices to confirm identity, but involves comparing the traces of the technology that they are captured on”[34]. In the following example the voice of the singer protagonist is being reshaped to give her another identity, another voice that adds another layer to the narration.

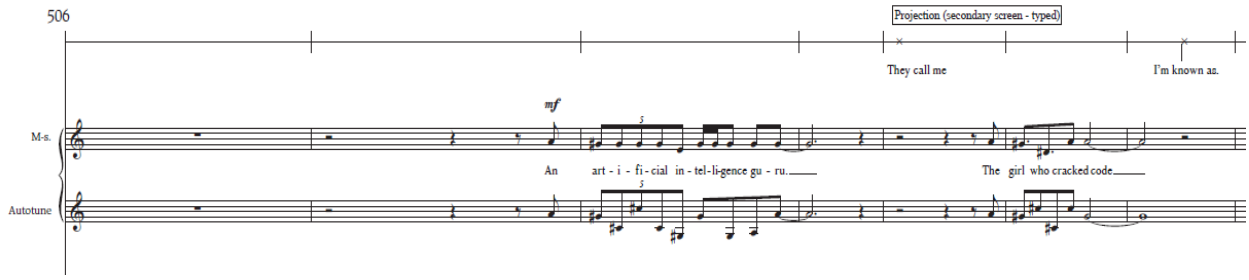

Figure 9 Use of autotune in the score of *Ask Ada* (2021).

The different layers of text, take the lead in different parts of the performance, giving form to the piece and a clear dramaturgy. There are 36 sections in this theater work[35], that are controlled through an Ableton Live file, containing all the audio, midi files, and electronic instruments, and whose structure corresponds directly with the sections in the score (all the digital instruments are notated in the score as normal instruments). Some parts are automated and strictly timed, others are free and cued on by the conductor and singer. The strict timing and sync points at the beginning of every section are used for the synchronization with a second computer, running Touch Designer (programmed by Darien Brito) which sends out the text films and live visuals to two screens[36].

The number 36 is not a random choice. According to the composer Ada’s algorithm has 36 lines and then she and her father Byron lived till the age of 36. It was a coincidence that gave structure to the piece. Kyriakides took Ada’s algorithm and structured the piece like a computer program. Each line of text has a different mathematical function. So, for example when it was subtraction, there are scenes that have to do with her memories and with her past. When it was multiplication, there are scenes that have to do with the future.[37] That's more or less how the form of the piece works.

Worth mentioning is that the staging of all the different elements of the performance is given in detail in the score by the composer. The score is not only used to carry information about the sound, but deals also with the visual aspect of the performance. Kyriakides gives a specific description of the positions of music boxes, the instruments, the singer and the two projection screens.

[34] Kyriakides, “Imagined Voices : A Poetics of Music-Text-Film.”, 183.
[35] Kyriakides, interview.
[36] Kyriakides, interview.
[37] Kyriakides, interview..

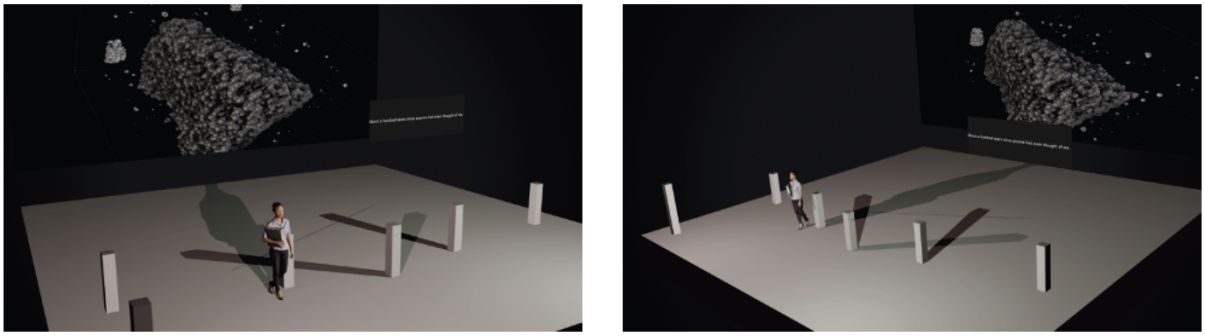

Figure 10 Stage visualization from *Ask Ada* (2021) score.[38]

He explained that this is the case for this work because he directed it himself. The composition has a very strong visual aspect, with the video and the music boxes, so he thought to keep things simple and not do it overly theatrical. He would be happy to work next time with a director though. Especially someone that can offer a different vision as well. He believes in collaborations that you trust the other artist. So, you give them very clear ideas and guidelines, but at the same time you leave them free to create their own vision. Of course, in other collaborations, like in the opera institution the director has the main say and not the composer. But in these kinds of works, having someone to come at least in the last stages before the performance can make a difference, in his opinion.

3. 1. 4. 3 Data analysis and cross-reference

The work of Michel van der Aa and Yannis Kyriakides appear to have a lot of similarities. They both use different multimedia and disciplines in their pieces and in some cases, they deal with technology itself as a subject. These aspects made me interested in their work as they relate to my research question. In the past chapter I analyzed the integration of media in their pieces and can sum them up in two categories:

- The Concept

Michel van der Aa is very consistent with his concept already from his early pieces. In his pieces he is dealing with themes like human values and the creative, active nature of human beings. Most times he is creating contrasts with the use of technology and the way it exposes you to what is not human. Technology itself and its innovations can be the main subject- concept of a performance, like on *Upload* 2019, or just a medium that of course carries a message but it's not the main subject like on *Up Close* (2010), *Blank Out* (2015) and *Eight* (2020). Usually, van der Aa uses video, soundtrack and electronics to expand the understanding of his live human characters- protagonists and shed light to different aspects of their personalities. He is always directing his compositions so he can control which layer of the performance is in the foreground each moment.

Yannis Kyriakides also relates his concept to the use of media and disciplines. Every instrument, acoustic or digital, live or prerecorded is chosen as a result of research and how it connects with the composition's subject. Some of his pieces like *Ask Ada* (2021) have technology as the main concept but

[38] Kyriakides, "ASK ADA", 5.

it's not something that happens in all of his pieces, even though he makes use of multimedia. He has developed specific strategies for the use of text with some of them incorporating digital tools or encoding techniques. The goal is again to expand the voice of the main character, creating different layers of narration.

- The Strategies

In the case of Michel van der Aa the main strategies for integrating multimedia seem to be the weaving of one element into the other by a constant interchanging of material from one medium to the other. The protagonists appear at times live and other times prerecorded interacting with each other and with other layers of the performance. More specifically the composer has developed a computer program called doubleAplayer, that he uses for the synchronization of his soundtracks. The program is being controlled live in the performance by one musician and has the ability to control the speed of the playback, following the conductor's indications and a specific score notation. Another strategy seems to be the reappearance of sound elements and visual objects in his pieces. Someone can follow in his work common themes and motives both in the sound and image.

In Yannis Kyriakides work there's a focus on the use of text and encoding text into sound, creating polyphony through different layers of media. The composer himself states four different strategies for the use of text. Three of them can be found in *Ask Ada* (2021) the work of reference for the past chapter. These strategies are the Internal Monologues, the Voiceprints, and the Unanswered Questions. The Internal Monologues have to do with the expansion of a monologue, through the projection of text that interferes and informs the text that is sung or spoken. Voiceprints refer to voice processing, mostly with the use of autotune in live performance. The Unanswered Questions refer to encoding text into music in the sense of using text to form the music material or the structure of a performance. This can also mean the use of an algorithm for the literal translation of text into sound.

3.1.5 Interventions / practical application

Inspired by the works above by Michel van der Aa (*1970 -)* and *Ask Ada* (2021) by Yannis Kyriakides, I decided to use the concept of multimedia as the main subject of a new mixed media performance. In collaboration with a visual artist, two musicians and three circus artists we developed an interdisciplinary performance that was inspired by the communication that the online environment evokes. Elements and characters from two years being online (because of the pandemic) were taken offline, creating an immersive performance and installation. The performance's name *In Medias Res* means in the middle of the story, referring to the short fragment of someone's story that people can see online. This concept was developed in collaboration with Lio Spinnewijn and proposed for this specific project.

During a period of one week, we were meeting regularly with the other artists, discussing and developing the form of the performance. My role was not only to design and coordinate the music, but also be in charge of the video and general direction of the performance. Between our common sessions I was busy preparing music ideas, material, and tools that could be used during our rehearsals and final result. Trying to apply some of my observations from the previous case studies, I decided to use multimedia in order to create digitalized versions of the characters on stage. In this way they were able to exist in two realities at the same time and expand their narrative role. The characters used mirrors, phones and cameras to watch themselves and that was also the only way to interact with each other. Prerecorded sounds of the instruments and effects through live electronics in Ableton Live were blended with the music performers on stage, adding to their dual existence. Furthermore, two cameras could react to movement with sound and a pixelated picture of the person in front of the camera projected on the wall. Lastly, the whole performance was streamed live and projected on Instagram and in the room.

More specifically, I developed a patch using the software MaxMSP, that translated motion in front of a camera to midi signal and sound. Slow movements resulted in low register subtle sound and big movements, to high pitched dense soundscapes. In this way the circus artists by moving in front of the cameras positioned in the room, could interact with the musicians with both movement and sound. Similarly, the musicians using DPA microphones, could move freely in the space and interact with the other performers not just with sound, but also with movement. In the beginning of the performance mirrors were handed out to the audience with the instruction to use them as their phone. This gesture aimed to engage the audience in the performance and make them think about their own online behavior. There was also the intention for the setup to function as an interactive installation after the performance.

Figure 11, 12 Max patch and video display from the audio reactive cameras in the piece *In Medias Res (2022)*

The music performance of the instruments was mostly improvised with some guidelines given regarding the range, texture, atmosphere, and expression. The performance had 5 parts based on different acts throughout the 20-minute piece. In the first part a surround atmosphere was made out of recordings from the performing instruments and was floating in the space while the different characters were wandering around absorbed in their digital or non-digital reflections. In the next part characters were acknowledging each other and their live voice recordings could be heard. The third part had a focus on movement with a duo circus act. The music was improvised accompanying the speed of the movements and the narrative of this interaction. In the next act narration was the main element and focus of the performance. A text was read and in parts a vocoder and other effects were applied extending the voice in the digital realm. The effects were more densely applied to create tension and in parts allowed the dry signal to be heard as a release. The piece ended with an intense interaction between text, movement and live music performance. Imitations between digital and analog sound and movement led to chaos and despair for the characters that seemed lost going back and forth between the two realms.

3.1.6 Outcomes

02 Reference Recording 02 (Sofia Bardoutsou) (In Medias Res)

In Medias Res (2022)
for 3 musicians, 3 circus artists, narrator, motion-reactive cameras and projection

Performance:
01/04/22
Root Gallery
Robert Fruinstraat 52

In the middle of a story, our story. In Medias Res is an audio-visual performance about bringing two years of being online into an offline environment. How do we communicate our online behavior?

In Medias Res is a collaborative concept made by Sofia Bardoutsou and visual artist Lio Spinnewijn.
Performed by:
Sofia Bardoutsou
Lio Spinnewijn
Alejandro Garcia Bustos
Oscar Cartwright
Ines Fraile Bernabeu
Utku Cergel
Eirini Zogali

3.1.7 Feedback, reflection and conclusion

Reflecting on my piece and comparing them to my reference recording, I think there is an apparent development both in the conceptual and practical level. Based on the comments of my teachers (Hans Koolmees, René Uijlenhoet) and my own observations, I can sum up the main points of the feedback in two categories, relating them with the strategies mentioned above.

In Medias Res (2022)

Integration of concept

The concept and how it relates with every element of the performance is clear. Nice integration of different layers of sound, movement and text. Successful development of material. Multimedia as a concept and medium gives direction and a clear dramaturgy. Strong visual character with the incorporation of movement and the usage of space.

Strategies

The absence of a score gave space for co- composing and interaction between the different disciplines, however the improvised character of the music played by the instruments allowed for referencing different styles and pieces. Successful use of digital tools (autotune, sound triggering cameras), to expand the characters and narration, creating contrasts in all the aspects of the performance.

I could use encoding strategies to relate more the material of the different media and give them a clearer structure. The collaboration between different disciplines can get challenging, when there is no common language. I should think of ways to make my thinking in sound, more accessible to performers of movement or visual artists.

3.2 Second research cycle

3.2.1 Overview of second research cycle

In this research cycle, the main focus of my research is “interaction”. Following similar research strategies with the first cycle, I sought to explore the various means by which media and disparate disciplines embedded within my compositions could establish reciprocal responsiveness. Through interaction, performances have the potential to embrace audacious experimentation, attaining heightened flexibility in form, and even venturing into non-linearity. With the assistance of digital media, I experimented with new compositional systems and ways of artistic collaboration. This part of the research is intended to be more practical and mainly focused on the development of different interactive music concepts, techniques, and tools that can then facilitate the interaction between the performers and the score, the performers and the multimedia, or extending it to the audience.

3.2.2 Reference recording

02 Reference Recording 02 (Sofia Bardoutsou) (In Medias Res)

In Medias Res (2022)
for 3 musicians, 3 circus artists, narrator, motion reactive cameras and projection

Performance:
01/04/22
Root Gallery
Robert Fruinstraat 52

Performers:
Sofia Bardoutsou
Lio Spinnewijn
Alejandro Garcia Bustos
Oscar Cartwright
Ines Fraile Bernabeu
Utku Cergel
Eirini Zogali

In Medias Res is the artistic result of an Incubator + project in Codarts and was performed at the Root Gallery on the 1st of April 2022. It's a collaborative idea with the visual artist Lio Spinnewijn. We intended to create an installation and performance based on characteristics of our online behavior and explore how we interact when we take this to an offline environment. It was composed for three circus artists, a narrator, 3 musicians, surround live electronics, motion interactive cameras and projection. We co- composed on the spot (in the timeframe of 4 days) every element of the performance, allowing for more freedom and interaction between the disciplines. During our work sessions we decided on a main form and parts where specific acts happen, cued by both movement and sound. Through the use of digital media (sound interactive cameras, autotune, live electronics) I intended to create a digital version of every character in the space, creating contrast between consciousness and unconsciousness, offline – online, human- psyborg and create opportunities for interaction between the performers. The piece is also considered to be an installation, since elements on stage are intended for the audience to interact with, while and after the performance. At the time the audience enters the room, they are given small mirrors with the instruction to use them like it would be they're phone. A metaphor for how we look at each other through screens and an opportunity to immerse the audience more to the concept of the performance.

3.2.3 Feedback and reflection

Some of my networks and teacher's (Hans Koolmees, René Uijlenhoet, Gwyneth Wentink) feedback, as well my own reflection, can be summed up in the following remarks:

- The performance of In Medias Res reached the objective of interdisciplinarity, since the boundaries between the collaborating disciplines were crossed.
- There was a clear connection and interaction between the different media and the concept.
- There was clear interaction between the performers and the digital media, but the interaction with the instrumental performers wasn't that obvious.
- The concept of giving the audience a mirror to navigate through the performance was really powerful in order to give them an opportunity to capture what is going on.
- The use of space was effective. Though, it didn't encourage the audience to walk and be part of the performance. If that was an aim, there is room for improvement.
- Music was always present and its role was prominent, but didn't dominate the performance.
- The abstract character of the performance, left freedom for more interpretations and effectively avoided traditional narration.
- There is no score for this performance. How do you notate an interdisciplinary performance is a subject to research.

Based on the feedback above, the focus of this cycle is going to be interaction. Interaction can be approached in two different ways:

- **Interaction between the performers and score**
- **Interactive multimedia- Interaction between the performers and the audience**

3.2.4 Data collection & data analysis

3.2.4.1 Case Study: Interaction in multidisciplinary performance, through works produced by State of the United Arts.

In this section, I will focus on one specific type of music interaction, which occurs between the performers and the music score itself. I aim to explore how the score, which is mainly developed within the field of music, can not only serve its traditional role, but also function as an agency for visual interpretations. The roots of interaction in music can be traced back to the earliest instances of human communication through sound. Even in the Paleolithic period, the exchange of sounds and noises served as a means of expression and connection among individuals. As Western music evolved, interaction continued to play a significant role, particularly during the baroque and classical periods. Playing together in ensembles, the so-called chamber music, emphasized the collaborative nature of music-making and the relation with a score. The concept that music notation can serve as a catalyst for interaction with other art forms is a key focus of the following text. It explores the notion that the way music is written and interpreted can facilitate dynamic exchanges and engagement between different artistic mediums

According to Grove Music, the term “Chamber music” was already being used in the 16th century to signify ensemble music performed in private. Towards the end of the 19th century the term came to mean “instrumental ensemble music for small forces, performed in either a private or a public context and by the early 20th century the term got associated with the quartets, quintets and piano trios of Haydn, Mozart, Beethoven, Schubert and their successors. At the moment the term is used to describe music composed for small instrumental ensembles and in essence, the term implies intimate, carefully constructed music intended for performance with an audience of limited size. One of the most important elements of it is the social and musical pleasure for musicians playing together”[39].

State of the United Arts is an arts think-tank and performance-platform which produced *Canto Ostinato Audio Visual* and the performance *In Code*, an audiovisual performance of Terry Riley’s *In C* for harp, electronics and visuals. Gwyneth Wentink (harp), Wouter Snoei (electronica) and Arnout Hulskamp (visuals) came together for their first project in 2012 and in the next years their audiovisual performances toured all around the Netherlands and many cities around the world[40].

Canto Ostinato (1976–9)[41] by Simeon ten Holt, is considered the composer’s major breakthrough. It is originally written for four keyboard instruments, but can also be performed by any kind and number of instruments. It consists of repetitive music in which the performers follow their own route choosing the so-called ‘drift parts’ they prefer. The musicians are given the task of determining the total length and the number of repetitions in any performance. Each performance of *Canto ostinato*, ever since the première (April 25th 1979), produces new sound combinations and creates a kind of living musical organism[42]. Interaction and improvisation are the foundation of the composition.

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[39] “Chamber Music,” Grove Music Online, accessed November 8, 2022, http://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000005379.
[40] InnerAct, “Canto Ostinato Audio Visual,” accessed October 20, 2022, http://cantoostinatoav.com.
[41] Simeon ten Holt, “Canto Ostinato : Voor Toetsinstrumenten” (Donemus, 2003), https://webshop.donemus.com/action/front/sheetmusic/3360.
[42] “Holt, Simeon Ten,” Grove Music Online, accessed October 19, 2022, http://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000013256.

In the audiovisual version by Gwyneth Wentink, Wouter Snoei and Arnout Hulskamp, each performer responded to each other on stage using their instruments and self-developed software, determining who takes the lead. According to Gwyneth, she transcribed the original score for harp and played live interchanging between a few of the voices[43]. The rest of the voices were recorded and played by the electronics. The music cells were also encoded in the visuals. Both Gwyneth and Wouter mentioned that the way the piece is composed and the freedom it gives to the performers, is what inspired them and led them to choose it for this particular interpretation. As we can read in the preface of the score:

> The main part of Canto is indicated by the bracketed systems in bolder type. For the right hand there are two systems on which alternatives (variants) have been notated. Likewise, there is one alternative stave for the left hand. Supposing that the piece is performed by just one musician (e.g., a pianist), then he can diverge from the basic part via the given alternatives in order to create variety. Apart from these alternatives each bar or section of the basic part itself has the possibility for variation: by displacement of accents and dynamic contrasts. Some suggestions for these are given in the score by thinly drawn stems connecting notes within each group[44].

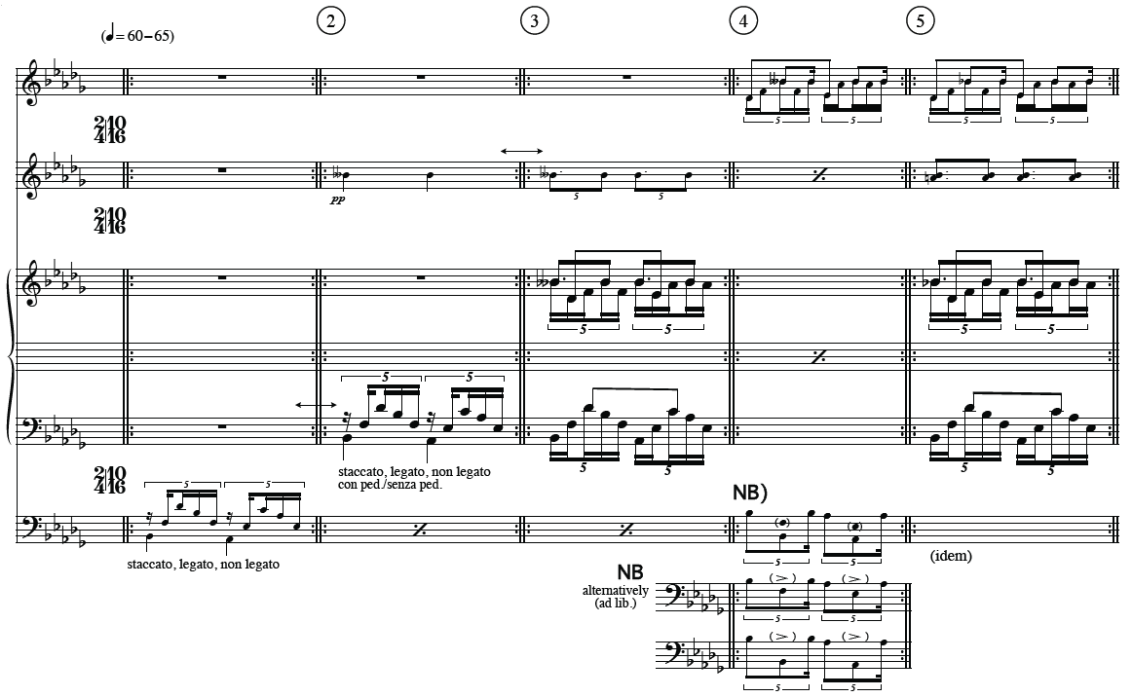

Figure 13 *Canto Ostinato* score, page 5[45]

> The symbol ←→ indicates that in many cases one can either go back or forward in one's choice of sections and that, depending on the harmonies, certain sections can be combined[46].

[43] Interview with Gwyneth Wentink, October 29, 2022.
[44] Holt, "Canto Ostinato : Voor Toetsinstrumenten."
[45] Holt, "Canto Ostinato : Voor Toetsinstrumenten." 5.
[46] Holt, "Canto Ostinato : Voor Toetsinstrumenten." 3.

In the instructions we find more details about the repeats, the form, the timing and the dynamics of the piece. The composer makes it clear that the performers are free to choose the number of times they will repeat each section (except the transition parts that should be played only once), the dynamic markings and how they evolve throughout the piece and the manner in which they will play each section. Some indications are included in the score in different parts (legato, staccato, portato). The performers are in charge of keeping a stable tempo throughout the piece and the changes in dynamics and manner of playing should be done collectively with a maximum of control and distinction. The performers are not allowed to come up with new material, other than the choices offered in the score and "behave like composers".[47]

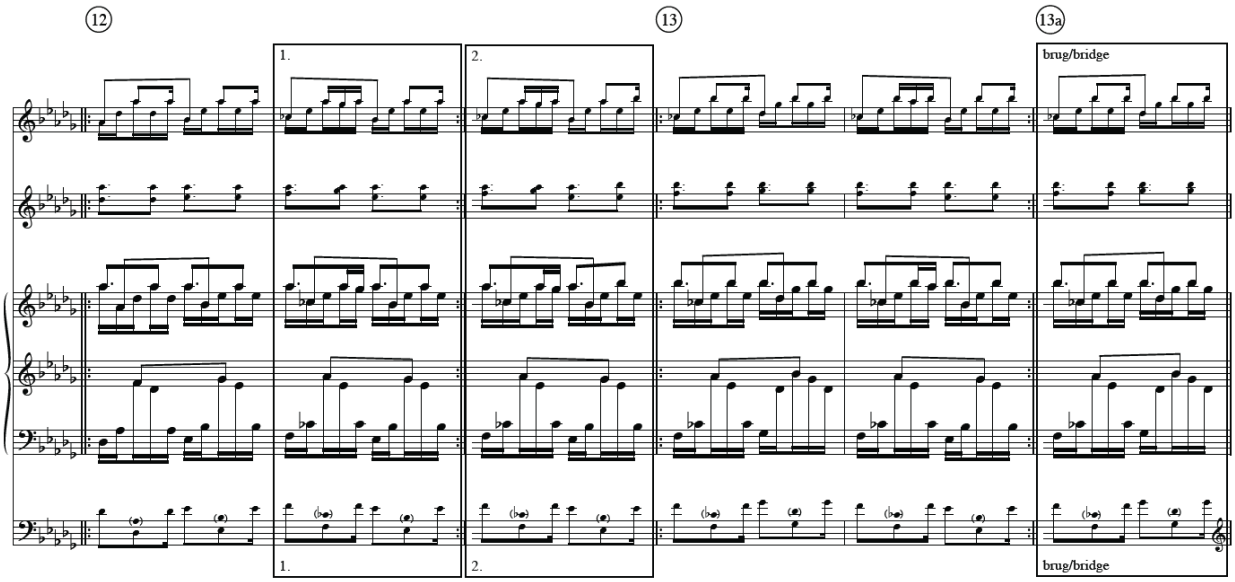

Figure 14 *Canto Ostinato* score, page 8[48]

According to Sylvie Klijn, Simeon ten Holt regarded his music as "social music". Of course, any music played by more than one performer could be seen as social music. It seems that the term mainly relates to the communication between the performers on stage, but can also provide the start of a relationship between listeners, addressing in this way the audience. In the article by Sylvie, someone can see that listeners identify themselves with the piece, feeling that the composition becomes part of their life. "But for others it can evoke antiparty at parts and the listener does not want to join the performers"[49]. In our interview, Wouter mentioned that a big reason that led him to choose this piece to perform, was how fond his father was of it[50]. It's really impressive how performers and listeners relate to this piece with each of their senses. Adding the visual representation of the notation, might be the element that completes the experience and makes the piece even more immersive.

[47] Holt, "Canto Ostinato : Voor Toetsinstrumenten." 4.
[48] Holt, "Canto Ostinato : Voor Toetsinstrumenten." 8.
[49] Sylvie Klijn, "Musical, Sociological and Psychological Aspects of Minimal Music Composition: The Case of 'Canto Ostinato' by Simeon Ten Holt," n.d., 147.
[50] Interview with Wouter Snoei, November 15, 2022.

Because the visuals were projected at the back, Gwyneth and Wouter had 2 mirrors in front of them during the performance, so they could see the reflection of the visuals and respond with the dynamics and expression. Gwyneth mentioned that the visuals were even leading them in parts[51]. Dynamics, communicating and listening were main elements of their performance that reminded her of the 'conventional' chamber music practice. She also acknowledged the relationship with the performance's environment:

> The environment where we played also made a huge impact - it was always a large communication between the music, the players, the audience and the environment/ building. Once we played in India in a large outdoor park - you could hear the rikscha's honking throughout the piece. At another occasion we had the visuals projected on a large firehouse - it all gave new impulses for the musical interpretation - you play with it[52].

The ensemble worked in a similar manner for their interpretation of *In C (1964)* by Terry Riley. "In Code" was inspired by the piece's first pioneering performance in 1964 (with Steve Reich among others), where live electronics and "real-time" visuals were integrated into an ensemble of acoustic instruments. In the interpretation by State of the United Arts, a custom-made lens structure joined the ensemble on stage, where visuals were shown. Interaction is key in this piece and decisions about the instrumentation, number of players and duration are left to the performer's imagination. Riley was most likely inspired by the North African and Indian music, both of which are characterized by the interaction of the ensembles and where spontaneity is key[53].

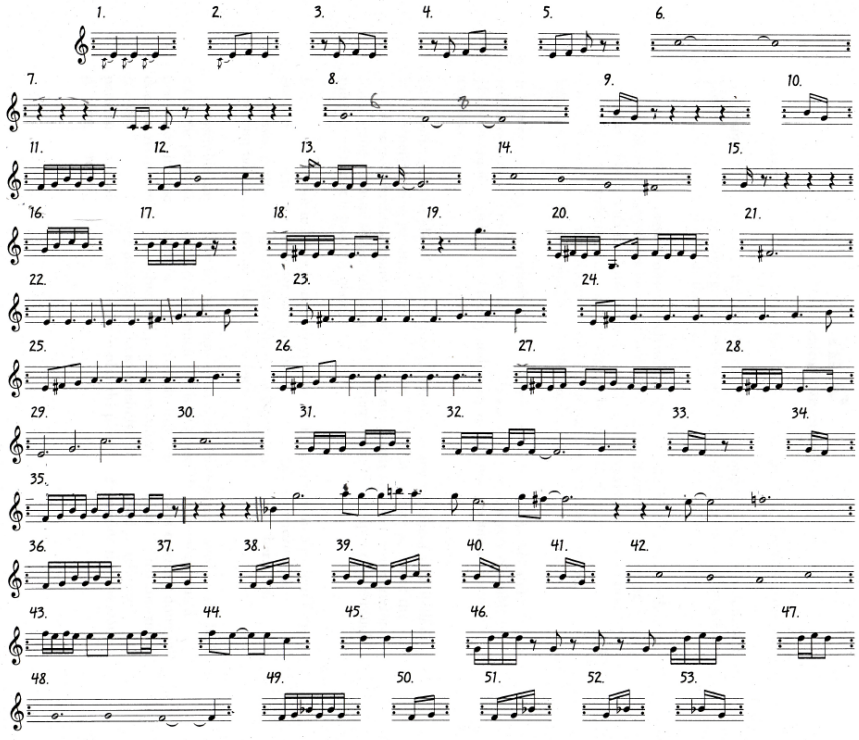

Figure 15 *In* C score[54]

[51] Wentink, interview.
[52] Wentink.
[53] In Code, "In Code – An Audiovisual Performance of Terry Riley's Masterpiece.," In Code, accessed October 19, 2022, https://in-c-ode.com/.
[54] Terry Riley, *In C: Performing Directions* (Celestial Harmonies, 1989).

In C (1964) defined the minimalist style of modular repetition and was the first work to bring minimalism into mainstream culture. The score (for unspecified instruments) by the American composer and performer Terry Riley, consists of 53 phrases or modules. They are to be played in sequence and freely repeated by each player, before proceeding to the next. As a consequence, unpredictable layerings of the same and successive motifs occur[55]. "The rhythmic vocabulary consists of even subdivisions and multiples of the quarter note with one exception of repeated and rising notes in dotted quarters. The pulse is a steady, unvarying eighth-note texture which provides a sort of neutral "grid" against which shifting rhythmic relationships between the modules may unfold. The work is a matrix of possibilities"[56].

Riley's original notated artifact for the premiere appears to have been the score sheet of modules plus a few verbal instructions for its execution. Some instructions that later became available are a sort of an afterthought and the result of decades of performance, during which Riley determined what decisions and approaches seem to work best[57]. According to those, the piece can be performed by any number and kind of instruments, but a group of about 35 is desired. About the repetitions of the modules, there is again no fixed rule, but an average length of a module repetition could be between 45'' - 1'30''. Performers should listen carefully to each other and move to dynamic changes together. "The tempo shouldn't be faster than the one performer can play comfortably in. Octave transposition and augmentation of rhythms are possible, but with always having in mind the larger periodic accents in sound, even when resting"[58].

One can notice that Riley is careful to leave room for alternative interpretations and to preserve the performer's autonomy as an individual within the collective. Moreover, with In C, Riley reaffirms the importance of the score, within the world of both conceptual and indeterminate composition. While for many composers at that time, the text was the most important, and in many cases the only, element of the score, for Riley it was an addition[59].

According to Wouter the notation didn't limit the ensemble's performance, but actually opened the way for their interpretation. In his opinion it would be really complex and unnecessary to try and notate their audiovisual version. It would mean that you would possibly have to come up with notation for sound colors which for electronic music isn't possible[60]. Because so many things are left free, like the timing, the character and manner of playing, there are so many different versions that sound completely different.

The similarities between *Canto Ostinato and In C* are really apparent and it is no wonder that the ensemble chose those two pieces for their audiovisual interpretation. The open form of the pieces and the concept of indeterminacy in performance, seems to leave a lot of space for other disciplines to add their approach, even though the piece's core building element comes from music notation. Another element of both pieces that encourages a more multidisciplinary approach is the use of modules in sequence. Wouter used this idea to create multiple electronic players that can play different voices at the same time. He "organized the voices in sequences and was triggering them live in order to achieve different combinations with the harp and the visuals"[61]. In the case of *In Code "*certain shapes in the visuals were even coupled to the melodies, the electronics and to the tempo of the video rendering. Gwyneth also had her own electronic hardware and could make her own loops with advanced control".[62]

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[55] "Riley, Terry," Grove Music Online, accessed November 8, 2022, http://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000023474.
[56] Robert Carl, *Terry Riley's In C* (Oxford University Press, 2009), 58.
[57] Carl, *Terry Riley's In C,* 59-60.
[58] Riley, *In C: Performing Directions*.
[59] Carl, *Terry Riley's In C,* 59-60.
[60] Snoei, interview.
[61] Snoei, interview.
[62] Snoei, interview.

> We made it technically, in such a way that I could actually play images on Arnout's system from my system, and vice versa. So, triggering the correct melody that's connected to the correct shape. You could really see that. We had this lens that the image was projected through and there were these shapes traveling around it at different speeds and in different lengths and were really coupled to the notes that were in the score and also to the tempo. Actually, if you knew the language, you could even predict how the shapes would look for a certain melody[63].

To conclude, in the performances produced by State of the United Arts, interaction is a key element that results from the ensemble's collaboration but also from the relation with the music score itself. Someone could argue that a traditionally notated score isn't necessary for a performance of a multidisciplinary setting and that's true in a way. On the other hand, someone can also notice that when you incorporate musicians in a project and not define at all the music material, then you are dependent on the performer's playing habits and stylistic preferences (as it is apparent in the reference recording of this cycle).

The case of chamber music and the correlation it has with the way the ensemble above worked together- in a multidisciplinary setting-, can give us some guidelines on how to achieve interaction in such performances. According to Gabrielle Padilla, these are some fundamental chamber music guidelines for the rehearsal and performance, that are very similar to the performing strategies described in the text above[64]:In my opinion someone could apply these strategies not only when working with musicians but also with artists from other disciplines.

- Interpersonal relationships are key in an ensemble. There should be an open environment to have discussion and establish some rules for group communication and behavior prior to working together.
- Attention on placement in space. Seating arrangement, acoustics, balance, traditional practices of the chosen repertoire (style), or performers' preferences. (remember how the ensemble had to use mirrors in order to interact with the visuals behind them).
- Score study provides a way for a group to practice or rehearse away from their instrument/ discipline. Performers should know which voice has the primary role or materials and who they share or trade off rhythms with. They should also know where there are silences within the music. Attention to the rhythm environment enables the performers to better connect and play together. As included in the performing instructions of both Canto Ostinato and In C:

> It is important to think of patterns periodically so that when you are resting you are conscious of the larger periodic composite accents that are sounding, and when you re-enter, you are aware of what effect your entrance will have on the music's flow[65].

> The players should keep in mind that there is no conductor waving a baton over Canto Ostinato and that it is the inner strength of the players themselves that should perform this task. The control, even when looked after by one of the players, lies in the sum of interactions[66].

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[63] Snoei, interview.
[64] Gabrielle Padilla, "Chamber Music Fundamentals and Rehearsal Techniques for Advancing String Students" (DMA, West Virginia University Libraries, 2021), https://doi.org/10.33915/etd.10265, 19-41.
[65] Riley, *In C: Performing Directions*.
[66] Holt, "Canto Ostinato : Voor Toetsinstrumenten." 4.

- Recording and listening back.
- Making interpretive decisions as an ensemble. The aim of an ensemble is to combine ideas and come to a singular vision for a performance.

3.2.4.2 Case Study: The interactive sound sculptures of Walter Giers

While the preceding case study centered on interactive techniques between performers and the music score, the subsequent case study primarily shifts focus towards interactive tools and media. In the previous research cycle, the utilization of digital tools to facilitate interaction among performers from diverse art forms was approached in a somewhat intuitive manner. In this section, my objective is to exclusively explore how digital tools can transform into dramaturgical objects on stage, granting performers control over sonic events throughout their performances. Expanding on this concept, it has the potential to foster interaction with the audience and facilitate a highly adaptable, non-linear approach to musical composition, as sonic reactions cannot be precisely planned or timed.

According to Hugh Davies, “Sound sculpture is a sculpture or construction that creates sound, not always of a musical nature, by means of its own internal mechanism, or when it is activated by environmental elements such as wind, water or sunlight, or when it is manipulated”[67]. Earliest datable examples come from the Romans around 200 CE and stretch through the 20th century when an explosion of sound sculpture activity occurred. This case study is dedicated to the work of Walter Giers, one of the pioneers of electronic art, that used openly visible electronic components such as loudspeakers, buttons, capacitors, resistors, relays, and batteries in a series of kinetic audiovisual constructions. “In some of his works the audience can interact with the objects operating buttons and switches. Others take on a life of their own acting autonomously through the use of random generators”[68]. With the words of Walter Giers:

> When I built a tone generator and I wanted it to produce different tones, I brought a person who operated the switches and practically reached the direction I was going for. And then at the beginning of the 70s I realized that I could also do these things with the random generator automatically of course, well not automatically in the sense of a program, but the objects would become autonomous. And that was really important for me, if I wanted to give them a life of their own. But most of the objects that I make or I’m interested in are about the interactions[69].

[67] Hugh Davies, “Sound Sculpture,” in *Oxford Music Online* (Oxford University Press, 2001), https://doi.org/10.1093/gmo/9781561592630.article.47630.
[68] “Learn About Early Audiovisual Art With 10 Pioneering Works,” Telekom Electronic Beats, February 7, 2017, https://www.electronicbeats.net/audiovisual-art-began-10-pioneering-works/.
[69] *Walter Giers - Electronic Art (Electronic Beats TV)*, 2017, https://www.youtube.com/watch?v=3-zyXnc2Xls.

Walter Giers was a German light, sound and media artist. He was born in Mannweiler, Germany in 1939. He started as a jazz musician and in 1963 completed his studies as an industrial designer from the state school for technical arts and crafts (today HfG) in Schwäbisch Gmünd. In 1992–1993 he was a lecturer at the Karlsruhe University of Arts and Design and his first work as an artist was exhibited in 1969. Giers' work was exhibited and can be found till today at a number of museums and collections such as 'Städtische Museum Gelsenkirchen', 'Center for Art and Media Karlsruhe' (ZKM), 'Städtische Galerie Karlsruhe', 'Museum für Neue Kunst' in Freiburg, Ministry for Science, Research and Art of Baden-Württemberg in Stuttgart, Galerie Reckermann, Cologne, Galerie Denise René Hans Mayer, Düsseldorf, Galerie Edith Wahlandt, Schwäbisch Gmünd and Stuttgart, Stedelijk Museum, Amsterdam and more[70].

In 1969 he created the first interactive picture. The viewer can produce sound by closing the circuit, touching the metal hands. The tones change based on how the user touches them and what parts of their skin and body they use to conduct the electricity.

Figure 16 *Handbild/Hände* (1971)[71]

Giers always wanted the pictures he made to be able to change and avoided static audiovisual repetition. He achieved this by making them interactive or able to change on their own. He explored the concept of music left to chance, as well as the use of self-playing instruments and repetitive loops. The following sculpture produces shrill sounds and flashes of light that the user cannot turn off, because the circuits switch to an internal energy block connected to a random generator when the main connector is deactivated. Thus, a user would have to destroy the piece entirely to stop the emissions.

[70] "Walter Giers: Electronic Art - Announcements - e-Flux," accessed October 10, 2022, https://www.e-flux.com/announcements/483385/walter-gierselectronic-art/.
[71] "Learn About Early Audiovisual Art With 10 Pioneering Works."

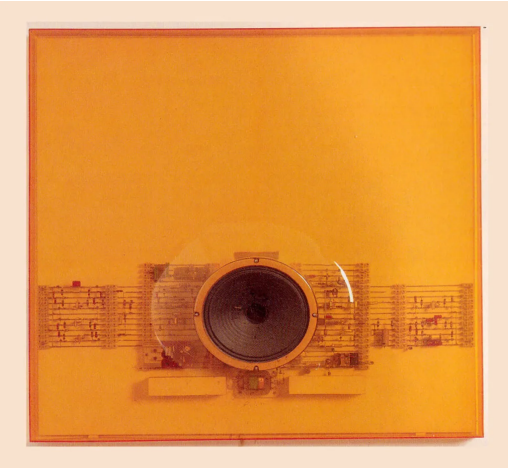

Figure 17 *Impertinent* (1976)[72]

Another great example of the interactive sound sculptures of Walter Giers are the four chairs that talk to one another without human interaction. The chairs have a conversation with a somewhat restricted vocabulary, simulating real life in a way. People can actively participate in the dialog by occupying the chairs. The chairs can listen and answer more or less meaningful answers[73].

Figure 18 *Der Stammtisch*[74]

Even though Walter Giers work is now more than 50 years old, someone can recognize many concepts, elements and techniques that are very much used in the field of sonic arts today. The most engaging aspect of his work for me personally, was his wish to make his sculptures interactive and give the audience the chance to participate in the process of sound production. In the past decade, there has been a big wave of artists that combine motors, magnets, motion and digital media, to enhance traditional

[72] "Learn About Early Audiovisual Art With 10 Pioneering Works."
[73] "Walter Giers + Berthold Beuthe Licht Und Klang," accessed November 14, 2022, https://www.waltergiers.de/pages/f03.htm.
[74] "Learn About Early Audiovisual Art With 10 Pioneering Works."

instruments and create new physical and digital instruments. Performers have employed sensing-based interfaces to achieve greater expression to their playing and interaction with digital music through gestures and body movements.

As noted by Arie Altena in the article *Participation and interactive art,* interaction in performance art[75] from the 1980s and later, followed naturally from working and experimenting with technology. The desire to break the boundaries that restricted art and society and think beyond traditional frameworks started already in the 1950s with many avant garde artists using game strategies and turning the spectator into a participant. The process of computer human interaction, opened the artists a new window of opportunity for actively involving the viewer in their work. In the words of Arie "*It follows that creating interactive art is fundamentally shaping user behavior"*[76].

3.2.4.2.1 Self Experimentation

Being inspired by the work of Giers and the concept of designing artworks- instruments for interaction with the performers and the spectator, I decided to conduct my own experiments. I wanted to combine physical objects with digital media and create my own interactive interfaces that can then be integrated in live performance. In order to translate human action into sound, I decided to use sensors that I can attach to objects and then translate the signal into sound through self-made patches in the software MaxMsp.

Research at Nottingham's Mixed Reality Laboratory has explored the use of digital technologies in live performance. According to Steve Benford there are three key facets of bodily interaction with sensors: Expected movements, sensed and desired. When designing a sensor-based musical interface, having in mind these three facets, helps to recognize opportunities and challenges that arise from having partial overlaps between expected movements, movements that can be sensed, and their desired outcomes[77].

The first "sound object" that I made is a Communication Cup. A piezo sensor is attached in the bottom of a cup and then is connected through a cable to an audio interface. When someone is talking into the cup the sensor picks up the vibrations and translates them into a digital signal like a microphone. Then the signal is directed into a peak amplitude, through Max Msp and the amplitude of the waveform is then transformed into a sine wave sound imitating the live voice in the cup.

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[75] According to "Performance Art," Grove Music Online, accessed November 20, 2022, http://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-1002257784.: An umbrella term that encompasses a wide array of performance traditions. Frequently it engages mixed media and elements of theater, both narrative and non-narrative and often borrows from experimental music, video art, dance, and visual art. It shares much with conceptual art, an artistic genre in which the concept supplants the object as the essence of the artwork. Depending on the performer's goals, performance art may contain various levels of scriptedness, from fully texted scenarios to primarily improvisatory works: however, it is usually characterized by a certain amount of textual flexibility, which allows room for performer–spectator interaction.

[76] Arie Altena, "Participatie En Interactieve Kunst," accessed October 1, 2022, https://ariealt.home.xs4all.nl/interactieve_kunst.html.

[77] Steve Benford, "Performing Musical Interaction: Lessons from the Study of Extended Theatrical Performances," *Computer Music Journal* 34, no. 4 (2010): 49–61, 50- 51.

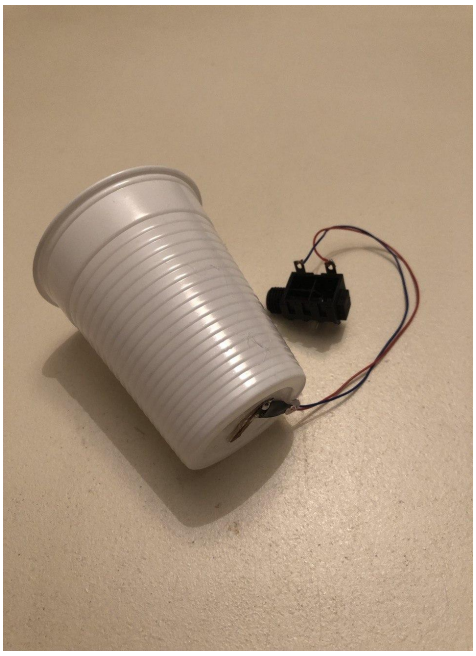


Figure 19 Experiment 1- *Communication Cup*

The desired movement that I wish to translate into a sine wave is the movement of the voice. Though the sensed movement will be any movement around the piezo sensor (from the hands) that can trigger the amplitude. The expected movement will be therefore any movement in contact with the cup. In order to tackle this problem, I followed a technical and a theatrical solution. The technical one was to add a scale to the numbers of the signal's amplitude in order to avoid clipping. The theatrical was to make it look like a string telephone; the two cups tied together with a string, that a lot of us played with in our childhood, trying to communicate with each other. This association invites the spectator to talk into the cup and adds to the experience, since he is expecting to communicate with someone and indeed, he is communicating with a digitized version of himself.

Figure 20 Experiment 1- Max MSP patch

The second “sound object” experiment is a Music Button. A piezo sensor is placed inside a power switch (with no power connection) and sends digital signal to an audio interface like a contact microphone. The signal then goes into a peak amplitude, through a patch in Max MSP and when crossing a threshold triggers a sound sample. This way when someone switches the button a music sample is played.

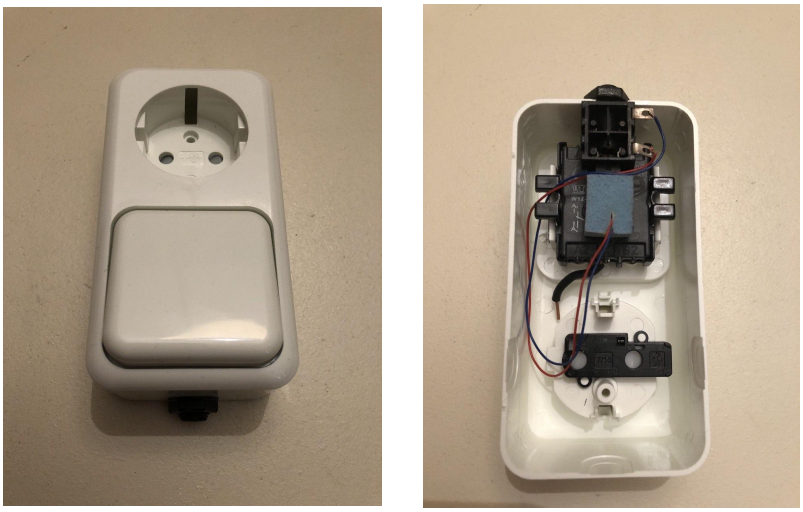


Figure 21, 22: Experiment 2- *Music Button*

The desired movement in this example will be switching the button. Again, of course, any movement around the switch can create a vibration and trigger the samples. The expected movement consequently will be any movement around the switch. In order to solve this issue and have the sample play only when the button is pressed, I increased the threshold so that only vibrations in immediate contact with the piezo can trigger it and not loud sounds from the environment around. Moreover, I choose a switch as the physical object, so that the spectator is prone to switch it on and off because of habit and curiosity.

Figure 23 Experiment 2- Max MSP patch

3.2.5 Interventions / practical application

As mentioned in the case studies above, in this research cycle my aim was to examine two different sides of interaction. Interaction between the performers and the score and interaction between the performers and the multimedia. Promt by the work produced by State of the United Arts, I wanted to explore how an open score notation and indeterminacy would allow for a “chamber” multimedia music way of working. Additionally, being inspired by the sound sculptures of Walter Giers and their autonomous interactive and playful character, I wanted to take my experiments to the next level by incorporating them in a composition. The result of this exploration were two new compositions, each applying different concepts, tools, and techniques and striving for more flexible and non-linear compositional or performative forms.

3.2.5.1 Intervention: *Dots for Pierrot ensemble and live painting*

The inspiration behind the title of the piece was the game “Dots”, where somebody needs to draw lines connecting dots in order to reveal a picture. The way I worked with the music material used to compose the piece reminded me figuratively of the act of connecting musical dots (notes). The piece consists of 10 parts where 2 pentatonic scales (one from C and one from C#) and the remaining two notes (B and F#) from the chromatic scale, are used as the main musical material. The consonance of these two pentatonic scales and the contrast created when the tonic center moves to the two notes outside of these scales are the main elements that create the soundworld of *DOTS*.

At first when I started composing this piece following the traditional way of writing for classical instruments- by indicating every note and value in detail- the result was really fast and complex chromatic changes for the instruments that made it difficult for the instrumentalists to navigate through the piece and connect to the playful concept behind it. The solution came by giving freedom in parts to the instrumentalists to compose their own lines on spot. In this way there was better integration of the concept achieved and more chances for interaction between the performers and the score. Similarly, to *Canto Ostinato* by Simeon ten Holt[78] and *In C* by Terry Riley[79] where the musicians are given the task of determining the total length and the number of repetitions of the music cells, the dynamics and expression in every performance, I decided to leave some aspects of *Dots* open to the interpretation of the performers. More significantly the piece is originally written for Pierrot ensemble, but is intended to be performed by different combinations of instruments and performers from visual and movement arts. The ensemble can start playing from part A and then move to the next parts, or can collectively choose a different order, always starting from A and finishing on J. Repeating parts is also allowed. Where there are no indicated notes in the score, the performers are instructed to play the notated rhythm using notes coming from either the two pentatonic scales of C and C# or choose between the pitches B and F#. Dynamics are also indicated but the expression is left to the ensemble's interpretation.

[78] Simeon ten Holt, “Canto Ostinato : Voor Toetsinstrumenten”.
[79] Terry Riley, *In C: Performing Directions*.

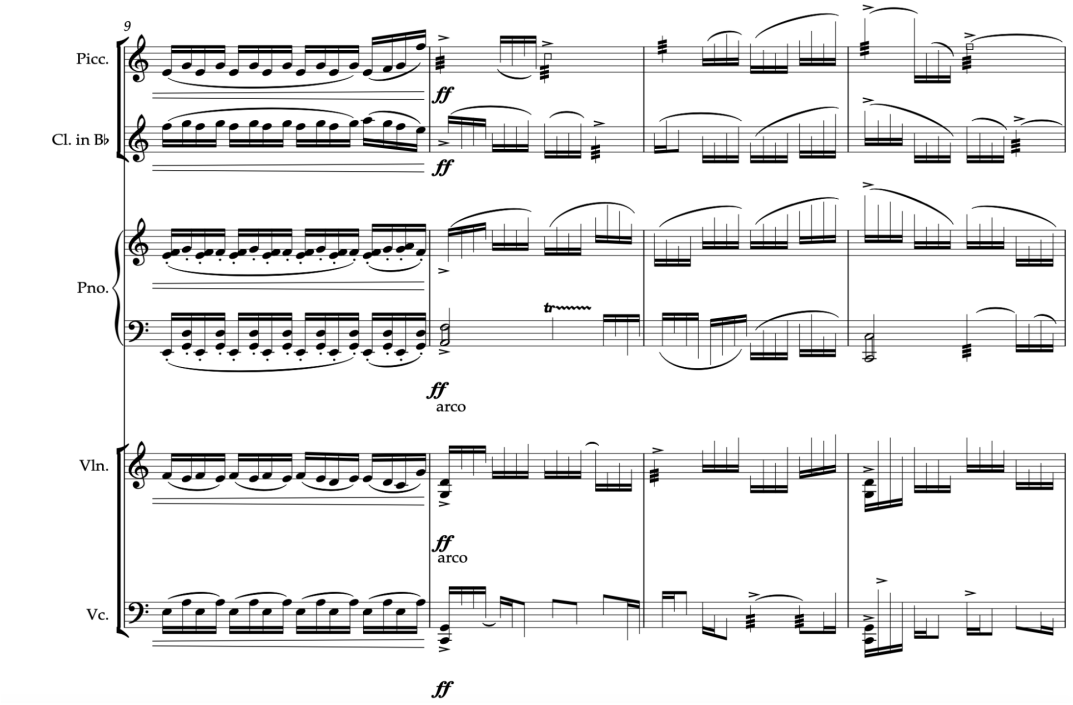


Figure 24 *DOTS* score, pg 3

The next step was to invite a visual artist to function as a member of the “chamber music” ensemble and add their own visual interpretation interacting live with the musicians and the score. My main guideline was that there should be an immediate relationship of the visual result with the music form as written in the score. The musicians and the visual performer should be equal and react directly to each other’s musical, physical or visual gestures. That should result from the score through discussion and experimentation during common sessions. Dafni Arvaniti, a student from Willem de Kooning Academy agreed to be part of the ensemble and her music reading knowledge made her the perfect match for this intervention. In our meetings together we discussed how she would translate the sonic material and musical form into colors and shapes with painting materials. She was completely aware when each part was beginning in which speed and atmosphere. During the rehearsals with the musicians, she tried out different materials and techniques and was able to notice the influence that her presence and actions had on the musical performance and vice versa. During the final performance it felt like sometimes she even initiated the beginning of the next part through entering a new color, the speed and intention of her movements. In Dafni’s words:

> I find it very interesting to be part of an ensemble and observe the agency that the movement of drawing and listening has. As an artist I value a lot the performative aspects of nonlinguistic production of shared knowledge within a collective moment, capturing the movement of an experience from different points of view. The interaction with the materials for me provided a certain kind of unspoken score that my body would follow, guided from the sound influencing the way that the story would present itself. A certain kind of narrative having its basis on the moment of the performance. Water and paint, oil pastels giving agency to my bare hands, extending their momentary existence captured to mine and projecting it towards the audience and back to the moment of interaction, becoming a bigger image to be experienced. [80]

[80] Conversation with Dafni Arvaniti, May 12, 2023.

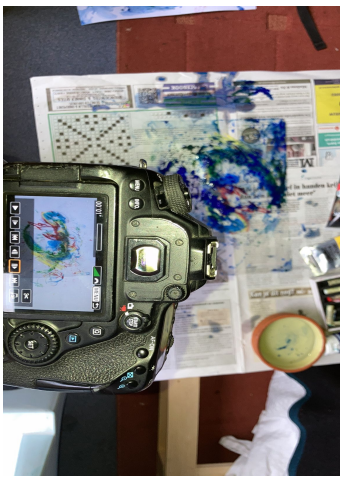


Figure 25, 26 *DOTS* experiment during rehearsals/ Performance at Composers Festival 7th May 2023

Concluding, the visual interpretation of Dafni was mainly based on the form of the score, the speed and character of the musicians' movements while playing, rather than the pitch material. Correspondingly the musicians were reacting live to the nature and speed of Dafni's gestures while painting and the vividness of the colors and textures used. Both were serving the concept of *DOTS* from a different perspective and in no way literally narrating it.

3.2.5.2 Intervention: Interactive installation of the opera *AER*

My next intervention was to compose a piece that would incorporate interactive objects and technology, applying artistically in a long-mixed media composition the techniques I experimented with in the case study for the work of Walter Giers. In the beginning of the academic year, I was assigned to participate in one of the educational programmes of the Dutch National Opera, where I would have the opportunity to collaborate with other students from departments of Production, Theater Direction, Scenography and Dramaturgy in Amsterdam, in order to create an opera that would be performed during the Opera Forward Festival 2023. It was my perfect opportunity to endeavor into the integration of acoustic, processed and synthetic sound, incorporate interactive digital tools and create an engaging and innovative performance.
During the first 3 months of meeting together with my artistic team (director, dramaturges, scenographers) we developed the concept for the opera and decided in detail the intended role of the audience, the space and the music:

The concept:

Sonus, whose name is Latin for "sound", the main character and the only one physically present, has lost the love of his life, Avir, whose name is Hebrew for "air". Avir, however, is still very present, even after his death. Sonus can communicate with him and perceive him, although he is not physically there anymore. They found ways of communicating through various (musical) elements. In that way, they keep their relationship alive, but hidden from others, as Sonus lives in a society which he thinks is not open for this kind

of spiritual experience. He therefore fears to be judged and outcast once others know that he is communicating with his dead partner. The opera starts with Sonus and his dead partner, Avir (who is not physically on stage) communicating with each other, very absorbed in their twosomeness, not paying attention to the outside world. This interaction is playful, romantic and wholesome. After a while, Sonus realizes that they are being watched. This triggers a repeating anxiety about being seen as crazy, as he thinks others do not perceive his lover as he does. In panic, he stops the communication abruptly because he wants to hide what is happening and act according to the norms. Avir does not understand why Sonus suddenly rejects him. In what follows, Sonus constantly switches between acknowledging Avir (responding to his signs) and pretending that Avir isn't there. The main inner conflict here is between the desire to maintain their relationship beyond death and the fear of being judged for it. Sonus is torn between the two. There is also an outer conflict between the lovers as Avir does not understand why Sonus suddenly rejects him. Eventually, Sonus lets his fear win and Avir disappears from his life. However, he pays a high price for it, as Sonus (sound) cannot express himself without Avir (air). His fear of being outcast makes him choose the living over the dead but also makes him lose his voice.

The role of space:

The breathing, morphing space represents Avir, which moves/morphs with the help of wind machines and hanging voile curtains. It is a way of having sensorial interaction for Avir and Sonus, just like living humans interact with each other not only through spoken language, but also via their bodies. In *AER*, where one of the lovers is not physically present, this aspect of a relationship is represented by the physical interaction between Sonus and the space, whereby the space takes an active part and has agency itself. In a very literal context, the moving transparent curtains are there for the performer to touch/play with, adding very interactive, physical elements to the opera.

The role of music:

Music is the language/form of communication between the two characters. The music is the verbal language between the two. For Sonus, the text and singing is the manifestation of his voice, but for Avir, the music is his form of voice. In the end, Sonus loses his voice because he abandons Avir. The other instruments, however, can still play. This means that Avir withdraws from Sonus, but is still around, the other instruments can still "use" air. A secondary role of the music is to express the emotions communicated between the characters and their psychological state/development. Avir, the dead lover, is represented vocaly by a choir of breaths and sonically by an interactive installation on stage. Sensors attached to the hanging curtains as part of the scenography can trigger pre-recorded sounds when moved. The sensors are there to emphasize the interaction, to add to the movability and morphing of the space/Avir. Like that, the sound comes directly from the moving space. Sonus, sung by a counter-tenor, is the only performer visible on stage. All instruments and voices are offstage, but in the room.

The role of the audience:

The role of the audience is to trigger the fear of being an outcast in Sonus. It is not about if the audience actually does think this, but about the fact that Sonus THINKS and BELIEVES they do. In the Boekmanzaal of the National Opera, the audience was seated all around the stage. The fact that the audience was all around him makes him feel even more encaptured /paranoid, like there is no way to escape their gaze. The circle could also symbolize infinity (of time), the circle of life and death (that it does not necessarily end with death) and the interconnectedness of everything. In a way as in the work of Walter Giers the whole opera performance is being influenced by the spectator.

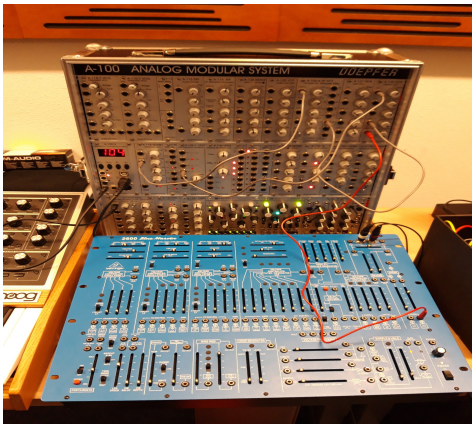
Since the presence of Avir is perceived as one of a ghost that exists nowhere and everywhere in the space at the same time, I wanted to give the ability to the stage to morph in sound. The conversation between the two characters is supported by an instrumental ensemble consisting of violin, cello, percussion (bass drum, tam- tam, metal bars), french horn, clarinet and flute. The composition for the ensemble, the choir and Sonus was fixed in a score of 2 Acts and 4 scenes. There had to be some fluidity

though in the rhythm, as it was almost impossible to have perfect synchronization when Sonus (the main character on stage) never had a clear view of the conductor and the ensemble (they were standing in a balcony above the stage). That was achieved by instructing the musicians on a fluid interpretation of the polyrhythms written, rubato rhythm in parts and cues that indicated the end of free counted parts for the soloist. Sonus' voice and actions were constantly conducting all the other elements of the performance and the instrumental music was a moving canvas supporting his narration.

- Approximate rhythm

Figure 27 *AER* score, performance notes

The interactive electronic music installation, even though it appeared to be just a solely part of the music performance, was in effect a crucial element of Avir's persona and the main focus of this intervention. My aim was to create an interactive system that could function independently from the music score and allow the stage to morph sonically, liberated from the constriction of time and able to interact with the performer on stage. As observed in the previous cycles of this research, technology is often used to express non- physical and ungraspable concepts and ideas. For that reason, I chose to use digital media and processed voices to express the presence of a dead person and parallel realities. It is not just one more medium in the performance. The interactive installation attempted (in combination with the processed vocal ensemble) to signify a second character "on stage" that we cannot perceive differently.



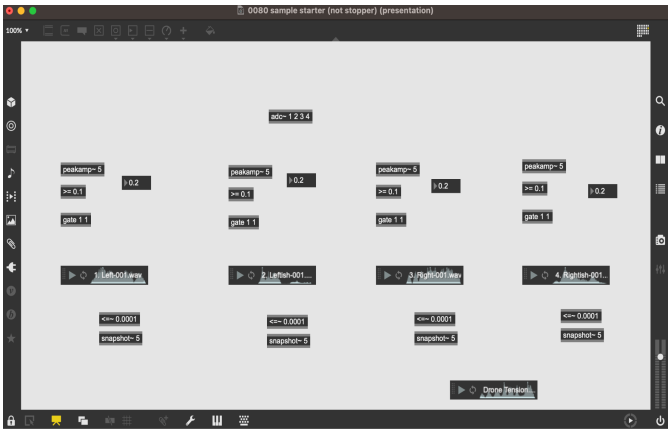


Figure 28, 29 *AER* patching for breathing synth sound/ Max MSP patch for the sensor's installation on stage

For the design of this installation, I applied tools and techniques developed in the previous cycle such as the use of piezo sensors- hanging between the curtains on stage- and further advancing the Max patch used in my Music Button experiment. Four sensors hanging around four different corners of the stage functioned as contact mics. When the performer or the moving curtains (with a draft of air) touched them, a signal went into a peak amplitude, and through the patch in Max MSP, when crossing a decided threshold, a sound sample was immediately triggered from the speaker closest to that sensor. The electronic sounds triggered were made out of modular synth recordings that imitated a breathing creature in combination with low evolving drones and noise close to static electricity. The reason that these sounds

were all synthetic was conscious as I wanted to give the sense of different realities, as explained above. The breathing aspect is evidently connected to the nature of Avir, symbolizing air, and the breathing vocal ensemble. Every element of the music is instructed to be amplified and the breathing choir is processed with effects like reverb and delay as well as the ability to be moved in the surround picture of the speakers. Every aspect of Avir is morphing in space. Acoustic, synthetic and processed sounds are all coexisting and interacting with each other in one non- linear composition.

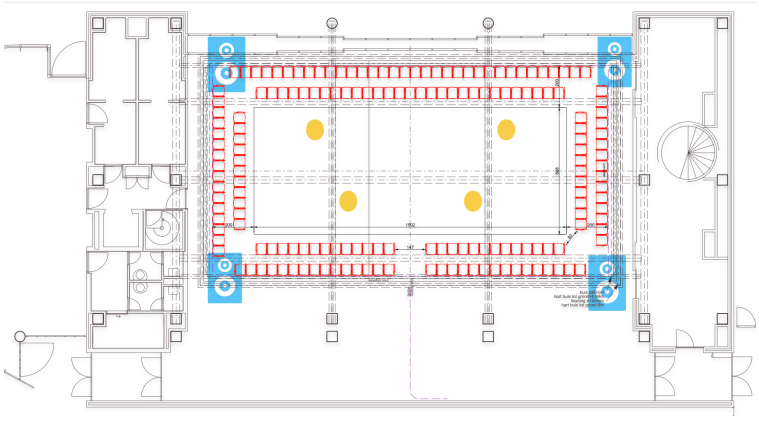


Figure 30 Sensors plan for the interactive installation of the opera *AER*

3.2.6 Outcomes

[03 Reference Recording 03 (Sofia Bardoutsou) (DOTS)]
[03 Reference Recording Score 03 (Sofia Bardoutsou) (DOTS)]

DOTS (2022)
for Pierrot ensemble and live painting

Using two simple pentatonic scales (one in the white keys and one in the black keys) and the two remaining notes of the 12-tone scale, Dots is a music game between pitches and patterns. An experimentation on the classical idea of picking a music material and stretching it. Making music by connecting musical dots.

Performed on the 7th of May 2023 at Kruisplein (Codarts, Rotterdam) 6.41 by:

Flute: Luca Roncato
Clarinet: Simon Redshaw
Piano: Francisco Rodríguez
Violin: Ana Moreno Sánchez
Cello: Shang- Chien Wu
Live painting: Dafni Arvaniti

06 Reference Recording 06 (Sofia Bardoutsou) (AER)
06 Reference Recording Score 06 (Sofia Bardoutsou) (AER)

AER (2023)
15' Opera for Countertenor, electronics, vocal and instrumental ensemble

The relationship between two young lovers, Sonus and Avir, grows beyond death. They converse vividly but Sonus' fear of being judged for it by society runs deep. *AER* combines an interactive electronic music installation on stage with a composition of floating rhythms and modal harmonies, interrupted by dissonance.

Stage director: Harmen van Liemt
Composer: Sofia Bardoutsou
Libretto- Dramaturgy: Lea Hegemann & Noa Appelman
Production: Maud Bruggeman & Jessy Martens
Countertenor: Sean Haid
Cello: Irene Cancer-Navarro
Flute: Nicola Stevenson
Horn: Janire de Paz Rivas
Violin: Anastasia Koukioglou
Clarinet: Mathilde Lettinga
Percussion: Davide Montagnoli
Chorus: Mantas Jarasunas, Hanna Aïlane, Mathilda Herbeaut, Edurne Ruiz Garcia, Puck van Eijk & Ambro Golachowski
Scenographers: Myckelle van Weverwijk & Selina Losa González
Light: Jurre Pöpping

Performed in the Dutch National Opera on the 10th and 11th of March 2023 as part of the Opera Forward Festival Labs- Performing Arts

3.2.7 Feedback, reflection and conclusion

My networks and teacher's (Josue Amador, René Uijlenhoet) feedback, as well as my own reflection, can be summed up in the following remarks:

Dots for Pierrot ensemble and live painting

- The interaction between the performers was apparent and the limited amount of freedom given to the performers, sounded as if they were playing a well-rehearsed deterministic score.
- The interaction of the musicians with the live painting was not so apparent and the projection felt even destructing for some people rather than adding value to the musical performance.
- The fact that the artist was standing on the right side of the stage and her result was projected in the middle made it more difficult for the audience to follow her actions and see the connection with the music.

- Moreover, the position of the musicians made it difficult for them to be influenced and react to her actions. There should have been a screen in front of them with the projection or mirror so they could see clearly her actions.
- In addition, the complexity of the music hindered the musicians from being able to follow the artists gestures. That led to one sided interaction and change of hierarchy, as it was mainly the visual artist responding to the musician's input and not so much the oposite.
- It's not so clear which parameters the fine artist used to translate the music score into a painting.
- The ensemble stuck to the linear A to J form and didn't change the order of the parts. That probably was the result of how the score was formatted. There can be found a different way of engraving it that allows for quick change between different parts.

AER for countertenor, electronics, vocal and instrumental ensemble

- The integration and interaction between the different elements of the opera performance (scenography, sensors installation, music score) was successful.
- The sensors could have been attached to the curtains, rather than hanging freely, increasing in this way their accuracy in reacting to a movement or touch.
- The pre- recorded sounds triggered by the sensors didn't vary much resulting in a repeated rather than morphing soundscape. This interaction was like a secondary element and easy to miss by the audience.
- The music score is fixed and the rhythmic freedom could sound like a mistake (for example wrong entrance of the countertenor) in parts. The score can be adjusted to have more flexibility in form and clarity for next interpretations.
- The influence of the audience on the countertenor was apparent during the performance. Audience participation could be even more effective if they could walk around and interact with elements in the space.

In conclusion

- Indeterminacy with some limitations can give opportunity for more interaction between the performers and more flexible compositions.
- The position of different performative elements in space is determinative for the clear connection, balance and interaction between them.
- Interactive multimedia using looping techniques can be made to evolve rather than being repetitive.
- Scores should assist nonlinear processes.
- Immersing the audience in an interactive experience can allow them to actively influence the story's development and outcome.

3.3 Third research cycle

3.3.1 Overview of third research cycle

The focus of this research cycle will be “non-linearity” in the form of compositions as a result of the integration of acoustic sound with digital media and other artforms and the interaction between them and the audience. According to Cambridge dictionary the term “non-linearity” “is used to describe a process, series of events, etc. in which one thing does not clearly or directly follow from another”[81]. In storytelling nonlinear narrative is used to describe the non-chronological unfolding of a story, with parallel narratives or enclosure of another narrative inside a main plot.

In music composition this idea focuses, for me, more on the creation or performative process rather than the perceived result through for example a recording. Flexibility given to the performers through instructions or a score can assist for improvised duration of parts, jumps in time and new interpretations of the given material in every performance. In my opinion the audience will most likely always perceive a music composition or performance in a linear way- based on the duration of the piece and how the sound events unfolded- unless they can see their own influence on it. The participation of the audience can increase the unpredictability of a live act and transform the end result of a composition. Already from the previous century composers and sound artists experimented with playful ways that can involve the audience in a performance and let them influence the form and music material of their compositions.

3.3.2 Reference recording

06 Reference Recording 06 (Sofia Bardoutsou) (AER)
06 Reference Recording Score 06 (Sofia Bardoutsou) (AER)

AER (2023)
for Countertenor, electronics, vocal and instrumental ensemble

Stage director: Harmen van Liemt
Composer: Sofia Bardoutsou
Libretto- Dramaturgy: Lea Hegemann & Noa Appelman
Production: Maud Bruggeman & Jessy Martens
Countertenor: Sean Haid
Cello: Irene Cancer-Navarro
Flute: Nicola Stevenson
Horn: Janire de Paz Rivas
Violin: Anastasia Koukioglou
Clarinet: Mathilde Lettinga
Percussion: Davide Montagnoli

[81] “Non-Linear,” in *Cambridge Dictionary*, May 10, 2023, https://dictionary.cambridge.org/dictionary/english/non-linear.

Chorus: Mantas Jarasunas, Hanna Aïlane, Mathilda Herbeaut, Edurne Ruiz Garcia, Puck van Eijk & Ambro Golachowski
Scenographers: Myckelle van Weverwijk & Selina Losa González
Light: Jurre Pöpping

Performed in the Dutch National Opera on the 10th and 11th of March 2023 as part of the Opera Forward Festival Labs- Performing Arts

3.3.3 Feedback and reflection

As mentioned above, opera *AER* was a first attempt to combine different interactive elements in a performance that involved different disciplines and multimedia in order to serve the general concept and plot of the opera. The form of the piece was fixed with small freedom in the timing, in parts, in order to assist the communication between the Countertenor on stage and the music ensemble in the balcony. The "non-linear" part of the composition was the interactive installation with the hanging sensors that were triggered at any moment based on the performer's movements or draft of air through the curtains. However, that element didn't function exactly as intended and felt secondary compared to the instrumental composition of the piece. For the audience it was even not so apparent that this technology existed as they could perceive the electronic sounds as part of the general composition and were not aware of the triggering mechanism. Moreover, the electronic sounds were repetitive and didn't evolve, losing in this way their expressive or even narrative strength (indicating the movements of the ghost of Avir in the space). The fact that the Countertenor addressed the audience during his performance and seemed to be influenced by their presence for the way the story unfolded was very successful and could be enhanced even more. If there was a way for the audience to immediate interact with the performance space might have given them the chance to have more power over the visual and sonic aesthetic result.

3.3.4 Data collection & data analysis

The term "non-linearity" in music is mostly used today to describe the music of video games, where sounds constantly adapt to a user's input. For example, when a character is seen on screen fighting, that is accompanied with a different music than when he is wandering around looking for clues. This is usually achieved with looping music material that transforms character based on the user's actions in the game. Other terms often used to describe this kind of compositional writing are interactive, adaptive or dynamic music[82]. I believe that it is no accident that this kind of compositional technique evolved to assist a game play. It is of course not the first time that composers use playfull techniques and games (look at Walter Giers's work in the previous chapter) in order to compose or make their compositions more flexible, alive and immersive. Mozart's music dice game *(*Musikalische Würfelspiele*)* is one of the most well-known and earliest examples of game techniques used to lead any amateur not familiar with compositional techniques to compose a piece. According to research dice rolls possibly selected small sections of music, which would be patched together to create a musical piece[83]. Later on, composers like John Cage, Iannis Xenakis, Christian Wolff, John Zorn and more experimented with the idea of game

[82] Louis-Xavier Buffoni, "Making Interactive Music For Video Games | Gamesounddesign.Com," accessed May 16, 2023, http://gamesounddesign.com/making-interactive-music-for-games-part-one.html.
[83] Hideo Noguchi, "Musical Game in C K.516f," accessed May 16, 2023, https://www.asahi-net.or.jp/~rb5h-ngc/e/k516f.htm.

techniques in pieces. In this chapter I decided to narrow down my research into music “game” pieces that utilize mixed media and different technologies to engage the audience in creative and performative experiences.

3.3.4.1 Case Study: Public “plays” with the form, music material of compositions

In the past decades the evolution of smartphones and their extensive use in our everyday life led more and more composers to look for creative uses and applications that can engage the audience during music performances. In 2015 the portuguese composer and sound artist Rui Penha performed his piece *Cellular*[84] for saxophone, vibraphone, electronics and smartphones in the famous concert hall Casa da musica in Porto. The a.bel application used in the performance was developed at INESC laboratory[85] by Alexandre Resende Clément, a master student at the time with supervisors Rui Luís Nogueira Penha and Rui Pedro Amaral Rodrigues. The aim was to create a system that would allow for interaction between performers and audience via a network of smartphones using the visual programming language Pure Data[86]. The audience by using the application on their phones during the performance could create an evolving soundscape by manipulating the pitch and rhythm of specific sounds. Then the instrumentalists could interact with the soundscape of the audience while performing their own score.

Specifically, the piece was built based on steady fast notes and changing harmony. The sonic material produced by the cellphones was quantized and consequently always synchronized with the live music performance. Moreover, through the system (that all the phones would connect to through a network) the positioning of different music material and harmonies in the room could be controlled. Specific pitches were becoming available for the audience to play only in the corresponding part of Cellular where harmony changed. The saxophonist of Cellular, Gilberto Bernardes is also a programmer and was completely aware of how this interaction was supposed to be performed[87].

Later the concert was repeated at Carnegie Hall in New York city and the technology used was much simpler. According to the composer bluetooth beacon devices were used to assist the communication with the smartphones and could also mark time. The budget was then reduced from 10.000-euro equipment in Casa de Musica to 50 euros. Also, the reliability of that technology was better since a server that wouldl be able to hold 120 smartphones was a risk. The composer confided that he and his colleagues were unsure till the very last minute before the concert if the server would be able to support all the smartphones from the public. In one of the tests the server had failed when 200 smartphones joined the network. In that case a simpler autonomous version of the application was planned to be used[88].

After the big success of the concert in Casa de Musica Rui Penha wanted to make the a.bel app open source but the rest of the developing team disagreed, resulting in the app not being available anymore. In addition, the composer was disappointed by the way the audience approached this digital interaction. He mentioned that they had a projection of the image of the audience in the front and people were waving to see themselves on the screen and talking with each other. In the concert at Carnegie Hall the audience had better presence in the piece. The fact that then 90% of the public were conservatory students might have contributed to that success, since that public is trained to listen, as the composer mentioned[89].

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[84] *Cellular*, 2016, https://vimeo.com/152253875.
[85] Interview with Rui Pehna, May 22, 2023.
[86] Clément, “Development of Tools for Live Networked Musical Performance System using Smartphones.”
[87] Penha, interview.
[88] Penha, interview.
[89] Penha, interview.

As a response to Cellular and his experience with the audience not really "listening" the composer created the same year (2015) the piece *Resono*, "an interactive installation that builds on the idea that the cornerstone of autonomy is the capacity to say: no!"[90] He wanted to create a piece that the audience could explicitly play. 15 small objects- beings using machine learning could sing reacting to the audience behavior. When a member of the audience was initiating an interaction by singing, they were able to listen to the frequencies and sing back when specific frequencies were lacking. The objects would copy the dynamics of the people or get shy and not respond at all, especially when ignored. When somebody sung like nonsense or when sung like a professional opera singer the devices wouldn't respond, but if a child was heard in the room, then they would. The loudest they got was during the night when nobody was at the museum. Then they could join each other in a collective performance and sing freely.[91]

Another implementation of the performers- audience interaction through smartphones was done by the Amsterdam-based trio Tin Men and the Telephone with the development of their application *Tinmedo* and their interactive shows that involve video, digital media, pre-recorded and live sound. During a residency in The Festival of New in October 2017, they started experimenting with new ways to craft the live experience through audience participation[92]. Their show *World Domination* revolved around a playful and provocative concept where an alien peace force is sent to Earth to banish world leaders and restore harmony. The audience could swipe and shake their phones to interact with the band and guide the set by creating rhythms and melodies from which the band improvised[93]. The band consists of the pianist Tony Roe, drummer Jamie Peet and bassist Pat Cleaver. The Max patches for their shows are usually programmed by Marcel Wierckx. In their latest show *It's about time* the band explores themes of visual time manipulation with new compositions and implementations of their application[94]. *Tinmendo* can also be used independently from the band's performances to create drum beats. I downloaded the application and really enjoyed experimenting with its simple format and concept.

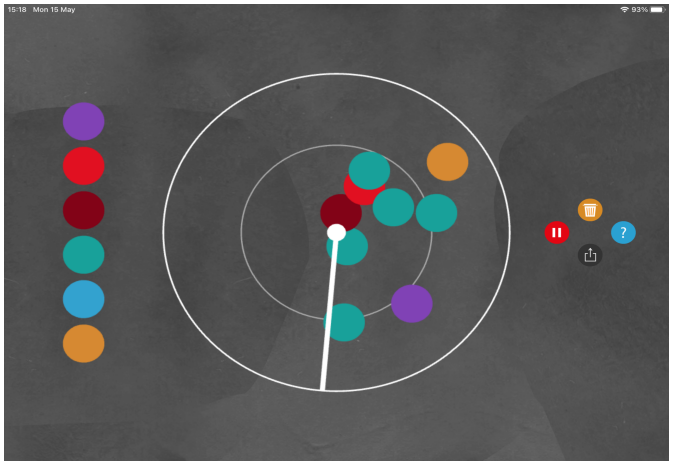

Figure 31 Screenshot from my experimentation with the *Tinmendo* app.

[90] *Resono [2015]*, 2016, https://vimeo.com/156422629.
[91] Penha, interview.
[92] "Festival of New," Britten Pears Arts, accessed May 17, 2023, https://brittenpearsarts.org/take-part/artists/residencies/festival-of-new.
[93] "Festival of New."
[94] "Tin Men & The Telephone - 21st Century Interactive Music," Tin Men & the Telephone, accessed May 21, 2023, https://tinmenandthetelephone.com/.

Screen Dive's platform, an initiative curated by Luke Deane and Maya Felixbrodt in partnership with Gaudeamus is a website dedicated to playful sound-based compositions-games by composers, designers and hackers from all around the world. *Screen Dive* was created at the beginning of the pandemic in the spring of 2020, when live music events were canceled[95] and is focused on interaction and different types of participation[96]. What I found common in most of these works was the craving for connection and for bridging spaces and bodies in the dipole of the digital and physical realms. Another similarity is that most of the creators transform the audience- virtual visitor into the performer of their work leading to non- linear processes and different outcomes with every interaction.

Web-canvas (2021) was commissioned to Eleni-Ira Panourgia by Screen Dive and Gaudeamus Festival in September 2021. The description is "an interactive web-based audiovisual work that invites members of the public to experiment simultaneously with images and sounds and create personalized compositions"[97].

Figure 32 *Web-canvas* by Eleni-Ira Panourgia (2021) at Screen Dive platform

Online participants can hover their cursor over pieces of the canvas and listen to sound fragments. By clicking and dragging the different shapes, colors and textures around the digital canvas they trigger changes in the soundscape of the piece. They can play back, reset, erase or recreate the sonic and visual landscape according to their liking. The first version of the work was published online in 2017[98]. The print used is derived from a series of abstract landscape monoprints called "Topos" that the artist worked on during 2014-16. Monoprints are "single impressions of images, made on blocks of material … In printing the image, one also captures the gestures of his drawing."[99] This printmaking technique of monoprints influenced the way she thought about image and sound. Panourgia was at that moment interested "in the

[95] "Home - Screen Dive," accessed April 18, 2023, https://gaudeamusscreendive.com/splash/index.html.
[96] Interview with Adriana Minu, May 21, 2023.
[97] Eleni-Ira Panourgia, "Web-Canvas 2.0", 2017, accessed May 15, 2023, https://www.eleniirapanourgia.com/art/web-canvas-20.
[98] Eleni-Ira Panourgia, "Web-Canvas," 2017.
[99] Eleni-Ira Panourgia, "Web-Canvas: Creating an Online Interactive Process between Sound and Image, Presentations – Seeing Sound Symposium" (Bath Spa, December 12-13, 2020), https://www.seeingsound.co.uk/seeing-sound-2020/2020-presentations/.

way these shapes drawing gestures, colors and textures could sound like and how sound could expand their temporal dimension in an interactive and participatory manner."[100]

As mentioned by Panourgia, "*Web-canvas* is made out of 60 draggable images cut from the initial monoprint and 60 sound samples individually created in response to the visual characteristics of each piece and the whole monoprint."[101] The samples were made out of electronic sounds, field recordings and cello recordings, based on "three main visual characteristics: color, shape and texture."[102] According to Panourgia, color and tones corresponded to high, medium or low frequency, whereas "shape such as length, width, roundness, or the way a form unfolds in space was interpreted in terms of duration and movement."[103] Visual textures were imprinted with "density, different sound sources and rhythmic variations." These audio-visual relationships were involved in each piece of the canvas.

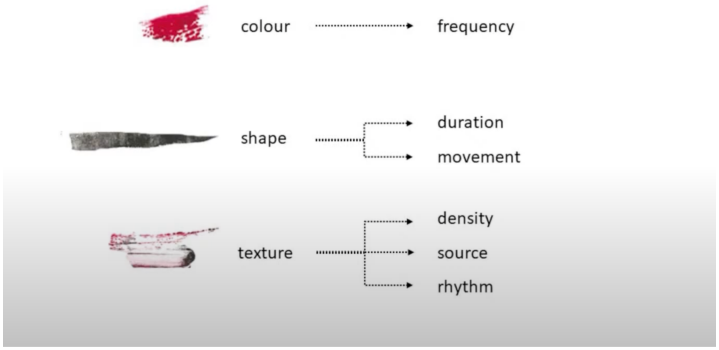

Figure 33 Visual representation of sound qualities in samples, Eleni-Ira Panourgia[104]

Web-canvas was developed in HTML, CSS and JavaScript through a collaboration of the artist with software engineer Kosmas Tsakmakidis. The different parts of the monoprint were cut individually and turned into HTML elements. "HTML was then connected to CSS for precisely mapping images to their position on the canvas"[105] via x and y parameters. Through JavaScript "images were made draggable and linked to their corresponded sound file" and allowed the function of "a forward loop from left to right to play the composition of web canvas. The overall duration of the initial composition is 16 seconds, but this can be further modified" depending on the interaction time that the user has with the artwork[106]. In *Web-canvas* audience members are invited to explore the relationships formed between sound and image reflecting on

[100] Panourgia, "Web-Canvas: Creating an Online Interactive Process between Sound and Image, Presentations – Seeing Sound Symposium."
[101] Panourgia, "Web-Canvas: Creating an Online Interactive Process between Sound and Image, Presentations – Seeing Sound Symposium."
[102] Panourgia, "Web-Canvas: Creating an Online Interactive Process between Sound and Image, Presentations – Seeing Sound Symposium."
[103] Panourgia, "Web-Canvas: Creating an Online Interactive Process between Sound and Image, Presentations – Seeing Sound Symposium."
[104] Panourgia, "Web-Canvas: Creating an Online Interactive Process between Sound and Image, Presentations – Seeing Sound Symposium."
[105] Eleni-Ira Panourgia, "Web-Canvas: Creating an Online Interactive Process between Sound and Image, Presentations – Seeing Sound Symposium."
[106] Panourgia, "Web-Canvas: Creating an Online Interactive Process between Sound and Image, Presentations – Seeing Sound Symposium."

the idea that “we are bonded with everything around us”[107] and each individual action influences a whole. In this way the audience through the interaction with the virtual artwork can obtain the power to influence it aesthetically.

Unlike *Web-canvas* where a physical artwork gets placed in a virtual space, in the work *Boundary* (2020) by Amy Brandon, an augmented reality sound sculpture appears in the real space. *Boundary* is an application built and designed by the guitarist and composer Amy Brandon as part of Screen Dive for the Gaudeamus Festival 2020. The app is designed to generate a musical composition when the user “touches" an interactive augmented reality sound sculpture. Using the lens of their smartphones people can walk through the 3D sculpture in their own room. By examining and touching the sculptural elements they trigger sonic events performed by flutist Sara Constant. These sounds are depended on the users’ movements and can be experienced best through headphones[108].

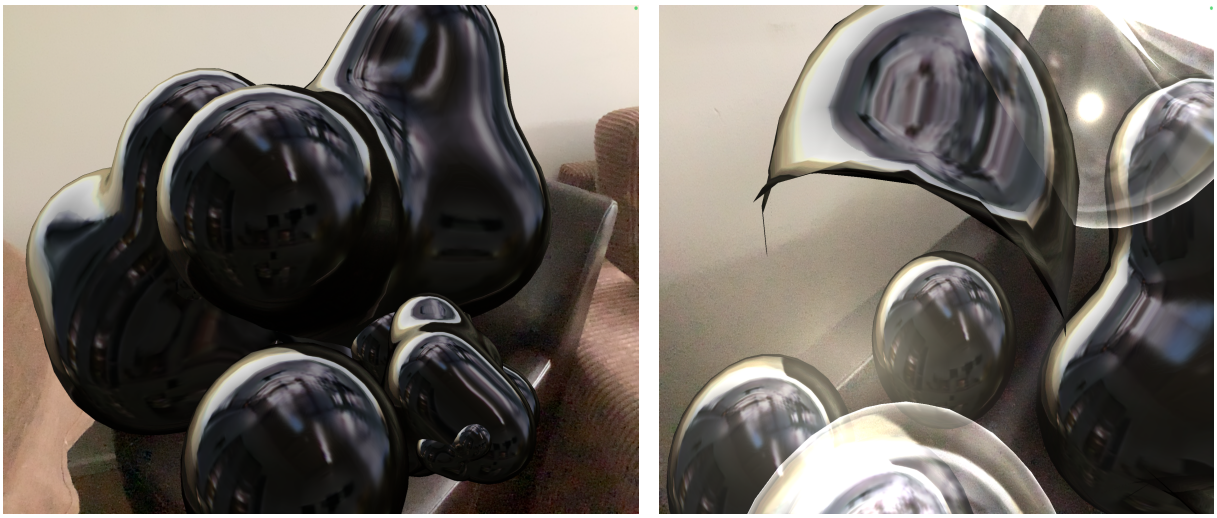

Figure 34, 35 Screenshots from my experimentation with the *Bounary* app

In my interview with Amy Brandon, she mentioned that the user's smartphone through hand recognition can identify when the sculpture spheres get touched and immediately trigger 76 music samples randomly. That of course results in a new soundscape with every new interaction. The composer informed me that the sound samples used were part of a previous work of hers called *microchimerisms*[109]*.* The reason she used that piece was that the different fragments functioned really well with the concept of *Boundary*[110]. In my opinion the fact that the source of the sound is an acoustic instrument but works as a sonic reaction to a virtual artwork is really contrasting. This contrast in combination with the constant dipole of reality and augmented reality in this work, surprisingly helps even more with the merging of the two realms.

The title of the piece itself origins in the themes of boundaries, examining where the real-world ends, and the digital world begins. Augmented reality technology and in particular AR controlled by hand gestures, “gives the physical body control over digital space, allowing the individual to explore and sense

[107] Panourgia, “Web-Canvas: Creating an Online Interactive Process between Sound and Image, Presentations – Seeing Sound Symposium.”
[108] Amy Brandon, “Screen Dive - Boundary,” accessed May 17, 2023, https://gaudeamusscreendive.com/boundary/.
[109] Interview with Amy Brandon, May 19, 2023.
[110] Brandon, interview.

the boundary between the real and the digital realm, and to manipulate it"[111]. Amy Brandon expressed in our conversation how augmented reality fascinated her because of the sense of merging it gives with the digital world.

> To me, what fascinated me about AR was its interaction with real space. I have used VR but I did not have the same sense of mystery in the merging of digital and real worlds. As our digital and real worlds get more and more bound together, I became particularly interested in the interaction between physical bodies and digital objects[112].

Here I would like to clarify the distinction between augmented (AR) and virtual reality (VR) as it might be confusing. In VR a completely virtual setting is used. Users require a headset device in order to interact with a fictional reality. AR on the other hand uses a real- world setting where users can control their presence in the real world. Nowadays AR can be accessed with a smartphone in order to enhance both the virtual and real world[113]. For building *Boundary* Amy Brandon used the framework purpose-built for augmented reality development, *AR Foundation in Unity*[114] and *Mano Motion* a third-party gesture recognition software[115]. AR Foundation's latest improved aspects allowed composer and designer to add some realness to her digital sculpture through real object reflections and light estimation.

In her chapter on AR and guitars of the book *21st Century Guitar,* she explains more about her journey with composing for augmented reality as *Boundary* is not her first project using such technology.[116] She has been active in this field since 2017 when she first started experimenting with 360 graphic and video scores. In 2018 she started composing for the METAVision headset that allowed for hand recognition and the manipulation of digital objects with hand movements. Using the headset worn she created the piece *Hidden Motive II* where the performer could interact with a graphic score and trigger sound samples by touching digital objects. The difficulties that came with performing while wearing a headset led the composer to look for other applications of the same technology. By placing the META headset, the other way around in front of the guitar, she then wrote pieces where the physical movements of the instrumentalist could trigger electronics extending the acoustic instrument into the digital space. The first piece that used this technique was *7 Malaguena Fragments for Augmented Guitar.* Other pieces using this idea were an improvisatory piece for solo guitar and digital objects called *flesh projector I* and the piece *Augmented Percussions*[117]*.* With technological improvements in the industry of AR and the incorporation of new properties for smartphones, the composer could place the audience in the place of her performers and have them interact with her work. In 2020 she created her first sound reactive augmented reality applications *WNMF* and *Boundary* and her latest more elaborate AR application called *touchgrass* for the Cluster Festival in 2022[118].

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[111] Amy Brandon, "Boundary," accessed May 17, 2023, https://2021.zeroonefestival.com/projects/boundary.
[112] Brandon, interview.
[113] "What's the Difference Between AR and VR?," Tulane School of Professional Advancement, December 22, 2020, https://sopa.tulane.edu/blog/whats-difference-between-ar-and-vr.
[114] Brandon, interview.
[115] Amy Brandon, in *21st Century Guitar: Evolutions and Augmentations* (Bloomsbury Publishing USA, 2023), 246- 247
[116] Brandon, "Augmented Reality Guitars." 239.
[117] Brandon, "Augmented Reality Guitars." 239- 247.
[118] "Touchgrass App Info," Polycoro, accessed May 20, 2023, https://polycoro.ca/touchgrass-app-info.

Ecstasies of Rooms (2020) by Christine Cornwell and Adriana Minu is yet another piece created for the *Screen Dive* platform that caught my attention. The format of the piece differs slightly from the previous examples as it is more sound than image based. The two composers using an audio guide invite the virtual audience to connect to the space of their own living room by using their own voice. During their journey they are offered the chance to record fragments from exercises that use touch, smell, light and the voice and submit them in "The Common room", a virtual 3D sound installation that gathers responses from participants in a virtual living room[119]. "The home-made recordings were then positioned into the 3D space allowing the public to move through each participant's specific vocal response".[120]

According to Adriana Minu the piece was developed over zoom during the pandemic. She and Christine Cornwell, having forged a profound bond during their undergraduate years in Birmingham and having previously collaborated with a deep sense of trust, embarked on their latest endeavor. They started developing the different exercises individually, experimenting with their own relationship with their voice and room. Then during their sessions, they would guide each other through their ideas and discuss about the experience. The next step was to draw a map of" how to enter the space. So, what would be a useful order for somebody to kind of go through the exercises in order to get closer and more intimate the more time spent in the room"[121].

The application of *Ecstasies of Rooms* was programmed by Tim Murray-Browne and the virtual 3D space was made in Unity by Adriana Minu and Luke Deane. "We kept this physical space relatively bare bones, just with enough things so that it's got a bit of personality, but not too much… because the whole idea was so that the room is seen as a common room, as a space for all of the different people to be able to inhabit"[122]. At the live event during the Gaudeamus Music Week 2021, audio was gathered in a server from people that recorded responses in their phones. The submitted recordings coming from one location were then rendered into a long audio file that was then incorporated into the common room. The creators were renewing these responses throughout the week and positioning them in different parts of the room, for example the ceiling, the floor or the window. Unfortunately, this manual process couldn't be sustained for longer than the week of the festival. Now when somebody visits the virtual common room the sounds are the same. As Adriana also commented[123]:

> *Now the room is starting to kind of have a sound of its own that every time I go and visit it sounds static. So yeah, logistic issues with sustaining something like that when the process is not automated. That's definitely something to consider.*

After this virtual collaboration and interactive work that was developed during the unique circumstances of the pandemic, Christine and Adriana developed a similar interactive piece to be experienced live in a workshop setting during the Gaudeamus Music Week Festival 2022. *Ecstasies of things* (2022) is performed by four audience members and the two composers around a table. With sound and touch, the audience's attention is guided to the qualities of objects that Adriana and Christine have gathered over the years. "Participants can touch, sing or simply observe the power that objects and spaces can have"[124]. "We took that kind of intimate knowledge we developed of vocalizing and being with objects

[119] Adriana Minu and Christine Cornwell, "Ecstasies of Rooms," Screen Dive, accessed May 21, 2023, https://gaudeamusscreendive.com/ecstasies/.
[120] Adriana Minu and Christine Cornwell, "Ecstasies of Rooms"
[121] Minu, interview.
[122] Minu.
[123] Minu.
[124] Adriana Minu and Christine Cornwell, "» Ecstasies of Things," accessed May 21, 2023, https://adrianaminu.com/project/ecstasies-of-things/.

and with space and we focused it in a more intimate and participatory performance, which became *Ecstasies of things"*[125].

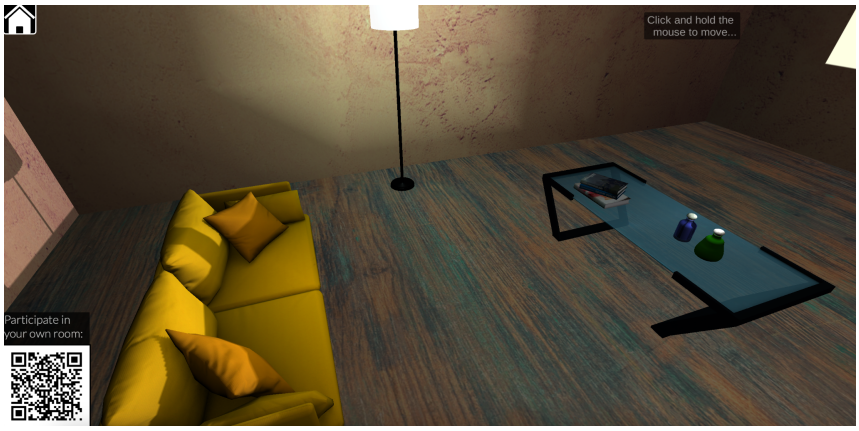

Figure 36 The virtual "Common room" from *Ecstacies of Rooms* (2020) by Adriana Minu and Christine Cornwell (screenshot from Screen Dive's website)

In conclusion, the main elements present in all the aforementioned works are the playful engagement of the audience through "game" instructions and multisensory experiences. The audience, guided by their intuition and embodied knowledge, actively participate in the creative works and can clearly perceive their influence on them. This dynamic allows them to become creators and performers rather than mere observers of a finished composition. In turn, by relinquishing this power to the audience, the creators are led to unpredictable forms and aesthetic outcomes, liberating themselves from the constraints of time and their authoritative role.

3.3.5 Interventions / practical application

Taking inspiration from the ideas and techniques of the games analyzed in the case study above, I intended to create my own game- interactive piece where the audience could participate and actively influence the form of my composition. Technology would assist the connection between the audience and the performers through an interactive interface. My initial idea was to create a music memory game, based on the existing structure and rules of the memory cards game. The original game starts with a specific number of cards facing down. The number can vary from 4 to 48 or more, depending on the difficulty. Players take turns to turn over two cards. If the two cards have the same picture, then they keep the cards, otherwise cards should be turned face down again. The winner is the person with the most cards when all the cards have been matched and revealed.

My own music version of the piece would go as follows: The piece starts when an audience member reveals a card by touching it. Every opened card is also matched with a music fragment that is either prerecorded or played live. When a card is revealed, but its pair not, the fragment is played only once and the cards get hidden again. When a pair of cards get revealed the music fragment gets repeated by the instrumentalists for a couple of times before moving to a new fragment and looped with the help of

[125] Minu, interview.

live electronics. As more cards get revealed, more fragments keep on looping and the audience must pay more attention in order to identify the patterns and match them. When all cards are revealed, cards get hidden again for a new round. Some old and some new cards- fragments are added or moved in different positions. The piece ends when the audience stops revealing cards or when the revealed cards don't get hidden for a new round. Things like dynamics, expression, manner of playing are left free to the interpretation of the instrumentalists.

My aim was to have the game- piece performed in a real-time event and include live performers. A virtual version of the piece could also be a possibility so that people could interact with the work from every location. I decided then to look into the technology that I was already somewhat familiar with and search for ways that could help me make real or virtual cards sound responsive. The piezo sensors system that I used in my previous intervention in combination with the software Max MSP was then again, the perfect tool to help me translate sensorial input through an object into digital sound.

I first started my experimentation with carton cards and colored papers and created a first draft of a score. Each color was assigned intuitively to a short melody that I then sung and recorded. The music fragments were created in a way that their rhythm and pitch would complement each other creating a moving ostinato. Using the same Max MSP patch that I used in my opera *AER,* I decided to attach piezo sensors behind four of the carton cards. When someone would touch a card, a signal would go into a peak amplitude, and when crossing a threshold that would trigger a specific prerecorded sound sample. The other four samples I would sing live. The audience would have to listen carefully and match the prerecorded fragment with the one sung live. The only issue in this first try out of the piece was that the cards couldn't be turned around. After touching the first two cards and listening to the fragments the participant would have to remember the right positions and place same-colored papers on top. A first sketch of Memory Cards was then created for me to see and evaluate the visual and sound result, receive feedback and decide on how to further develop this idea.

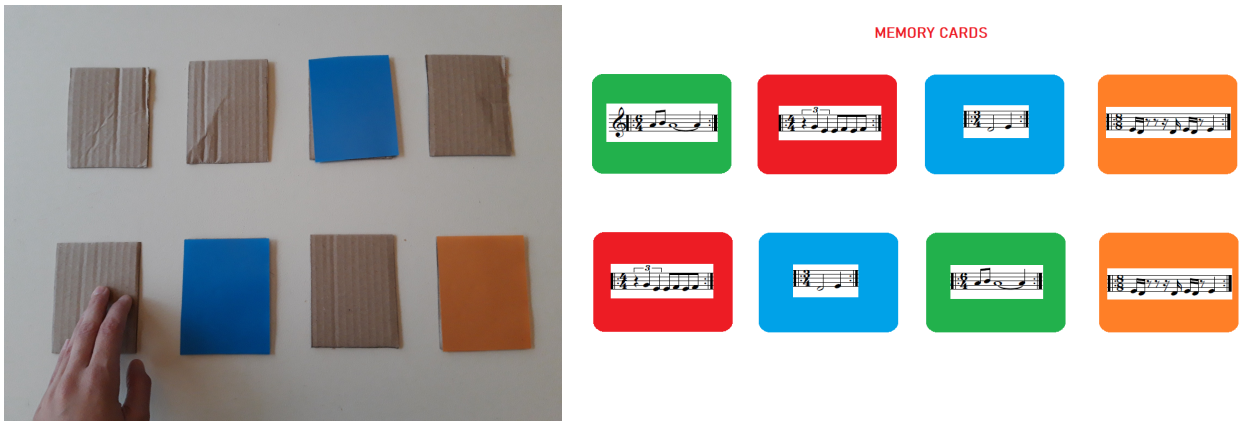

Figure 37, 38 Carton cards and score from first sketch of Memory Cards

There were several points of improvement for this first sketch of the game. In the technical aspect, as already mentioned, the cards were not able to turn around. However, that element was closely connected to the original way the game was played and by changing, it would totally confuse the participants and give the sense of a different game. There had to be a way for the cards to be able to flip around. On the visual aspect I knew that I wanted to incorporate some artwork in my piece similar to the idea of the *Web-canvas* monoprint by Eleni-Ira Panourgia or the augmented reality sculpture from

Boundary by Amy Brandon. The impact that their artwork had when reacting with sonic events was really strong and added value to my experience as a participant. I was very interested in the expressive power that an artwork can add aesthetically to my sounds and vice versa. The soundscape formed by the combination of my looping voice recordings was simple and according to the first feedback received pleasant, but lacked a personal touch as it very much resembled the sound of minimal tonal compositions from the 20th century. Last but not least I had to think of how the piece would progress to new rounds of the game (with new visual and music material) and how that could happen in a meaningful way.

Then I thought of using Max MSP not only for the signal processing but also for the visual design of my music game. The program's layout as a blank canvas and its Jitter toolkit that allows for graphics rendering and video manipulation offered all the tools needed for this next intervention. Additionally, the easy navigation between the edit and presentation mode and all the customizing capabilities of the program would assist for projection mapping the image to a surface as intended later. My next step was then to adjust the patch from the first sketch of the piece for this new more elaborate version. As I thought, the signal coming from the piezo sensors could be used not only to trigger a sound, but also to trigger the revealing of cards. Eight cards with the bottom part of my cards were visible and eight were stalked above the other ones but hidden. When a signal would go past my threshold a card would be revealed and a sound sample would be triggered at the same time.

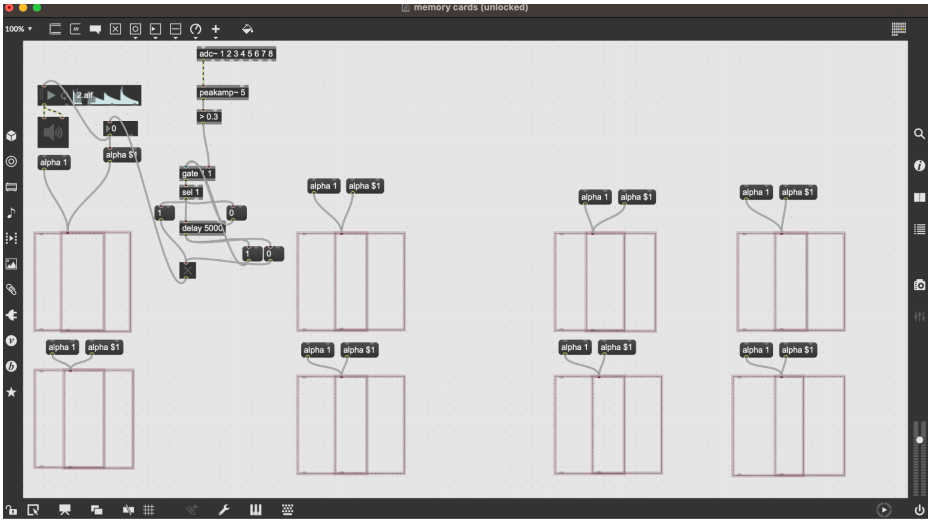

Figure 39 First try for making the new Max patch of my memory cards game

For this new edition of my memory cards game, I asked the graphic designer Giorgia Perra to create especially for this game new digital cards with a simple minimal artwork. Based on her designs I then composed new music fragments. When composing these fragments, I looked for a way to connect the visual and sonic aspect of the piece as well as the idea that it progresses in new rounds with new addition of cards and sounds. I then came up with the idea to incorporate the haiku poem *A poppy blooms* by Katsushika Hokusai[126] and set it as text for my music fragments. The simple shapes of Giorgia's design that resembled traditional Japanese art and the common element of nature in both of them might be the reason for this association of mine. The three-line poem engages with themes like creativity and writing as well as nature. When I read it, I found that it perfectly fitted the concept of my piece and Giorgia Perra's designs. The idea that cards get revealed and hidden again and the audience has to fail (when turning the

[126] "A Poppy Blooms by Katsushika Hokusai - Haiku Analysis," accessed June 5, 2023, https://poemanalysis.com/katsushika-hokusai/a-poppy-blooms/.

“wrong” cards) while revealing all the artworks and creating the final soundscape, very much resembles the journey of an artist during the creation process.

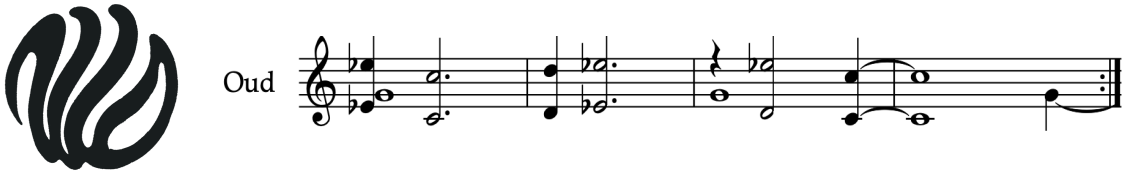

Figure 40, 41 The “poppy” card design and the corresponding fragment from the piece *A Poppy blooms*

Following the general upward or downward direction of the fine lines of each design I created nine music fragments that moved around two chords, C minor and G. The designs functioned more or less like graphic scores for creating the music. Starting from the bottom of the design I interpreted the direction of the lines as high or low direction of pitch and the white space as silence. When the lines were connected that for me indicated legato phrases, steady rhythm and movement. The 9 fragments used a lot of common notes but different rhythms, resulting in moving modal harmonies in their combination. I decided to divide them in three different scenes- rounds and have a few to appear in more than one scene, connecting in this way to the three-line haiku form. The card that looked like a poppy flower (seen in figure 40) was the card appearing in all the scenes connecting back to the poem and concept of the composition.

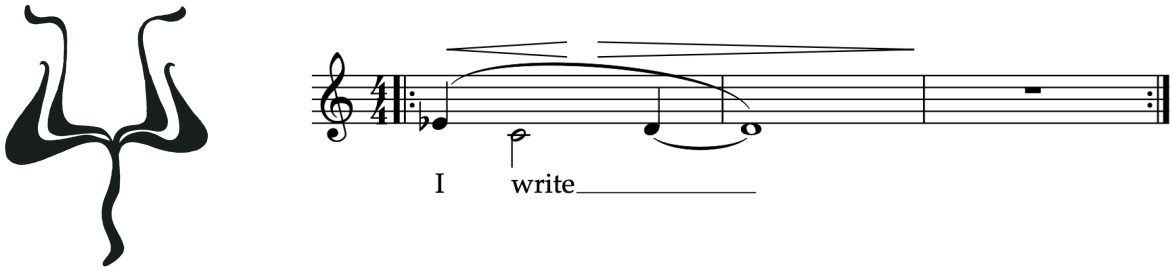

Figure 42, 43 Another example of a card design and the assigned melody for soprano voice from the piece *A Poppy blooms*

The realization of the game’s patch proved to be more difficult than I initially thought as there were more rules involved than just having cards to be revealed when touched. Cards that were not a match had to be turned back (get hidden) after a few seconds and cards that matched had to stay open triggering the looping of the sound. Moreover, when all cards were revealed, a new round had to begin with old and new cards and music fragments. I then consulted my teacher of electronic composition René Uijlenhoet about these more complicated aspects of the piece since my limited knowledge of Max wasn’t enough. We

decided to design the three scenes with specific places for each card and sound fragments so that I could better control the sound result of each scene. That means that only the audience participants would be the ones not knowing the right combinations. From there René took over the patch construction and evolved my ideas into a functional finished patch that included all the parameters I needed and could switch from one scene to another when pressing a button. The next steps were the recording of the music fragments, planning of the live performance and creation of an interactive projection screen.

For the construction of the screen, I collaborated with the sound engineer Laurens Voois. We decided to make a wooden frame 2 x 1.40 meters, and place piezo sensors under carton cards that were connected to the frame with elastic bands. Eight jack cables would connect the sensors to the input of a sound card and signal would influence each individual virtual card in the Max patch. Then the screen was covered with a white sheet and was ready for the projection mapping.

Figures 44, 45 Photos from the construction of the interactive screen

For the needs of the live performance all the cards would react to the audience's input visually but only half the cards would trigger sound. The rest of the fragments would be performed live by the musicians when an audience participant would reveal the corresponding card. This element would allow for interaction not only between the audience and the artwork but also the performers on stage. The audience can play in this way with the form of the piece following either the visual or the live and prerecorded sonic events and the performers can play following the audience's actions. Everyone should be constantly aware of each other's input. For this first live performance of the piece, I decided to include two voices and an oud, but in the future the piece can be performed with any instrument combination and number of performers. I then completed a score for the performers including their music material per scene and the position of the card that they should react to as they see it from their perspective on stage. In order to have the music develop more -outside of the repetitive loops- I gave the instruction to the musicians to improvise freely based on their music material when both the cards of their corresponding shape were open.

A standalone version of the Max patch that includes the prerecorded samples used in the live performance will also be available for interaction with the piece through the computer. Max can be downloaded free of charge and can give access to anybody that is interested to open and use patches made in the software. I believe that this piece can evolve further by incorporating other technologies or by

creating a customizable workshop version in which the participants can create and interact with their own visuals and music and become the designers of their own memory haiku games.

3.3.6 Outcomes

[08 Reference Recording 08 (Sofia Bardoutsou) (A Poppy Blooms)]
[08 Reference Recording 08 Score (Sofia Bardoutsou) (A Poppy Blooms)]

A Poppy Blooms (2023)
for 2 voices, oud and audience participation

Based on a haiku poem by Katsushika Hokusai with the same name, this music piece- game engages with the themes of creativity and writing as well as nature and life. The piece starts with eight cards face down and the audience takes turns to turn over two cards. If the two cards have the same picture- music fragment, then the cards stay open, otherwise, they turn face down again.

Soprano: Hanna Aïlane
Mezzo soprano: Sofia Bardoutsou
Oud: Eirini Zogali
Graphic design: Giorgia Perra
Max patch: René Uijlenhoet
Interactive board: Laurens Voois

Figure 46 Photo from the first live performance of *A Poppy Blooms* in May 2023

3.3.7 Feedback, reflection and conclusion

Some feedback received from teachers (Josue Amador, René Uijlenhoet) as well as my own reflection are gathered in the following remarks:

- In the piece *A poppy blooms* (2023) the interactive quality of the multimedia used and the connection with the live performers and the audience felt the most relevant and meaningful compared to previous outcomes of this research topic.
- The mixer that was initially used had to be replaced right before the concert because of some routing problem. The time lost trying to solve that issue resulted in a very limited soundcheck time and the prerecorded samples that were supposed to be triggered, when half the cards were touched, never worked. The technical preparation of the piece and the testing of the technology used- in different circumstances- must have been much more elaborate and proactive in order to prevent the technical issues that arose.
- The unpredictable behavior of an audience not aware of the right way to explore an immersive piece must always be taken into account during the developing and testing process of such a piece.
- The positioning of the interactive objects in the space invites different actions by the participants. Since the screen was on the floor it invited the audience to step on it. If that action wasn't desired because for example the fragility of the sensors the screen should have been placed in a different way.
- The "game" instructions given to the participants were not clear, which resulted in confusion regarding the way they could interact with the cards in order to perform the piece. On the other hand, this "confusion" led the participants to participate enthusiastically and try to figure out the game themselves. This exploration attitude solved visually and sonically the gap from the prerecorded sounds that didn't play.
- The transitions between the three different scenes of the piece were apparent and effective and connected really well with the concept of the haiku poem used.
- The design of the cards was very harmonious with the musical composition and the simplicity that prevailed in both mediums gave a specific character to the result. Elements regarding rhythm, modality and simplicity are often part of my compositional language and were once more very apparent.

Concluding, the integration of the different elements of the piece such as music and visual elements like the artworks on the cards and the interaction between the interactive screen, the performers and the audience really felt like it served its purpose and worked in the best way possible. Compared to the last outcomes of this research this is the one work where the interactive media felt more relevant and led to non-linear creative processes as intended. However, there is still room for improvement regarding the technical aspects of the work and the further development of the composition for a live or virtual setup. The instructions given to the audience should be more distinct in order to prevent any misinterpretation about the nature and rules of the specific game. Nevertheless, the sense of mystery and exploration that the participants had due to the limited information given enhanced their engagement.

4 Research findings and outcomes

4.1 Documentation and explanation of the research outcomes

The portfolio of my artistic results consists of four mixed media performances and compositions:

In Medias Res (2022) for 3 musicians, 3 circus artists, narrator, motion reactive cameras and projection

DOTS (2022) for Pierrot ensemble and live painting

AER (2023) 15' Opera for Countertenor, electronics, vocal and instrumental ensemble

A Poppy Blooms (2023) for 2 voices, oud and audience participation

In Medias Res (2021) was a collaborative experimental performance formed during my exploration for techniques that would help for the better integration of multimedia in a theatrical work. Since I was new to the use of electronics and music programming software, I was interested in the way that digital interfaces could relate to the real performance space, the performers and the audience. Similarly, to the work of Michel van der Aa and Yannis Kyriakides, I decided to add dramaturgical meaning to every element of the performance, rather than randomly incorporating media in a composition. The main concept of the piece was "What happens when we bring our behavior of being online for two years (during the pandemic) to an offline environment?". With this being the main idea behind the piece, all the digital elements in the performance space like smartphones, cameras, beamers and electronic sounds became the virtual extension of the real performance space. Our beings as performers existed in the real and digital world at the same time. The contrast between the two worlds was the merging point of the varying disciplines and media involved.

Because of the interdisciplinary nature of this project the composition form that we followed was based mostly on the visual aspect and the different acts of the performance rather than a score. The fact that the performers were not only musicians but also circus or visual artists meant that the use of music notation wouldn't make sense. I built the score and instructed the musicians based on experimentation during the rehearsals and that gave a lot of flexibility and freedom in the way the visual and sound material was being presented and timed. However, the amount of freedom given to the instrumentalists resulted in parts in resemblance with different music styles and well-known pieces, losing in originality. The piece was designed more like an installation work and the interactive media used would hopefully invite the audience to participate and explore the space but that didn't happen. The power that performers had over the space naturally forced the audience to observe when not given other instructions. The few people from the audience that interacted with the digital media in the space did it briefly after the end of the performance.

Figure 47 From the premiere of *In Medias Res* in 2022. The audience is detected at the very back of the room keeping distance from the performance space.

My next focus was then the interactive media and techniques that can be used to immerse both the performers and the audience to a performance space. Additionally, I wanted to research how the incorporation of music notation could possibly assist this interaction. The use of interactive media was implemented quite intuitively in the work of *In Medias Res* so now it was time for me to be more conscious about the different techniques used.

The piece *Dots* (2022) was the first result of my experimentation with music notation and indeterminacy in order to increase the interactivity between the performers and examine how music notation can give the notion for visual interpretations. It was also my first attempt to lead the performers to nonlinear performance processes by instructing them to follow a different path in the score and by incorporating a playful idea. Almost 90 percent of the piece is notated in detail and the rest is only indicating the rhythm. The pitch, dynamics and expression of these short parts are left open to the interpretation of the performers. This limited indeterminacy assisted the interaction between the instrumentalists during the rehearsals and resulted in a really accurate musical performance of a demanding piece because of the fast tempo and quick chromatic passages.

Following the example of the audiovisual works by *State of the United Arts* ensemble (2015) where music and visuals both emerged out of music notation and indeterminacy, I wanted to examine how this could apply in my work. A visual artist was then invited to interact live with the form of *Dots* by interpreting visually the sonic events at every moment. The presence of the artist on stage definitely had some influence on the musicians but their interaction wasn't always clear during the first performance of the piece. Moreover, the nonlinear form wasn't easy to accomplish by any of the performers because of the difficulty navigating quickly through the score and the different parts.

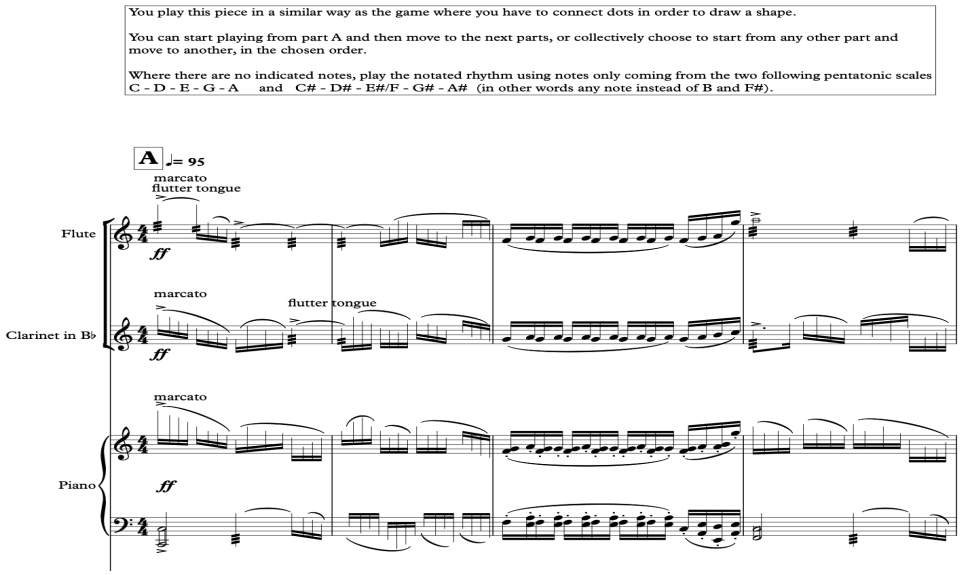

Figure 48 Indeterminacy in the score of *DOTS* (2022) and performance notes

My opera *AER* was then written to apply a different side of interaction, accomplished with the use of interactive multimedia. Inspired by the work of Walter Giers and his interactive sculptures I tried to develop my own interactive installation with which the performers could interact on stage and be in charge of the time, density and direction of sonic events. That's when I started using piezo sensors in order to translate the input of a performer through vibration to a digital signal in the program Max MSP. The result of my experimentation was the interactive installation of *AER* that incorporated hanging sensors between curtains that triggered electronic sounds when moved, symbolizing the persona of Avir on stage. Even though its application resulted in a flexible and interactive electronic soundscape the material was repetitive and very subtle compared to the strict and dominant instrumental score.

Figure 49 The hanging sensors installation as seen during the performance of *AER* in the Dutch National Opera

A Poppy Blooms was the last outcome of my research and the result of me looking at works that use interactive media and game techniques in order to immerse the audience in the performative experience. Using digital media to mediate the interaction between a composition, the performers and the audience naturally resulted in nonlinear processes and adaptive music performance. A Max patch was designed to assist the live performance of this game piece during which, participants could influence the music composition by revealing cards on an interactive projection screen.

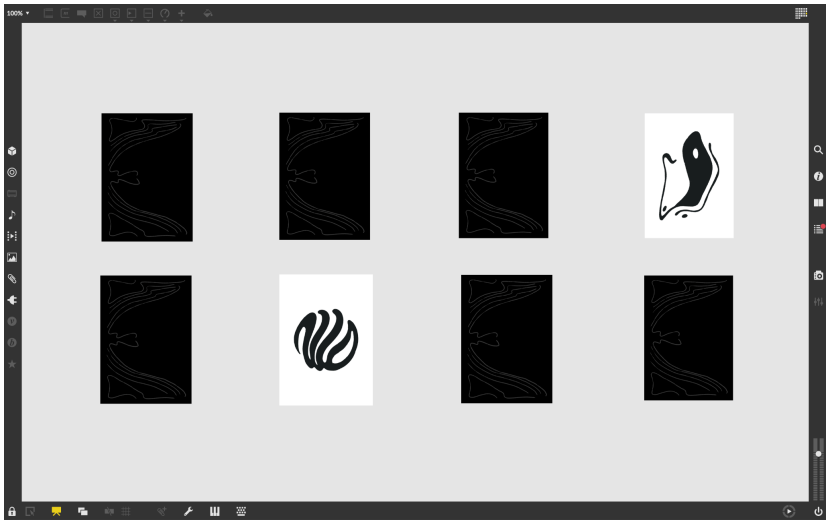

Figure 50 The final Max patch with the cards designed by Giorgia Perra

The music was written based on designs made exclusively for this game. Like the shapes on the cards the music followed simple lines and material. Interpreting the general upward or downward movement of the artworks resulted in short fragments with settled movements in the mode and rhythms used. Common notes and repetition were main elements of the composition creating an evolving atmosphere. Each scene of the game included four specific music fragments with some appearing in more than one scene. A music score came then to assist the performers in the interpretation of the piece.

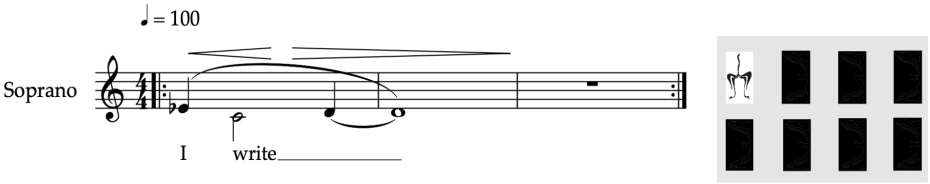

Figure 51: Fragment from the score including the melodic line of the soprano and the position of the corresponding card from the point of view of the live performer.

4.2 Self-assessment of the research outcomes and expert feedback

Research Outcome: *In Medias Res* (2022)

The successful achievement of interdisciplinary collaboration was realized by transcending boundaries and establishing meaningful connections between collaborating disciplines. Notably, there was a distinct and cohesive interaction observed among the main concept of the piece, the incorporation of digital media, and the physical space of the performance. While music played a significant role within the performance, it did not overpower or dominate the overall experience. However, the challenge of effectively notating an interdisciplinary performance persisted, thereby warranting further investigation and research in this domain.

Expert Feedback:

The concept of offering the audience a reflective lens to navigate through the performance proved to be remarkably powerful and impactful. The utilization of space within the production was skillfully executed, although it fell short of actively encouraging audience participation and physical involvement. While there was a discernible interaction with digital media throughout the performance, the level of interaction with the instrumental performers was not as prominently apparent. The abstract nature of the production left it open for different interpretations, successfully steering clear of conventional narrative structures and opening the doors to rich personal perspectives.

Research Outcome: *DOTS* (2022)

The positioning of the artist and musicians inadvertently impeded clear visibility and hindered the potential for direct influence and communication among them. The incorporation of indeterminacy within the performance notably augmented the interaction and improvisation between the musicians, although it did not significantly enhance the collaboration with the visual artist. Moreover, the limitations imposed by the score formatting restricted the ensemble's agility in swiftly changing parts and exploring a more nonlinear approach to the performance order.

Expert Feedback:

The interaction between the musicians was noticeable, yet it appeared rehearsed and lacking spontaneity, giving off a sense of determinism. The link between the musical elements and the parameters guiding the painting remained ambiguous and unclear. The extent of interaction between the musicians and the live painting was not readily apparent, and some found the projected visuals to be distracting rather than enhancing the overall experience.

Research Outcome: *AER* (2023)

The overall interaction among the various elements of the performance, including scenography, sensors, and the music score, was effectively executed. However, the prerecorded sounds triggered by sensors lacked variation and, as a result, took a backseat in the overall performance. The music score, with its floating and adaptable nature, provided a level of flexibility but could benefit from adjustments to enhance clarity and cohesiveness within the composition.

Expert Feedback:

In order to enhance accuracy, it is suggested to improve the attachment of sensors to the curtains. The repetitive nature of prerecorded sounds triggered by these sensors resulted in diminished impact on the audience, calling for exploration of diverse variations. Additionally, adjusting the music score to provide greater clarity, particularly in terms of rhythmic freedom, would be beneficial. To further engage the audience, it is recommended to facilitate their interaction with elements within the performance space, thereby enhancing their overall participation and creating a more immersive experience.

Research Outcome: A poppy blooms (2023)

The integration of interactive multimedia, live performers, and audience connection was executed with clarity and achieved success within the performance. However, the presence of technical issues, compounded by limited soundcheck time, had a detrimental impact on the overall presentation. Despite this setback, the presence of unclear instructions paradoxically led to both confusion and heightened participant engagement, as it spurred individuals to explore and actively contribute to the experience. Notably, the design of the cards utilized harmoniously with the musical composition effectively emphasized elements of rhythm, modality, and simplicity, creating a cohesive and visually appealing experience for the audience.

Expert Feedback:

The successful integration of various elements, including music, visuals, and interactive components, effectively served the intended purpose of the piece. The thoughtful selection of interactive media proved to be relevant, fostering non-linear creative processes and enriching the overall experience. However, it is crucial to consider the unpredictable behavior of the audience within immersive pieces during the development and testing phases. The transitions between scenes were skillfully executed, establishing a strong connection with the underlying concept of the performance. In order to optimize participant engagement, careful consideration should be given to the positioning of interactive objects within the physical space, aligning them with desired participant actions. Clearer and more distinct instructions for the audience would further enhance their understanding and involvement. Notably, the inclusion of certain "theatrical" elements, such as inviting the audience to join on stage and become part of the performance, added an additional layer of engagement and immersion.

4.3 Conclusion

In conclusion, this research has explored the concept of nonlinearity in the form of mixed media performances, focusing on cross- disciplinary collaboration and audience interaction. The study encompassed multiple research outcomes, each providing valuable insights into the effectiveness of different ways of incorporating various media and disciplines in a performance.

One of the first key findings was that media and different performative elements can gain dramaturgical roles, assisting the integration of different media. The conscious choice of each element can extend their function and meaning and assist narrating a performance. Digital media and the contrast they create with the physical space around us can be used as the main theme of a work or can be used to emphasize what is human or not. However, challenges related to notating such performances were identified, suggesting the need for further research to develop innovative approaches to score creation.

The integration of well-designed interactive multimedia and techniques that incorporate indeterminacy and shift the creative power from the composer to the performer, proved to be crucial aspects of successful mixed media performances. The effectiveness of this integration was evident in facilitating non-linear playful processes and enhancing audience engagement. However, technical issues, such as soundcheck and spacing limitations or unclear instructions for participants, highlighted areas that require careful attention and proactive preparation to ensure optimal performance outcomes.

In summary this research underscores the importance of fostering clear connections and interactions between different components of a performance, as well as addressing technical considerations. By further exploring innovative approaches to score creation, refining technical aspects, and optimizing audience engagement, future mixed media performances can continue to push boundaries and provide immersive and captivating experiences for all involved. Future research could shift its focus towards the realm of score creation, exploring the potential for developing a shared language system that encompasses different disciplines involved in a performance, rather than solely relying on the predominance of music notation.

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6 Network

Dimitra Trypani: Greek composer with a lot of experience on the creation of interdisciplinary music performances, using structured polyrhythmic and heterophonic patterns both in music and speech. Her approach on the integration of different layers of interdisciplinary performances is inspiring.

Hans Koolmees: As a composer, organist and teacher with studies and experience on both classical and electronic music, he is a valuable source of information and guidance regarding the combination of different music languages.

René Uijlenhoet: As a composer, performer, audio-art installation designer and lecturer in the field of electro-acoustic music he is a valuable source of knowledge regarding sound programming, mixed media and interactive media techniques.

Yannis Kyriakides: Composer and sound artist based in the Netherlands. He looks for ways of creating new forms and hybrids of media exploring different relations between words and music. His main focus on his recent pieces has been the idea of an imagined or inner voice. His work is a research subject for the integration of different media in a composition.

Gwyneth Wentink: Gwyneth Wentink is an internationally acclaimed harpist, cultural innovator and arts advocate working across many genres and roles. She is director and founder of State of the United Arts, an arts think-tank and performance-platform which produced Canto Ostinato Audio Visual and the performance In Code, an audiovisual performance of Terry Riley's 'In C' for harp, electronics and visuals.

Wouter Snoei: Wouter Snoei (1977, Amsterdam, The Netherlands) is active in the field of electronic and electro-acoustic music as composer, performer, software-developer and teacher. His interest in technology and science combined with a drive to create music brought him to various realms in the world of music.

Wouter worked with jazz musicians, as producer of electronic dance music, as sound director performing complex electro-acoustic compositions and as composer, also in music theater.

Josue Amador: Composer, artistic researcher, and lecturer at Codarts focused on expanding the notion of music composition practice beyond the performing arts and exploring its possibilities within transdisciplinary collaborations.

Amy Brandon: Composer and guitarist Amy Brandon writes and presents academic work concerning music cognition, virtual reality, improvisation and the guitar. Holding degrees in jazz guitar performance and composition, Amy is currently completing an interdisciplinary PhD in music cognition at Dalhousie University in Halifax, Nova Scotia. She has presented her work at conferences in Australia, USA, Switzerland, Hungary, the UK and at Berklee College of Music, Boston.

Rui Penha: Composer, media artist, and performer of electroacoustic music, Rui Penha was born in Porto in 1981. He completed his PhD in Music (Composition) at the University of Aveiro. His music is regularly recorded and played in festivals and concert halls around Europe and North America.

Adriana Minu: Composer, sound artist and vocal performer, Adriana Minu was born in Bucharest and studied music technology in Birmingham, UK. She is often leading relational sounding workshops informed by my neurodiversity, doing impromptu vocal improvisations and creating new pieces in intimate and care-full settings.

Appendices

Appendix 1: List of all AV media included in report

01 Reference Recording 01 (Sofia Bardoutsou) (X-society)

02 Reference Recording 02 (Sofia Bardoutsou) (In Medias Res)

03 Reference Recording 03 (Sofia Bardoutsou) (DOTS)

03 Reference Recording Score 03 (Sofia Bardoutsou) (DOTS)

04 Experiment - 04 (Sofia Bardoutsou) (Communication Cup)

05 Experiment- 05 (Sofia Bardoutsou) (Music Button)

06 Reference Recording 06 (Sofia Bardoutsou) (AER)

06 Reference Recording Score 06 (Sofia Bardoutsou) (AER)

07 Experiment- 07 (Sofia Bardoutsou) (Memory Cards)

08 Reference Recording 08 (Sofia Bardoutsou) (A Poppy Blooms)

08 Reference Recording Score 08 (Sofia Bardoutsou) (A Poppy Blooms)

Appendix 2: Critical media review

Marshall, Jonathan. "Freezing the Music and Fetishising the Subject: The Audiovisual Dramaturgy of Michel van Der Aa." *Sound Scripts* 2, no. 1 (January 1, 2009). https://ro.ecu.edu.au/soundscripts/vol2/iss1/7.

The article *Freezing the Music and Fetishising the Subject* by Jonathan Marshall, is an incredibly useful source of information regarding the operatic dramaturgy, theater elements and even the philosophical view of van der Aa's compositions, as it includes an interview with the composer himself. Even though the article was written twelve years ago, it includes a representative description of the composer's dramaturgy that can be considered valid also in his more recent works. Moreover, it allows us to see how the work of the composer evolved in cooperation with the development of technology.

His compositions typically consist of pre-recorded soundtracks and video projections that double the on-stage live performing characters and have them interact with their technologized others (visual alter ego and electronic alter ego). In a conversation with the author of this article, van der Aa described the different layers of the performance (visuals, electronic soundtrack, live performers), as a way to extend the personality of the main character, shedding light into the mind of the protagonist from different prisms. For that reason, he is in most cases the director and librettist of his compositions, so that he can conceive and develop all three layers at the same time and choose which element should be in the foreground every time.

In the compositions of Michel van der Aa, the concept of a main character and his contradictory-technologized alter egos, justify the use of the different media layers and integrate them in the dramaturgy of his work.

Novak, Jelena. "Music Beyond Human: A Conversation with Michel van Der Aa." *International Journal of Music New Sound* 55, no. 1 (2020): 7–22.

Aa, Michel van der. "Eight (virtual reality installatie)." November Music - internationaal festival voor actuele muziek. Accessed November 13, 2021. https://novembermusic.net/programma/michel-van-der-aa-eight.

The article "Music Beyond Human: A Conversation with Michel van Der Aa", by Jelena Novak, was written on the occasion of the first presentation of the virtual reality installation, "Eight" by Michel van Der Aa. An installation that I had also the opportunity to experience at the November Music festival 2021.

The author first gives a short overview of van der Aa's compositions from 2002, when she first encountered his work, until today and then she includes their conversation. She notices some reappearing themes in his work, such as the attempt to reveal the multiple perceptions of our sense of identity (other themes, according to the composer, are mortality and loneliness). With the use of multimedia, he keeps questioning the borders between real and virtual, human and machine, live and mediatized. He also challenges the borders of popular and classical music by reshaping terms like "operatic", looking for a different type of music theater performer that can connect with the audience, initiating a sort of personal journey. His ultimate goal is to pass his humanistic themes to the audience and even the use of technology cannot have another function. As he says: "Maybe by confronting people with what it is to be not human you determine what is human"

In his conversation with the author of this article, regarding the installation *Eight* (2019), we learn about his latest approach on the themes above. In this mixed reality project, the composer and director Michel van der Aa collaborated with the singer-songwriter Kate Miller-Heidke and the Nederlands Kamerkoor, as well as the designer Theun Mosk and virtual reality company The Virtual Dutch Men, to create a unique fusion of musical theater, VR and visual art. In this 15-minute experience the visitor becomes the subject of the opera, as he is the most realistic person there. All the other elements are his reflections. The virtual space is a very important character, since it creates a sense of infinity (thus the name 8).

Successfully, according to the composer, most audience reactions were about their personal journey and not about the technology. As I can confirm from my visit, he chose the material very carefully, so that all these different elements won't overwhelm the visitor, by simplifying them. Of course, you cannot notice every element, every moment and he took that into account. The result of that simplification and his intention to touch his audience, is a recent indie- pop music album with music from "Eight".

Having read this article before attending the installation myself, I have to admit that I was expecting specific things. However, I cannot say that I could imagine what the real experience would be. The experience itself was very immersive, as described in the article. Also, if you had some previous experience with the work of the composer, you could really feel that you were immersed in his world, seeing reappearing objects like a lamp, branches and nature. Also, the music reminded me a lot of his previous work. It seemed like it was his intention to have that familiarity.

Kyriakides, Yannis. "Imagined Voices : A Poetics of Music-Text-Film." Phd, Leiden University, 2017. http://hdl.handle.net/1887/58691.

In the second chapter of his Poetics of Music- Text- Film Kyriakides is explaining more about his different strategies for the use of text in combination with music and film. He divides the strategies into four main sections: the Internal Monologues, the Unanswered Questions, the Voiceprints and the Interactive Scores. Some of these strategies like the "Internal Monologues" and the "Voiceprints" are functioning more as a way to expand the understanding of his main character/subject, taking the role of someone's inner voice or the subconscious. In the case of "Internal Monologues" through the words of a singer and projected text he creates more layers of expression and perspective in a monologue. The same effect has in "Voiceprints" the use of autotune that creates the idea of another voice and layer of text. The other two strategies:" Unanswered Questions" and "Interactive Scores", have to do more with the structure of the music material, by encoding text into sound or turning projected text into notation for the musicians.

More specifically the Unanswered questions have to do with question-and-answer structures in his music material. Moreover, he explores whether music functions in the same way as language. Usually, a question is either translated from words to music and vice versa, going through other media by using different encoding methods. The Internal monologues is a strategy inspired by the inner voice, the private commentary that tries to make sense of the information that flows in our minds. The composer explores the idea of an absent inner voice as a narrator for his pieces. A voice that isn't heard but is there inside the mind of the characters and the audience revealing layers of the plot. In Voiceprints the composer removes the semantic content of speech, by editing or recomposing it to underline something

about the identity of the speaker. In practice, voiceprint authentication involves not only comparing a sample voice to a database of voices to confirm identity, but involves comparing the traces of the technology that they are captured on. The Interactive scores is a strategy that Kyriakides is using to turn video into a music score for his musicians, exploring ideas similar to graphic or visual scores and interactive techniques. In different pieces the text-film is used as score (with interactivity) for the musicians as well as the audience.

In his PhD Yannis Kyriakides, is explaining much more about his idea behind the inner voice, encoding techniques and the relationship between music and language. For my research I focused more on his techniques for integration of these different elements in one composition. The text and his concept behind its use, seems to be the seaming point for the different layers of his compositions. Different layers of text become different voices that add to the narration of a piece. Others are shown, being projected. Other voices are heard through acoustic or processed sound and others are woven into the composition through encoding techniques, giving just a different character to the sound itself.

INTERACTION: CASE STUDY 1

> *InnerAct : Canto Ostinato Audio Visual - Simeon Ten Holt - Muziekweb*, accessed October 1, 2022, https://www.muziekweb.nl/en/Link/EBX1003/InnerAct-Canto-Ostinato-audio-visual.
>
> InnerAct, “Canto Ostinato Audio Visual,” accessed October 20, 2022, http://cantoostinatoav.com.

Canto Ostinato Audio Visual is a rendition of ten Holt’s famous composition, featuring harp, electronica, and visual elements. Performers Gwyneth Wentink (harp), Wouter Snoei (electronica), and Arnout Hulskamp (visuals) interact on stage using their instruments and custom software, deciding who leads based on the codes of 'Canto Ostinato'. The composition emphasizes interaction and improvisation, making each performance distinct.

Canto Ostinato comprises 106 cells that can be repeated as the performers see fit. They control the repetition count, articulations, phrasing, dynamics, and, in certain sections, the order. The performers agree upon signals to indicate who will lead and when to transition to the next cell.

> In Code, “In Code – An Audiovisual Performance of Terry Riley’s Masterpiece.,” In Code, accessed October 19, 2022, https://in-c-ode.com/.

Gwyneth Wentink, Wouter Snoei and Arnout Hulskamp came together in 2012 for their first project, *Canto Ostinato Audio Visual*. The dialogue between sound, frequency, and image is the core inspiration for the ensemble. Coming from different backgrounds and disciplines, the ensemble manages to attract a broad audience and enjoys national and international success.

Gwyneth Wentink, Wouter Snoei and Arnout Hulskamp’s interpretation of In C is inspired by its very first performance in 1964, where live electronics and “real-time” visuals were integrated into an ensemble of acoustic instruments. During the performance of In Code a custom-made lens joined the ensemble on stage. It was a special structure on which visuals were shown. In Code investigates the coherence of sound and image, creating a mix of audible and visual textures. In Code revolves around the themes of embodiment and structure, creating surprising and unexpected connections between the senses.

Terry Riley's *In C*, written in 1964, consists of one single page of 53 musical fragments. Although labeled as 'minimal', Riley's music does not allow itself to be easily tagged." Once you become an 'ism', what you're doing is dead." Most renditions of *In C* run somewhere between 45 or 90 minutes. It is inspired by Riley's interest in North African and Indian music. Every performance and interpretation of In C is unique and defined by the freedom of instrumentation, number of players and the piece's duration; which Riley leaves to the imagination of the performers.

> "Holt, Simeon Ten," Grove Music Online, accessed October 19, 2022, http://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000013256.

Canto ostinato for one or more keyboard instruments (1976–9) was the composer's major breakthrough. It consists of repetitive music in which the performers follow their own route choosing the so-called 'drift parts' they prefer. The musicians are given the task of determining the total length and the number of repetitions in any performance.

> Sylvie Klijn, "Musical, Sociological and Psychological Aspects of Minimal Music Composition: The Case of 'Canto Ostinato' by Simeon Ten Holt," n.d., 147.

The analysis of Simeon ten Holt's work, specifically regarding the concept of "social music" in his piece "Canto Ostinato," presents contrasting perspectives. Ten Holt viewed his music as social, allowing listeners to connect deeply with it and integrate it into their lives. Some respondents agree, suggesting that "Canto Ostinato" can initiate relationships between listeners or facilitate communication between performers. However, others argue that the composition is more individualistic, occasionally causing a sense of isolation rather than unity. Additionally, the idea is proposed that any music played by multiple performers might be considered social music, expanding the definition beyond ten Holt's specific intentions.

> Carl, Robert. *Terry Riley's In C*. Oxford University Press, 2009

p. 58- 60

"In C" by Terry Riley is a piece structured around 53 brief, repeatable modules that allow for a wide range of interpretive possibilities. The piece features a steady eighth-note pulse as a backdrop, against which complex rhythmic interactions between modules can unfold. Riley's original score included the modules and a few verbal instructions, but over time, additional guidelines were developed based on performance experience. These instructions emphasize flexibility and the performer's autonomy, using phrases like "may," "is allowed," and "left to the discretion of." Riley values the traditional notated score as an essential component of the work, maintaining its importance alongside the conceptual and indeterminate aspects of the composition.

> Riley, Terry. *In C: Performing Directions*. Celestial Harmonies, 1989.

Grove Music Online. “Riley, Terry.” Accessed November 8, 2022. http://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000023474.

In C, unspecified insts, 1964

American composer and performer who studied piano with Duane Hampton and theory with Ralph Wadsworth at Shasta College, composition with Wendell Otey at San Francisco State University (BA 1957), and piano with Adolf Baller at the San Francisco Conservatory. He later earned an MA in composition with Seymour Shifrin and William Denny at the University of California, Berkeley, while also studying privately with Robert Erickson and ragtime piano with Wally Rose.

His notable work, "In C," consists of 53 phrases or modules that each player repeats freely, resulting in unpredictable layerings, canonic textures, and polyrhythms. It can be performed by any number of melody instruments and has been adapted for solo piano, marimba ensemble, and full symphony orchestra. "In C" is a defining piece of minimalist music, bringing the style into mainstream culture following a favorable review by Alfred Frankenstein and its Columbia recording. Steve Reich, along with Jon Gibson, Oliveros, and Subotnick, participated in its premiere at the Tape Music Center on November 8, 1964.

Grove Music Online. “Chamber Music.” Accessed November 8, 2022. http://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000005379.

Music composed for small instrumental groups, designed to be performed for a smaller audience. Essentially, this term suggests intimate, carefully crafted music, created and performed for its intrinsic value. A key aspect of chamber music is the enjoyment and pleasure musicians experience while playing together.

Padilla, Gabrielle. “Chamber Music Fundamentals and Rehearsal Techniques for Advancing String Students.” DMA, West Virginia University Libraries, 2021. https://doi.org/10.33915/etd.10265.

- Seating Arrangement. Acoustics, balance, traditional practices of the chosen repertoire, or performers’ preferences (p.19-20)
- Interpersonal relationships in an ensemble: open environment to have a discussion that establishes some rules for group communication and behavior prior to working together 9p. 30).
- Score study provides a way for an individual or quartet to practice or rehearse away from their instrument (p. 32- 34). Always know which voice has the primary materials. This will help the others within the ensemble to understand their role. Same rhythm “buddies”: know who shares the same rhythm as you and who you trade off rhythms with. Know where there are silences within the music. Rhythmic cues: know where each voice fits. Attention to the rhythm environment enables the performers to better connect and play together. (also mentioned in Holt’s instructions)

- Rehearsal Procedures: time management, not the same material over and over. Recording and listening back (p. 39-40)
- Making Interpretive Musical Decisions as an Ensemble. The aim of an ensemble is to combine those ideas and come to a singular vision for a performance. (p. 41).

INTERACTION: CASE STUDY 2

"Walter Giers: Electronic Art - Announcements - e-Flux," accessed October 10, 2022, https://www.e-flux.com/announcements/483385/walter-gierselectronic-art/.

Walter Giers, born in Mannweiler, Germany in 1939, began his career as a jazz musician in 1955. After completing his studies at the State School for Technical Arts and Crafts in Schwäbisch Gmünd in 1963, he worked as an industrial designer before debuting as an artist in 1969. He taught at the Karlsruhe University of Arts and Design from 1992 to 1993. Giers held numerous solo exhibitions, including those at Galerie Reckermann in Cologne, Galerie Denise René Hans Mayer in Düsseldorf, Galerie Edith Wahlandt in Schwäbisch Gmünd and Stuttgart, and the Stedelijk Museum in Amsterdam. He lived and worked in Schwäbisch Gmünd until his death in 2016.

Giers's art prominently featured electronic components like loudspeakers, buttons, and capacitors, both as functional elements to generate and control lights and sounds and as aesthetic components. His early works were interactive, involving audience participation through buttons and switches. From the mid-1970s, his works became autonomous, utilizing random generators to create self-varying systems that engaged in optical or acoustic dialogues with viewers, often humorously and ironically. Giers's work combined clear structural designs with lyrical or meditative qualities, aiming to evoke emotions and reflections on themes such as the human-machine relationship, nature, media's societal role, and the treatment of religions and minorities.

Telekom Electronic Beats. "Learn About Early Audiovisual Art With 10 Pioneering Works," February 7, 2017. https://www.electronicbeats.net/audiovisual-art-began-10-pioneering-works/.

Walter Giers was an early pioneer in the field of electronic art, creating kinetic audiovisual pieces that integrated sound, light, and electronic circuits. His techniques delved into aleatory music, where parts of a composition are left to chance, and utilized self-playing instruments and repetitive loops. Giers aimed to captivate audiences by steering clear of static audiovisual patterns, often programming his works to produce random sequences at varying intervals.

Walter Giers - Electronic Art (Electronic Beats TV), 2017. https://www.youtube.com/watch?v=3-zyXnc2Xls.

Walter Giers, a pioneer of electronic art, emerged in the late 1960s and early 1970s with a unique vision for interactive and constantly evolving artworks. He sought to break the boundaries of traditional static art forms, envisioning creations that could change and interact with viewers. In 1969, he achieved this with the creation of the first interactive picture, where manipulating switches or buttons altered the visuals and

produced sounds. Giers's quest for autonomy in his artworks led him to experiment with random generators, allowing his creations to evolve independently, resembling living entities rather than static presentations. His work, such as "Music for 53.553.077 years" from 1990, showcases his fascination with randomness and interactivity, as samples are continuously rearranged by a randomizer, creating ever-changing compositions. Giers's emphasis on interaction and autonomy imbued his artworks with a sense of life and dynamism, marking him as a visionary in the field of electronic art.

Arie Altena, “Participatie En Interactieve Kunst,” accessed October 1, 2022, https://ariealt.home.xs4all.nl/interactieve_kunst.html.

In the 1950s, avant-garde artists began breaking down the boundary between art and life, aiming to eliminate restrictive conventions and expand creative possibilities. They pioneered events where spectators became participants, often employing game strategies and simple instructions. However, by the 1980s, the rise of new media art, with its focus on technology and computers, shifted the emphasis from breaking boundaries to embracing interaction as a means to involve viewers in the artist's vision. This shift continued with research, such as that at Nottingham's Mixed Reality Laboratory, which explores the integration of digital technologies into live performance. This research has led to the creation of theatrical experiences that blend fictional stories with real settings, virtual environments with physical props, and interaction with computers with live encounters with actors and other participants. Performers have utilized sensing-based interfaces to enhance their expression, allowing interaction with digital music through gestures and bodily movements. Key aspects of interaction with sensors include expected movements, sensed and desired outcomes, which present both opportunities and challenges in designing sensor-based musical instruments.

“Performance Art,” Grove Music Online, accessed November 20, 2022, http://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-1002257784.

A broad category covering diverse performance styles, often involving a blend of different mediums including elements from theater, both narrative and non-narrative, and drawing inspiration from experimental music, video art, dance, and visual art. It shares similarities with conceptual art, where the idea behind the artwork is prioritized over the physical object. Depending on the intentions of the performer, performance art can range from meticulously scripted scenarios to largely improvised pieces. However, it typically maintains a degree of textual fluidity, facilitating interaction between performer and audience.

Appendix 3: Full feedback on reference recordings

1. Self reflection:

Xsociety (2018) was a successful first attempt to combine different media to form the dramaturgy of a composition. However there were some aspects that could be done a lot differently if I had the right knowledge when I composed this specific piece. Inspired by the multimedia opera *The Cave* (1993) by Steve Reich, the singer and main character of the performance was assigned to play the laptop keyboard, giving it two functions. The one of producing sound and the regular one of writing things on screen. That

second function wasn't exactly achieved, as there was nothing written live by the keyboard, since the video shown was premade and had no interaction with the keyboard on stage. That was a solution for not having an internet connection on stage and because of my limited knowledge on software that gives you the ability to have live sound- interactive visuals. Moreover, this choice added more limitations to the live performance, as we needed to have a click track and a conductor for the synchronization. For the reasons above, I can say that the performance was closer to a film score recording than a multimedia piece. The only interactive element was the live streaming on facebook.

The music of the piece worked for that particular presentation, but had a lot of stylistic references to Steve Reich's music and especially *The Cave.* It was also less theatrical than I intended it to be. I believe that the core idea of this project is still really powerful and current and gives a lot of possibilities for research on the compositional dramaturgy of multimedia- interdisciplinary works and its application to not overwhelm the audience but make it relatable.

In Media Res (2022), was my first attempt at co- co-composing and developing tools for self generating sounds. Again the integration of the main concept with the media used was successful. It was a different approach on a theme similar to my reference recording *Xsociety* (2018). Both pieces were inspired by communication online and had the theme of technology and multimedia as their main concept. Also similar media were used like voice, sound and video, but in the case of *In Media Res*, there was a stronger visual aspect with the presence of the circus artists. In that case there was also no score, just different layers of material and a clear concept and development. That gave a lot of freedom for experimentation with the space and the different media and gave a more organic feel to the dramaturgy of the performance. In this piece I also had the opportunity to try different techniques for live sound processing and interaction, like the use of autotune and the use of cameras that turned motion into sound. There was a challenge communicating my ideas with the artists from the other disciplines, because of my tendency to think mainly in sound. These kinds of collaborations create the need for the development of a common language.

I feel like we were definitely able to reach the objective of interdisciplinarity with this project. There was a clear connection and interaction between the different media and our concept. The abstract character of the performance left freedom for more interpretations and avoided traditional narration. I had the opportunity to develop my technical skills, trying to find creative and functional solutions for what we were trying to do. The issue of how you can involve the audience more in the process and how to notate such performances, remain subjects that I would like to research more in the next cycles.

DOTS (2022) I recognize the success in achieving a well-rehearsed and deterministic score, as the performers' interaction demonstrated a seamless and cohesive performance. However, I acknowledge that the interaction between the musicians and the live painting did not have the same level of clarity. In fact, the musicians' placement hindered their ability to react and respond to the artist's gestures. To address this, a screen or mirror should have been placed in front of them, providing a clear view of the artist's actions. Furthermore, the complexity of the music posed a challenge for the musicians to synchronize their actions with the artist, resulting in a one-sided interaction where the visual artist primarily responded to the musicians' input rather than vice versa. Additionally, the parameters used by the fine artist to translate the music score into a painting were not explicitly conveyed, leading to some ambiguity. Lastly, the ensemble's adherence to the linear A to J form, without changing the order of the parts, was likely due to the formatting of my score.

AER (2023) I am pleased with the successful integration and interaction between the various elements of the opera performance, including scenography, sensor installation, and the music score. However, I acknowledge that improvements can be made to enhance certain aspects. Specifically, the pre-recorded sounds triggered by the sensors lacked variation, resulting in a repetitive soundscape that

could easily be overlooked by the audience. This interaction should have played a more prominent role and been more engaging. Regarding the music score, its fixed nature limited rhythmic freedom and occasionally led to instances that might have been perceived as mistakes, such as incorrect entrances by the countertenor. Adjusting the score to allow for greater flexibility in form and clearer instructions can prevent such issues in future interpretations.

A Poppy blooms (2023) Upon reflecting on the piece, I find the interactive quality of the multimedia and the connection forged between the live performers and the audience to be a successful and meaningful outcome thus far in my research. However, I cannot overlook the technical challenges that arose during the performance. The unexpected need to replace the mixer and the resulting limited soundcheck time, coupled with the failure of the pre-recorded samples, highlighted the importance of a more thorough and proactive approach to technical preparation and testing. Furthermore, the unpredictability of an audience unfamiliar with immersive experiences must always be considered during the development and testing process. In terms of the physical setup, the positioning of interactive objects played a significant role in shaping audience actions. In hindsight, if certain actions were not desired, such as stepping on a screen due to sensor fragility, alternative placement should have been considered. The lack of clear instructions for the participants led to initial confusion, but surprisingly, this confusion sparked enthusiastic exploration and problem-solving, ultimately bridging the gap caused by the malfunctioning pre-recorded sounds. The transitions between the different scenes of the piece were evident, effective, and aligned well with the concept of the haiku poem. Lastly, the harmonious design of the cards, in both their musical and visual simplicity, added a distinct character to the overall result, reflecting my compositional language rooted in elements of rhythm, modality, and simplicity.

2. Feedback received from teachers

Xsociety (2018)

Dimitra Trypani

“Since I was there on the presentation of “Xsociety”, I can say that in the video there’s the problem of not being able to see clearly what is shown on the screen. I remember that the video played a very important role in the piece. You also had dialogues showing, so that is an issue if you can’t see them. The musical part was decent, but the visual part could be more static at some point. Maybe you could do a different montage. On the other hand, of course mixed media performances today are somewhat bolder. You use different media but in reality, you have two static things. There is no sense of mix or interaction”.

René Uijlenhoet

“What I like is the unrelenting drive of the instrumental part. I like that it gives out some nervousness. Which is maybe very fitting with the fact that you always get new messages. There is an anti-rhythmical thing. There is not a logical moment when the next message comes, because different people in different places can contribute to whatever you read in your feed. So, I find it very fitting. It also gives a backing to the singer, so she can sing in a very natural way for her voice. I noticed that when she is pushed out of her comfort zone into the high range, she has difficulty maintaining the quality of the sound and I was wondering if it’s something that I should blame her as a performer or you as a composer, that you gave her hardly any time to get there. So maybe there are some logistics in writing for voice that

I might recommend. The second time I was already a little more at peace with that happening. I thought it might be that it is also very fitting with the text, so it's maybe an expression of getting a little bit derailed. And in that case, I might imagine that it's effective even, instead of criticizing It in a technical level. For the multimedia experience, let's say, the speed in which the shown text changes, I wouldn't have time to read it. I also had the feeling that the dramaturgy of what was shown was not clear. Of course, I cannot understand her words, but I guess that with many expressions, like musical or visual expressions, we as makers we think that it is too long already, but in experience of someone watching it and hearing, or reading it for the first time, you need much more time to know what's going on. That would be my remark. But I don't know what I would say if I had seen the whole thing".

Hans Koolmees

H: The first thing is… you have two layers of text. You have the "small talk", so to say and you have the more poetic line of text. They are both sung by the same singer.

S: The small talk is not sung, it is only shown. But in this specific part indeed, the poetic text is also shown in the conversation. It is the last part of the piece with the video present and the part where the singer finally shares her real thoughts with her friend.

H: It is a bit confusing… but maybe that's not a bad thing. Because you use them together, to have them mixed and integrate the poetic text with the small talk. So, to be blurry that's ok. I must say that the fragment is really short to really get an idea, because I think you have to watch it longer. Did you use these two layers of text to construct the music?

S: I have them written in the score in detail, yes. The meter of the speech is inside the rhythm. Sometimes it is doubled by the percussion and the viola.

H: I think that the language you used in this piece is very effective for the goal. So, you found the right aesthetics. I am wondering if there is any harmonic development throughout the piece, because in this fragment the harmony doesn't develop yet.

S: It's different every section of course, but I have to admit that I was really inspired by the way Steve Reich uses text in his pieces and how he is mimicking the voices. I think that's very apparent in this section. There are other parts that are more melodic.

H: I am thinking about the concept of the piece, because you have a fixed composition and fixed visuals but the idea is that the whole piece will be interactive. So, that would be controlled by actions in the moment. I am wondering if that could be possible in a piece like this, because in this concept the score is very strictly written. But you can maybe imagine that you work with musical modules which are controlled by typing for instance. So, you create a very interactive and flexible composition. You have to develop a system that is used to launch audio files or visuals. Maybe a first step to that direction is that you use only electronics. Because when you add live performers, another layer of complexity is added. I think you have to do it in stages, not all at once. You could also analyze how music is composed for video games. I was wondering to what extent interactiveness controls the music in that case, because it's kind of comparable to what you do.

In Media Res (2022)

René Uijlenhoet:
“Well done! Usually when students show me their pieces I have some things to complain about, but in this case I have almost nothing. Also the way the video is made, it shows that the piece has a nice development and almost narrative feel. It’s nice how it starts with a more abstract idea and then leads to the more chaotic part where you can see the performers moving a lot and interacting with the cameras. Also the text and the use of auto tune is very successful. I could understand her words in some parts and I heard the last phrase that she said “One collective hive, is that our story”. It’s nice that you didn’t use autotune for that last phrase, it makes you think of what we’ve become with online communication. It’s like she talks to the audience or projects the thoughts of the audience. I can see the relation of this piece with the previous one you did in Corfu, but this feels much more organic. It shows that you made big progress in the field of live electronics and digital media in your time here”.

Hans Koolmees:

S: How would you describe the performance of In Medias Res? (music performance, audiovisual, music theater, dance, multi-, inter-, un- disciplinary, sound installation)
H: Interdisciplinary
S: Do you think there was enough interaction between the performers, between the performers and digital media?
H: yes
S: Did it leave space for interaction with the audience?
H: Being part of the audience, I enjoyed it very much, but I was not interacting with the performance. If that was the goal, this could maybe be improved.
S: Did you notice a concept, meaning or narrative behind the performance and which one?
H: Yes, definetely I noticed concept and narrative (maybe development is a better word)
But I find it difficult to summarise this in a few phrases.
S: Did all the different performers- disciplines feel equal in the performance?
H: yes
S: Was music the dominant one or not?
H: no
S: Was the use of space effective in your opinion?
H: yes
S: What did you miss in the composition- performance or felt could be done better?

S: Did you feel all the media used were necessary?
H: Yes. Well, maybe not necessary, but they were effective.
S: What do you think was done better in comparison to the first reference recording (X- society)?
H: To my taste In Medias Res was more interesting than X- society, but that was also because In Medias Res was a live performance, X-society was (for me) video.
S: Do you have in mind composers or artists that their work could be useful for this research?
H: Wouter Snoei, Michel vd Aa, Merlijn Twaalfhoven.

Gwyneth Wentink:
Great performance and composition! It is a powerful presentation that left me somewhat uncomfortable - the isolation of the performance all living in their own bubble feels upsetting and frustrating. I really like

the concept of giving the audience a mirror to navigate through the performance. The audience has been designed to observe what is going on 'on stage' very particularly from a certain point of view (the classical audience position) and it is powerful to give the responsibility to the listening/ observer on how to capture what is going on.

I would describe it as interdisciplinary and thought the interaction with the digital media and the performers was strong. The interaction with the instrumental performers wasn't that obvious to me - I'd love to hear more about your ideas there! I am not sure the live musicians added much to the whole as I thought the electronics and performers had a strong presence and story. The use of the space was very effective too - you could observe the isolation in certain corners but also the isolation of performers while they were using the whole space.
My one question mark thus would be the use of live instruments and what your idea was behind it! Was that to bring out the vulnerable and 'human' side?

Dots (2022)

René Uijlenhoet:

Sofia: Do you think that the use of mixed media elements like now that we had the visuals with a live painting, added value to the composition or felt distracting?
René I was having exactly that question when I was in the hall. I had a lot of sympathy for the lady making the painting. But I had a little bit of feeling that I didn't need it. I would say that maybe the music, when it is more contemplative would be perfect. In combination with the painting and when the music is super lively. Maybe she could wait by adding more to paintings, so that the variations happen when the music is not that active. That was my kind of temporary solution.
S: So how did you think the indeterminacy of the score encouraged interaction and collaboration between the performers?
R: The performers played so securely, their chosen pitches. Since the freedom was quite limited, it almost sounded as if they were playing a well-rehearsed deterministic score.
S: So, what aspect of the piece did you find successful or innovative?
R: I thought, especially after the first version that was only the music, that the fact that you gave quite a limited number of choices to musicians, but within that limitation, they had the total freedom that was super successful. That's for me the most successful aspect and the fact that you take the reins back once in a while and write out all the details of the music for the kind of forgotten notes that worked and and with the painting, maybe in easier circumstances, you could have put her with a projector in the middle of the room, so that you could kind of see her action and see her projection at the same time. Now I had to focus either on her or on her results on the screen.

Josue Amador:
Do you think that the use of mixed media elements (visuals) added value to the composition, or it felt like a distracting element?
The visual elements did not distract the audience during the performance of the piece. However, the live painting did not add much to the composition. The connection between sound and image was not strong enough. It looked like a music composition with improvised visual material on top. The creation of the live painting did not relate to the narrative of the piece, even in its most basic parameters. For instance, both elements (sound and image) do not start at the same time. Or even

the title of the piece is Dots, the visuals do not make use of similar elements.

How effectively did the composition encourage interaction and collaboration between the Performers?
The score is very well written in the sense that it allows the performers to decide certain parameters without losing the direction of the piece. These decisions taken by the performers may foster a form of interaction as well. Based on the score and performance, it is not possible to know if there were strong collaborative elements in the preparation of the piece.

Is the piece-score successful in allowing for different interpretations of the music?
Indeterminacy is only applied to the selection of pitch material. Therefore, every interpretation of the piece would be slightly different. However, I don´t think that the difference in versions would be bigger enough to be noticeable.

What aspects of the piece stood out to you as particularly successful or innovative?
The piece is quite demanding because of its tempo, the fact that it contains only a few rests and due to the indeterminate elements. However, the notation is idiomatic for each instrument and this facilitates its performance.

AER (2023)

René Uijlenhoet:

Sofia: How effectively did the mixed media elements enhance or complement the performers musical performance in the composition?
René: I thought it was very effective, especially in the beginning when I started hearing those sounds, because the good thing about the electronic sounds was that they came from the sides, and they were not so much from the stage like everything else. The only thing is that I noticed that those sounds didn't vary much. So, at a certain moment, I felt that they were repeating. So, I would say make a few more variations for your next performance that are in the same atmosphere. So that they will really sound like new ones every time. I would say make sure that that one sensor triggers more variation. You can even use it with randomization or just walk through a whole library for each sensor, let's say 12 and the other one has 11. Then you never feel that it's like a routine. What did really work well was the electronic sound and then the sound of the choirs doing the breath. It was excellent and also very well blended.
S: How did the interaction between the different elements of the performance (theater, acoustic music, electronics) contributed to the overall experience?
R: I have the feeling that the cloudy atmosphere that the cloth from the ceiling gave was super good. The fact that he is like wandering around talking to someone you cannot see is quite strong. You really feel also that he is little bit shy that other people are watching him as it really worked the fact that you could not see so much the ensemble but you could see that there was an ensemble that gave enormous amount of depth to the visual and the fact that everybody was amplified mixed very well with the electronics and with the vocals.
S: And how this interaction between the different disciplines and media contributed to the interpretation of the music?
R: I don't know if I can answer. I was little bit worried that there was a kind of glitch in that interaction with the the sensors. At a certain moment, the ultimate sound started to stand out a bit so I kind of like felt like okay that they're doing their job. So, I could see the interaction and I would make sure for a next time that the sensors are a little bit more connected to the cloth so that we don't see them as separate bungling

things. Not that was a problem but then they would also be more accurate. If he touches the cloth or the wire, it would work every time. Yeah, that gave me the feeling that the electronics were like his hidden friend or his imaginary friend and that worked really nice. So that did help me with the interpretation. But of course, I was a little bit aware of it.

Josue Amador:

How effectively did the mixed media elements enhance or complement the performers' musical performance in the composition AER?
Mixed media was used in this piece in a very efficient way. It always keeps a good balance in relation to the rest of the elements and effectively complements the performance.

How did the interaction between the different elements of the performance AER (theatre, live music, electronics, lights) contribute to the overall experience of the piece?
In that sense, the piece works very well. All elements are integrated in a very natural manner.

How did the performers' physical movement or gestures interact with the media elements, and did this interaction enhanced the audience's engagement with the performance?
I don't think this is a very strong element in the piece. If I understand correctly, when the performer touches the curtains, they trigger a sound file, but this sound does not change depending on the movement, it just switches on. Therefore, the interaction is not something that the audience may notice. However, this is not so relevant and doesn't change the perception that the audience may have about the whole piece.

A poppy blooms (2023)

René Uijlenhoet:

What I also said after the concert is never assume that technology will do its work out of the blue. Occasionally it happens. And that is something you can put in the newspaper. Like, I just switched on the stuff and everything was right. And that's nice. That means Okay, well I'm lucky. But it's the exception not the rule. For instance, with this piece that things were weird, it was probably just a simple bug in a way, so we can explain it. What we cannot explain is the fact that the rehearsal went fine without the glitch. But I have many years with with electronics, and I do not trust it. I always want to test test and then test again, and be a bit neurotic in that sense, because you will be happy during the concert if one out of two will work and the ones that are not perfect it's kind of okay. But if you do not think that everything that can go wrong will go wrong. It will go wrong in the concert and that's a pity.

There probably was some routing issue with that first mixer we used. Because the problem with digital mixers or digital mixers that look like interfaces, is that they are quite complex. And on many layers, they have options. And one of my rules is no options, no problem. That means in vice versa, that lots of options, lots of problems. And that is a little bit the case with a versatile mixer. I was glad my intuition led me to finally use the interface from the school for your performance.

The fact that the projection screen was on the floor wasn't necessarily problematic because the carton cards more or less, protected the sensors. Also, if you lose one of the microphones, they're so cheap. That's really not a problem. It was very interactive that way, when people used their feet, or when were

super enthusiastic. Then of course, there's a kind of danger that all microphones constantly get a lot of motion. And that also contributed to the confusion in the microphones.

Another thing is that with the insecurities of the audience, not knowing the installation, you must always count on the worst-case scenario. Let's say that would be if they start banging the cards like madmen. But their enthusiasm in this case made it really lively and also gave the opportunity to show off the cards because the cards are super beautiful. And what I did like a lot was the fact that you had the patches on different windows and that looked really like the new scene was gliding in and there was a new set of cards and they glided in for the last time and that was really effective. I also told Hannah, the singer that contributet very nicely to the performance, It's such a nice thing for workshops with amateur people. You could really go on the road with it. And it will be I think, a success in every cultural venue.

Josue Amador:

How did the interactive element of turning over cards enhance your overall experience of *A Poppy Blooms*? Did it contribute to a deeper engagement with the performance?
From the three pieces, this is the one in which the interactive elements are more relevant. The piece is basically about that, the audience´s engagement and how this interaction is reflected in the narrative of the composition both, in terms of sound and visuals. The piece also includes some "theatrical" elements when the audience joins on stage to be part of the performance.

In what ways did *A Poppy Blooms* deviate from traditional performance structures, and how did this non-linearity impacts your experience?
This piece is an Open Form work that includes the audience in the performance, and it does not have a fixed duration or narrative. The interpretation of the piece relies on the interaction between the audience and the game-piece, which makes it very attractive and engaging.

As an audience member did you realize it was supposed to be a memory game? Was it problematic in your opinion that it wasn't clearly stated?
It was not clear that it was a memory game. It looked like the audience-performers had not a clear understanding of the piece. At some moment, more people kept joining, and it all became a bit random. Having clearer instructions would fix this problem.

How successful do you consider this performance of "A poppy blooms"? Did you realise that the prerecorded material intended to play during the performance didn't work? Did you miss that element?
I do find this piece very interesting and with a lot of potential. There is room for improvement but mostly concerning the way, the piece is explained to the audience when they are invited to participate.

Appendix 4: Transcription of interviews

Interview with composer Yannis Kyriakides (6 April 2022):

Reading the description of *Ask Ada* and watching it, I saw that the choice of the media you use is closely connected to the concept or the subject of the performance. I was wondering is that in all of your recent works? Is there a concept behind the choice of different media?

The choice of, let's say the materials or media really say something in themselves.
it also has to do with the language that's used with them, but predominantly the sound or the look of something. I think it creates a sort of a sonic image which is in a metaphorical relationship to the theme, to the concept. So, in the case of *Ask Ada,* we sort of looked at the idea of Victorian technology.
And, with one of the central things about her, the fact that she was the first programmer she worked with, Charles Babbage's analytical engine. I've seen the original version of that, not the analytical engine, but a different engine which is in London. It's in the Victorian Albert Museum and it's really like a series of cogs. There's something very much like a music box about it. And then it's just simply this kind of idea. You had the punch cards of the music box, which are like computer punch cards. So, this idea is kind of a really early computing thing. The closest I got is this kind of idea of a kind of mechanical musical instrument, and I thought, OK, we should somehow include something like that within the image. And then there was the idea of the instrumental ensemble. And you know for instance Ada played the harp historically.
So, we have harp in the ensemble, and then the harpist was kind of central. The music boxes were kind of central and then it was just a question of having something that could switch to 19th century music easily and I knew it was kind of a limited ensemble. We could have up to like 5-6 instruments, so that's how I chose the ensemble. I wanted the balance. Also, the harp, the piano, also with another, let's say mallet instrument, also to have this possibility of the more mechanical sounds and then I thought that would be complemented well with just strings, so that was one thing.
The other thing had to do with the sound world. Well, two more things. I wanted a kind of vintage synth sound- vintage electronic sound, and I mean that just had nothing to do with the historical context in a way, but more with this idea because I knew I wanted to use it. It's kind of pre-programmed, like patterns of sounds and I thought that would be nice to use. Just old synths for that. So, you have this layer also throughout the piece and the other sound choice was the use of autotune. So, I mean, it's something I've done in a few other pieces, but because I wanted the Ada character to have this many voices. In a way I wanted her to have different voices for different parts of her narrative, and I thought especially the voice that deals more with the computer thing because it has to do with, that we wanted also to look to the future like all the consequences of what she did. And and so there was this kind of, half human, half computer sort of sound world, so that was also the idea of like mediating her voice with autotune
So those are the sort of three main things. Let's say the music box, the instrumentation with the harp, the synthesizers, and the autotune. So, sort of four things.

It is mentioned in the synopsis of "Ask Ada that the structure of this work revolves around the number 36. Is that in any way related to something that you said, that you try to encode text into sound and what do you mean by that?

Yeah, so that's two things. It was actually the idea of the writer, because we talked in the beginning about having a sort of like 8 or 6 to 8 different scenes, but then I looked at her algorithm, because her algorithm is quite readable. It's quite understandable. That's why it made such a big impact, because it relates very directly to our world and it has 36 lines to it. And she did live to the age of 36 and so did Byron. I like

sometimes doing these kinds of things, where you take a sort of given structure. It's more like it's a found object. I knew I wanted to use the algorithm as really the sort of the main structuring point of the piece. Then the fact that she lived also to 36. It was like a nice coincidence and we made 36 scenes. If you look at the algorithm, basically it's an algorithm written to work out what Bernoulli numbers are. This kind of mathematical procedure. And like a computer program, basically each line has a different function. It's a mathematical function, so in this case it might be addition, subtraction, multiplication, division. We used it when it's an additional subtraction, we have a different structural function in the piece. I think for something like when it was subtraction, we had scenes that had to do with her memories and with her past. When it was multiplication, we had scenes that have to do with the future. So, you know things like that. That's how we sort of worked it out.

And was that related to the music material?

Yes. So, we had those different layers of things happening, also in the music material. There was one layer which was the actual algorithm encoded into music. So, I just created a sort of algorithm that literally puts that into note material and that's something that I often do anyway. Translation of one thing to some kind of sound medium. When she wrote the algorithm in one of the notes, it's just called the famous Note G, she said that in the future we might use these machines to do things other than mathematics. We might be using them to do music. She gave music as an example. That is what's so brilliant about what she did. She had this vision, where it could go. So that also gave us the idea, really to deal with where we are now with that. Where are we now with algorithms? Where are we now with machine intelligence? So, there was a certain thing encoded in the music and that was her algorithm and then I made my own let's say algorithm. So, all the notes that were generated were in the electronics. I just made a kind of simple patch, a simple algorithm based on Pascal's triangle, which is a bit like the Bernoulli Triangle, which is the same set of numbers that she was dealing with, but in the form of this triangle, which is like Pascal's triangle. So, it's a kind of series of numbers and the way they develop. I made this algorithm which generates these patterns constantly, getting more complex on that algorithm. So, it wasn't so much that wasn't so much. Let's say a complex algorithm. Let's put it this way, it was just the translation of these kinds of number sets, but I wrote an algorithm for it in order to just translate it into notes. So that was one layer. They had the layer of the translation of Ada's algorithm, and then there was the text which we put in all these different sections which had its own music. So, let's say the text of looking into the past had this kind of more lyrical aria type thing. We had the letter correspondences with Charles Babbage. And that also had much more, let's say recitative, like aspects to it, you could say. We had the note G parts, which we call the fairly well parts, which was her relationship to Byron, her father. So, there was also another encoding of text. I took this poem, a famous poem by Byron "Fare Thee Well" and I encoded the letters into the music box material. So, that was, let's say the whole poem. And what I did was each music box had this material. So, each music box had different modulations and verses of the poem. And I was like I don't know if you saw in the video they had these huge rolls of paper. I actually wrote a program in order to use the A cut paper cutter to do these rolls, because I started doing it myself, just punching and it was going to take days and weeks to do so. So, I was happy with that. That came out OK as well. So, in a way you see these different layers of encoding of the material. Obviously, you don't hear the poem by the notes, so you don't hear the algorithm with the notes, each type of translation of material has a quality to it, which is different and I think it sort of communicates something. It communicates something that the listener hears that it has this sort of rules of its own. It's kind of structured. And it has a different quality to it. You know each kind of different type of information has a different quality to it. And I always like to think that things have their own different voices. I think that's something that comes across in Ask Ada, because you have these different scenes than they're constantly cutting. And let's say the perspective
is constantly changing with the voices.

Reading your phd thesis and watching Ask Ada, I tried to recognize some of the strategies you mention in your thesis for the use of text. For example, the Internal Monologues, the Unanswered Questions and the Voiceprints. Was the video functioning as a score for the musicians in this work?

Yeah, only the projection. It's mostly the text we use as her thoughts, because when the writer came to me with the libretto, she wrote these kinds of dialogues. So, then I suggested, why don't we just print the stuff, that's more her thoughts? And in the original performance we wanted to do that with another screen. So, because this was videoed in the end, we had it. Just coming up in the video you have the prologue and the epilogue, which is more like this text as I usually use it. But with the video we worked with Darien Brito. We've worked together before. I know the kind of work he does and I gave him quite some freedom. I said look, there's 4 four types of material that there should be video for. One is, as I said, in the past, like looking into memories. The other one is the letters. One of them is the Byron letters and then we had the uchronia parts, where the conductor gives a speech, so that these four different types of material, they'll be coming in different parts of the piece many times. So, I just said just think of really some material that fits that can be sort of varied in different ways. And in a way he came up with his great ideas about it, and I think I realized it as a kind of collaboration idea, I mean I was happy with the whole. With all my collaborative partners in this piece, you know the writer and Barry and the video because when you're working with somebody, when you give them very clear sort of parameters and then give them really the freedom to express that. So, you don't say, yeah, I was thinking for this part we should have something you know... And be too specific about what you want and they know I don't like that. Sometimes it could really limit the other person creatively, so I was really happy to just say OK. I trust you know whatever your creative input will be and then what we did in the end. We looked at it with the music and then we just. We were sort of. Fine tuning it in terms of, I think this needs to be slower here. Here it needs to be faster in terms of the sort of rate between the media. So, he did. I mean, he works a lot with touch designer, so he created these really live made kind of works. He has a set of controls, where he can change different parameters. Almost all the stuff he does is quite sort of self-generating stuff. So, there's nothing fixed about it. Actually, everything is generated live. So, in the performance he also automated some of these changes, but then some he was doing live also. And of course, the processing of the face of the singer was live also. And actually, the only thing that wasn't live was the text.

Was the text functioning in a way to help synchronization?

Yeah, so the text needed to be synchronized, because I wrote that together with the actual music in really an exact point. I don't know if you saw the trailer for the piece. Before I wrote the piece, I made the trailer and we never used that music in the end. We used that text in the beginning and that's the sort of way I usually work with text. Try to give a voice to it with music.

And I noticed that there's a pulse in some parts. Is that also helping for synchronization with the musicians?

The pulse. No, I mean, that's just a general choice and that comes from this algorithm that generates the underlying music material. That's how I started writing the piece. So once we had an idea about the structure. I literally made this harmonic rhythmic stroke, for the whole piece, which is based on this kind of evolution of this kind of number series. So, it starts off with just one note and then you have like two or three notes. Then 4 notes and it gets more complex. In the middle It gets really complex, like you can never play that actually, and in some of the parts I try to transcribe some of the notes to the instruments.

But I had to simplify it a lot to do that. So, in that sense the underlying structure of the pulse has this kind of clear element and then there's this part in the middle of the piece, the Note G part, where she sort of gives the lecture about her algorithm. That has this kind of very rhythmic motive going around that you might be referring to.

Yes, because I saw that some parts are very strictly timed. So, I was wondering how do you achieve that?

Actually, in practice I think in about 1/3 of the piece we used click track or let's say half the piece. And in these parts where it was very rhythmic, the conductor just heard the click
track because it had to be very synchronized.

And I was wondering about the visual aspect of your performance. Did you direct it yourself?

Yeah, in a way I did it. I ended up directing it. It's funny because I thought, we keep it simple. I asked a director to work with me, this Italian director who I've worked with, when I worked with the writer for the first time like years ago. And we were going to do it but then, because the performance was canceled. It was going to be filmed and I think because of Corona we couldn't really communicate and there wasn't such a big budget. Well, I just thought, I'll do it myself and it's not going to be too complicated. So, because there was a strong video visual idea and we had this idea of the music boxes, which was kind of quite strong, the only thing that really needed to be directed was the position of the singer with the musicians. But I think I underestimated it because when I got to Athens and we started rehearsing, I thought I've got to make all these decisions. Like how they move, what happens at the end? What happens in this part? It went very nice in a way. The singer was also really nice to work with. She had her own ideas about position because she has a lot of experience with that. The idea was clearing the whole stage for the end part like let's say destroying the stage a bit. I think I had that idea for a long time that we have to sort of do something like that. And then the conductor reading this text is also something we also decided as a kind of breaking the 4th wall, the optical thing. So, in a way I directed it as I like things to be directed, quite simple and not overly theatrical. And because there was such a sort of strong visual language in the video, I felt we didn't need to do too much. But I'm sure if there was a budget, I would be happy to have a director as well. Especially, if they can offer this kind of different vision as well.

I saw that you had very detailed instructions for the staging in the score. When you work with a director, do you still have instructions in your scores?

I think not in a way. Because in the times when I've really done opera, they're the more conventional opera. It's strange in a way the director has more power because it's like in the institution. Sometimes I've had unhappy collaborations because it's just the way it goes. The pieces that I've directed more, are like multimedia pieces that have a stage element, but they're outside the institution of opera. In a way it makes more sense to several pieces that I've done that have a very clear stage. Like the *Buffer zone* or this other piece, I did ages ago, *Escamotage*, Where I asked a director to be involved. So, he came in the last few days for the last week and just helped with chronic choreographic ideas, but he wasn't there in the beginning with the concept and everything. And for instance with the last pieces, I did just before Corona, I did 2 music theater pieces. One was with a MIME director. She does very big productions in Holland. And it was a piece with a wind quintet Halifax. It was like you have this quintet like falling from the roof of the theater very slowly and actors. It's very stage theatrical, no text. It's just really like movement and music, and for something like that. I have no say in a way with the direction. You know it's really clear what the roles are. And then I did a very nice collaboration which I really enjoyed but was difficult with the choreographer. At the same time this piece was called unmute. It's a thing with these

sensors, hand sensors and that was really interesting because we were both in each other's territory because you know making a sound involves movement. So, it was like what comes first. You know the idea of the sound or the movement. I had to be there all the time in the rehearsal and there was a lot of communication. And I think that the performers found it difficult because they were also outside their comfort zone. We were outside our comfort zone. It was that for me, that was really a very special collaboration. Dance critics really hate it because it wasn't really dance and I think if music critics were there, they would also hate it. But a lot of my colleagues really loved it because it was this kind of very innovative and sort of news kind of form. So, I really enjoyed all sorts of learning experiences. So that's sort of a situation where I think I couldn't have done that myself. Sometimes having this vision of another artist is great. It really pushes you in a direction. What I'm saying is that with Ask Ada, at this point having made peace and everything, I wouldn't be against the idea of a collaboration, if we've tried to get it performed. Actually, it was supposed to be done in Moscow in May. I asked a Russian choreographer friend if she wanted to Choreograph some things in it, but of course that's canceled. But if it's ever done again, I wouldn't be against the idea of having a director.

How do you think artificial intelligence will change the contemporary music scene in the next few years?

I'm busy with a project at the moment. Also with Darien, the guy that we made a kind of AI sort of thing. We recorded like 12 musicians on video and with specific material we made different algorithms or rules, how the computer chooses material, which we and the computer analyzed. And in doing that I was also trying to figure out what is possible with AI. Because I mean myself, I haven't been so inspired by all these kinds of learning algorithms that I've seen AI being used in music. Where you train the computer to learn and replicate, and it mutates certain things. But of course, it's really a fascinating area. I think it also has to do with the next generation, because maybe my generation can't really think. It's too accustomed in a different way of thinking, but I think with the new generations there will be much more sort of creative and imaginative uses of it. I think of what is already used now. It's something that I want to try and learn more about what's happening. You know what people are doing with it. And I know that Leiden ACPA is starting to research that a bit more. But I'm not against it, also specifically because I love seeing how, let's say, nonhuman or beyond human things can be. As an artistic space to explore I find it really exciting. Sometimes we get tired of our own tropes of expression in our cultures. I mean, rather than getting the machine to replicate those, I'm curious, what other fields that can open up. And that expands the sort of perception of things and that will definitely happen. It's just you know, like how and when. Also, in relation to our Ask ADA it really was something that in a way leads to that area. So, we specifically wanted to just touch on it. We had no answers, but we wanted to shine a light on it or mirror to the audience about this idea of being the heritage of what Ada Left and we are still dealing with.

Interview with Gwyneth Wentink (29 October 2022)
What element of the score made you choose/allowed Canto Ostinato by ten Holt to be interpreted this way?
First of all, the Canto Ostinato score is a score that works very well on the harp! It is written for one to four keyboard instruments but it works really well on the harp as well - and Simeon ten Holt was open to various interpretations. The electronic specialist I worked with, Wouter Snoei, is a composer as well as a great musician. I knew he would do magical things with the score; be respectful to the written instructions and on top of that improvise with the freedom that is allowed in the piece.

I know that Canto Ostinato was originally written for four keyboards? How did you divide the voices of the piece?
Well, I always keep one of the 4 voices 'going' in one of my two hands. Then I play around with the other voices, I jump from one voice to another and listen to what the electronics are doing and respond to that. If Wouter is picking certain voices I might choose to play unisono at some point or go the opposite direction. It's always different!

Was the music encoded also in the visuals? Did you feel you were interacting with the visuals too?
Yes absolutely. Wouter and I would have 2 mirrors in front of us (two large side mirrors of a huge truck on a stand) so we could see what the visuals behind us were doing. We played with the dynamics of what was going on there; he would build up in tension and dynamics and we would respond.
And so was Arnout, the visual artist responding to us.

Were you happy with the opportunity for interaction with the other performers?
Yes, of course. This made it super fresh. The environment where we played also made a huge impact - it was always a large communication between the music, the players, the audience and the environment/ building. Sometimes we played outside which was also inspiring. Once we played in India in a large outdoor park - you could hear the rikscha's honking throughout the piece. At another occasion we had the visuals projected on a large firehouse - it all gave new impulses for the musical interpretation - you play with it.

Based on your experience in playing chamber music, what elements were similar (in the rehearsals and performance) with this audiovisual setting?
Playing with dynamics, communicating and listening are all the same elements as in 'conventional' chamber music. It was for me a journey in which I discovered especially how similar the elements were as supposed to how different.

Interview with Wouter Snoei (15 November 2022):
Which elements of the pieces Canto Ostinato by ten Holt and in C by Terry Riley made you interested- led you to choose them to work with for this audiovisual interpretation with Gwyneth Wentink and Arnout Hulskamp?

There was kind of a personal thing for me, because my dad is very fond of this piece. So, I was trying to find out how to put it together as there are many interpretations already, and it's quite free, in a way, in a way it's composed. So, it's possible to interpret it also as an electronic piece. And also, because it's written so openly. And the same for “in C”, it's even more open, because it's only one page of notes, and some rules. And you can do it with any number of players. Well, I can also make electronic players and then I can make multiple players at the same time. So, they're there. Very logical step, actually, to do kind of the same thing with that piece.

For Canto Ostinato specifically, I understood from Gwyneth that you used the original score and she transcribed it for harp. Did you include all the voices? How did that work?

Yeah, so we took the score. And each of the sections have like, I think, six or seven voices in one system, but you can pull them apart and then you get about six or seven voices. And I put all these in the computer and made six sequences of it. Then we organized it in a way that I could trigger these things, live and choose which ones to play with, which kind of sounds combined with what and when and also, we coupled it to the tempo of the video rendering. So, a coupling was made from my system. And he made a freer interpretation of the cells in his images.

Was the score translated- encoded in the visuals in both pieces? Were you and Gwyneth able to follow his visual translation while playing?

I'm not sure if I would be able to see where he was in the score exactly, although he did have specific images for specific sections. You'd have to ask him how he exactly matched those together. Because that I don't know. But because in performances it was projected on us, we did feel the changes. So, you could kind of feel the colors and the movement in it. And we reacted to that. So apart from the score, there was an improvisation part in it, that we tried to also react to what we see and feel. But of course, music is also an abstract thing, but video is even an abstraction of that abstract thing.

So how did you experience following a notation? Was it limiting in a way, or did it give you freedom?

The notation of course only has the notes in it. And also, all the sounds and the way to play them. The rest is completely free. So, it's kind of an open notation. So, I wouldn't know. Let's say if you would want to notate the version that we made in some way, I wouldn't really know how. It's quite complex to do that. Because then you had to also have some kind of notation for sounds, colors and things like that, which for electronic music isn’t possible. I think that would require a lot of work to notate such a thing. And I'm not sure if it's really needed to notate the version that we made. The actual piece is what is notated, which is only the notes. And anyone can play this and make his own interpretation. And that doesn't necessarily have to be the same as our interpretation. And the same, even more applies to in C, because that's really only a sheet of notes, and a set of rules. And then even the timing, and a lot of things are more free. And there's so many different versions that sound completely different.

And was the process for the visuals similar for in C?

No, actually we had a different approach for the visuals in “in C”, also because we wanted to make a more clear connection between the visuals and what you understand. So, we really made a synchronized version in which the visuals are really transformed, in melodies and into certain shapes and movements. We invented this kind of system for that and we spent a lot of time together. I was playing the melodies, and then he was writing the different shapes. And we made it technically, in such a way that I could actually play images on his system from my system, and vice versa. So, triggering the correct melody that's connected to the correct shape. You could really see that, we had this round thing that the image was projected through and there were these shapes traveling around this lens at different speeds and in different lengths and were really coupled to the notes that were in the score and also to the tempo. Actually, if you knew the language, you could even predict how the shapes would look like for a certain melody. But it was definitely a more clear coupling. And you could also see that in the performance.

In the website of In Code, you mention that you were using a self-developed software. What is that software called and what is its function? Is the workflow very different from well-known live electronics software such as Ableton live? Could you also mention which software was used for the live visuals?

Electronics were all done in supercollider. And the visuals, I think it was two different programs. The in C used *Resolume*. For the other one, I'm not sure if he might have used *Vessel* as well. But it could be that he also used another program, that I don't completely remember. I also worked with him together in the beginning of this year, on another project, and he also used *Resolume*, for that you can really get clear connections between audio and video. So, supercollider is basically a programming environment for sound. You can start just with codes and you really build something up from scratch. So, it's a programming environment. And I developed software in that environment. It was called *Wfs Collider*. I used parts of that. But I really made separate programs for that, borrowing some parts from the *Wfs Collider* library, which is a resource full of useful stuff. Maybe you could do it in *Ableton Live*, because everybody's using Ableton these days, but you would have to bend the program in all sorts of ways to make it really as flexible as I had it in these performances, so I chose to build it really from the ground up with only what I needed. I think *Ableton* is very good at making dance music and that's what it's made for and that's what people do with it and it's great and I think there's no other program that can be used for making dance music, as good as *Ableton*. If you're doing something else then *Ableton* kind of tries to force you still into this dance music thing by offering all kinds of easy options for looping etc and for regular timeframes and time signatures. For example, “in C” every melody has its own time signature so it's immediately hard in *Ableton*.

Did you find that during rehearsing the piece, you ended up in a specific way of performing it or was it every time changing?

I think that it developed, during rehearsals, and the software developed as well. We went to a different idea about what we were going to do, and then when you rehearse so frequently it musically developed, I think. The Canto Ostinato developed in that sense more than in C is (we played a lot of times I think like 50 times or so). And it took some kind of shape where we had certain areas of the piece where we would use these specific things in other areas where we do specific things. And the “in C” remained I think more free, so the flow was more improvised and we got to discover new things in every performance. I think that's probably because of the nature of these pieces that they're the way they're composed.

Were you pleased with the opportunity for interaction between the three of you, during the performance of both pieces?

Yes, and I think that “in Code” became the next level in interaction with visuals, which was really much more connected. So, with hardware Gwyneth had actually her own electronic controls and could make her own loops with advanced control. A lot more entangled anyway. In Canto Ostinato she would just play the harp and I would do some processing on her sounds and also my own sounds. But she wouldn't have any electronic controls there. In “in Code”, we were really all playing with each other’s material.

Conversation with Dafni Arvaniti (12 May 2023)
What was your experience being part of a multidisciplinary ensemble and having to follow sound and a notation score as a guideline for your visual interpretation?

I find it very interesting to be part of an ensemble and observe the agency that the movement of drawing and listening has. As an artist I value a lot the performative aspects of nonlinguistic production of shared knowledge within a collective moment, capturing the movement of an experience from different points of view. The interaction with the materials for me provided a certain kind of unspoken score that my body would follow, guided from the sound influencing the way that the story would present itself. A certain kind of narrative having its basis on the moment of the performance. Water and paint, oil pastels giving agency

to my bare hands, extending their momentary existence captured to mine and projecting it towards the audience and back to the moment of interaction, becoming a bigger image to be experienced.

Interview with Amy Brandon (19 May 2023)

What inspired you to use augmented reality as a medium for your composition and what is the connection with the theme of boundaries?

I was introduced to augmented reality by Shannon Novak, a New Zealand visual artist with whom I shared a residency at the Atlantic Centre for the Arts in Florida. To me, what fascinated me about AR was its interaction with real space. I have used VR but I did not have the same sense of mystery in the merging of digital and real worlds. As our digital and real worlds get more and more bound together, I became particularly interested in the interaction between physical bodies and digital objects. This in particular came into being when I started writing pieces for the METAVision headset (not META as in Facebook - this company - https://en.wikipedia.org/wiki/Meta_(augmented_reality_company)).

The Meta headset allowed for hand recognition and the manipulation of digital objects with hand movements. From this I became interested in merging digital objects with instruments and wrote a number of works around that concept (*7 Malaguena Fragments for Augmented Guitar, flesh projektor*)

I am in particular interested in the boundary between the real and digital worlds, and the way we can use our physical bodies to bridge that boundary.

I wrote a chapter about this work in this book - https://www.bloomsbury.com/uk/21st-century-guitar-9781501373305/

Could you describe the process of creating the app for "Boundary"? Did you have prior experience in app design?

I don't have any prior experience in app design, I'm entirely self-taught (Youtube helped :)) But Boundary was my second AR app, so I had gone through the process before and learned a great deal - my first app did not use sound or hand-recognition.

https://youtu.be/hJO7Mqr4oOo

I used AR Foundation in Unity to build *Boundary*. I had a few years of experience in Unity from working with the Meta headset which helped.

I also made a third, more elaborate AR app called #touchgrass for Cluster Festival last year - here is a promo.

https://www.youtube.com/watch?v=50OSK8l9F1c

In the app version of "Boundary," users interact with 3D augmented reality sculptures. Can you explain how the interaction with these sculptures triggers sonic events? How does the route-movement patterns of the users influence the soundscape?

In Boundary I use hand recognition software from ManoMotion. It tracks the hands and can detect when they 'enter' or 'exit' digital objects.

Entering one of the spheres triggers the playing of one of 76 random samples. In this way, the soundscape is different each time.

I noticed that "Boundary" was created for the Gaudeamus Festival 2020 as part of Screen Dive. Was there also a live performance of the piece? If so, how did the live performance differ from the app version?

There was no live performance - only the app.

How come you chose an acoustic instrument (flute) to interpret sonically the interaction of the user with the augmented reality sculptures?

I used samples from a previous work called *microchimerisms.* I used these samples because I liked the result and they worked effectively for the piece.

Interview with Adriana Minu (21 May 2023)
Could you provide some insight into the Screen Dive project? How did this initiative come about, and what is its current status as a community?
So as far as I know, it's something that Luke Dean and Maya Felixbrodt started with Gaudeamus. And I think the first year was the year that we did “Ecstasies of Rooms”. So that's maybe more of a question for Luke and Maya. But I think they were hoping to do something to kind of support makers. And that is kind of focused on interaction and different types of participation.

"Ecstasies of Rooms" offers a unique and intimate experience where participants use their voices to connect with their own living rooms. Can you explain how you developed the exercises that guide participants through the audio journey?

“Ecstasies of rooms” was developed over the pandemic, on zoom with Christine and I. it's important to say that we know each other from Birmingham, because we did our undergrads there. I think we met in our final year maybe. The reason I say this is because I think it's important to say the kind of friendship that's behind it. And the fact that we did work together before it kind of led to a desire to explore our collaborative relationship. Having done quite a few collaborations over the course of my PhD, and before, I just find it important to say that collaborations are actually quite tricky, and that they take a long time to kind of stress test. And that is important to kind of not go ahead with things if they don't work out. So, to kind of have that space for them to fail somehow.

The exercises we developed, kind of iteratively. We weren't really sure what we were going to do. There were like a lot of options kind of put on the table. We would like meet up and have a two hour zoom call. The first hour, we would catch up because it was also in the pandemic and then we would say what's on our mind. What's the thing that is pulling us. So, it was quite a journey towards like understanding and refining our common interests. It was also very much brought up by the context, so it was a pandemic, we were both in the house. I was developing a vocal practice that had a good spot in the house because it was still quite an intimate and emergent form of vocalizing. And Christine was also kind of exploring her relationship with her body and space and we were just kind of bouncing things from one to another. Over many meetings, the kind of forum became more apparent, and the exercises themselves. We would set a meeting where each of us would have an exercise that would get the other person to try. So then, Christine would guide me through something in my own room, and then I would do it. And then we'd come

back and discuss how it was and refine it. And. So then we kind of ended up with a collection of exercises. And then we also draw this map of how to enter the space. So, what would be a useful order for somebody to kind of go through the exercises in order to kind of get closer and more intimate the more time spent in the room. So, there were quite a few different elements to it and I think we also split them. We always had this in our collaboration that it really is a 50-50 split. So, I think it was quite natural to put this together so that it feels like it expresses both of our approaches, interests, kind of sensory experiences.

Can you share some details about your collaboration process as composers? Did you collaborate also with other makers (programmers, designers) in order to create the virtual space for your project?

So, I think I kind of already spoke about that a bit. So, my husband, Tim, is an artist and has a background in computer science and creative coding. And he helped us with the app, because you have to have this app that allows you to listen and record audio at the same time to kind of like pause the audio that's playing and to record with a microphone. And he very kindly coded that for us. And the 3d virtual space is something that Luke Deane and I were working on. So, Luke was also very keen to actualize any visions we had in practice and he had quite a lot of experience working in Unity before. I remember trying out things in Unity and yeah, he really helped a lot with getting it going. And we kept this physical space relatively bare bones, just with enough things so that it's got a bit of personality, but not too much. So that it's not only somebody's, because the whole idea was so that the room is seen as a common room as a space for all of the different people to be able to inhabit.

The Common room is a virtual 3D sound installation that gathers vocal responses from participants in real-time during Gaudeamus Music Week. How did participants respond to hearing their own recordings and the recordings of others in this virtual space? What kind of emotions or reactions did you observe during the event?

So the event was kind of what you see today, in the sense that audio was being gathered during the event, and what you would hear at different points in the day would change. I think Luke or Tim set up this server, like a repository where the audio would go from the people that would record. Then during the week, I had to take that audio, and render these in a longer audio. So, imagine one audio file is a collection of everybody's audio, everybody's submitted audios from that particular location. So, we had audio coming from the ceiling or audio coming from the window and various places in the room. So, it was very much like a manual process. That was definitely not sustainable to just keep doing forever. And we kind of kept it to the week that the project was going on live. About the response from the audience, well, because some of them we knew because they were our friends, we kind of chatted to ask more about how the experience was, but we didn't really have a formal feedback session, because it was like a remote thing. And we didn't really know who was doing what, and the sounds were abstract enough to not really be recognizable.

What happens to the recordings that participants submit online now? Are they continuously added to the virtual room, creating an evolving soundscape?

Well, that would be ideal, but because we haven't figured out a way to automate this process, I don't think that is being updated. But I need to check with Luke because he might have done something that I don't know about. It's true that I did go in recently and thought, oh, this sounds different than when I listened to it last time. So, something might be happening. But yeah, maybe it would be an idea to kind of do a daylong event or something. And get some more audio because for a while, I would go to the space and it

would be the same. Now the room is starting to kind of have a sound of its own that every time I go and visit it sounds static. So yeah, logistic issues with sustaining something like that when the process is not automated. That's definitely something to consider.

Considering the unique circumstances of the pandemic, "Ecstasies of Rooms" was created as a response to the limitations and possibilities of that time. How do you think the project would have been approached differently in a non-pandemic reality?

So interesting that you asked this because, I think it was very much involved by how prevalent screens were in our lives. Also, back then, if you wanted to do something with others, it had to be through a screen. Because this was also like the early stages. So, there were lockdowns. I was in Glasgow and Christine was in Amsterdam. I think *Ecstasies of Rooms* is very much a reflection of screens and rooms, equal pandemic. And for the Western world, for some of us. So how to approach it differently maybe is what we managed to do with the work *Ecstasies of things*. We were asked last year to do a workshop version of *Ecstasies of rooms*. So, then we came up with *Ecstasies of things* but our starting point was very much ecstasies of rooms. I was working with these transducers, which were these tiny speaker cones that you could have attached to a certain object. You could put them inside a mug, for example, and they would make sounds so I think the first thing we wanted to do was maybe something like that, to have some sort of physical surround or kind of location audio-based thing. And we were thinking about that for a while, but I think because there was a bit of time in between Ecstasies of rooms and Ecstasies of things, our interest and approach changed. We took that kind of intimate knowledge we developed of vocalizing and being with objects and with space and we focused it in a more intimate and participatory performance, which became *Ecstasies of things*. If you don't know much about it, there is some documentation on my website.

Interview with Rui Pehna (22 May 2023)
Was the a.bel application developed especially for the work Cellular? Has the a.bel application been used for any other performances?

- A.bel was designed to give access to smartphones to control PD patches. It was then used for the different compositions performed during the premiere at Casa de Musica in Portugal. A server was sending data to the smartphones of the people in the audience allowing them to use PD patches.
- There was a big projection mirroring the image of the audience.
- When they tested the application with the participation of 200 phones the server failed. So, until the very last minute, they were not sure if the server will be able to support the communication of 120 people that were in the room. In that case, there was a plan B with a simpler autonomous version of the application.
- Later the concert was repeated at Carnegie Hall in NY city and the technology used was much simpler. Bluetooth beacon devices were used to assist communication with the smartphones and could mark time. The budget got reduced from 10.000 euro for equipment in Casa de Musica to 50 euros.
- After the piece, Cellular the composer gave up on the idea of concerts with audience engagement. “From the music perspective, the concert was a failure”. People were not listening to the music, they were talking loud during the performances being busy with their phones and waving to see themselves in the mirrored projection of the audience.
- In the concert at Carnegie Hall, they choose not to mirror the audience and rehearse the performance beforehand. That concert was much more successful. The fact that then 90% of the

public were conservatory students might have contributed to that success, since that public is trained to listen, as the composer mentioned.

How was the a.bel application developed, and who was involved in its development?

A.bel was developed in Inesc where Rui was working at the time by Clement a Master student at the time.

Is the a.bel application still active and available for use?

After the big success of the concert in Casa de Musica Rui wanted to make the a.bel app open source but the rest of the team disagreed resulting in the app not being available anymore.

How did the instrumentalists interact with the music they played in relation to the a.bel application?

- The piece was built based on steady fast notes and changing harmony. The sonic material produced by the cellphones was quantized and consequently always synchronized with the live music performance. Moreover, through the system, they could control the positioning of different music material and harmonies in the room. Specific pitches were becoming available for the audience to play only in the corresponding part of Cellular where harmony changed.
- The saxophonist of Cellular is also a programmer and was completely aware of how this interaction should be working.
- No artificial reverberation was used. The room served the amount that is heard in the recording.
- If he could do *Cellular* again the composer said that he would prefer to go in the direction of the participatory piece *Study no. 30* by Ryan Ross Smyth using a visual score. http://ryanrosssmith.com/study30.html

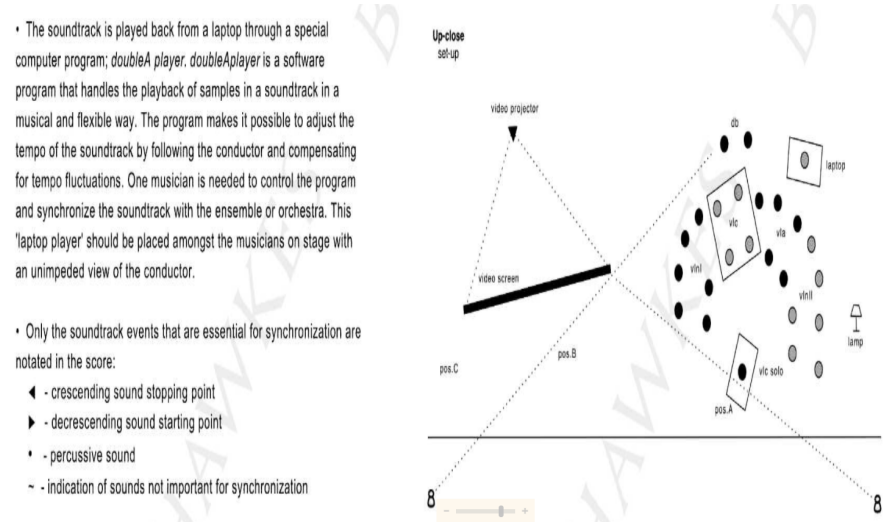
- As a respond to cellular and his negative experience with the audience not focusing on “listening”, the composer created the piece “Resono”. He wanted to create a piece that the audience could explicitly play.
- *Resono* was a museum installation where 15 small objects- artworks using machine learning could sing responding to the audience behavior. They were able to listen to frequencies and sing back when specific frequencies were lacking. The objects would copy the dynamics of the people or get shy and not respond at all when ignored.
- When somebody sang nonsense or when sung like a professional opera singer the devices wouldn’t respond, but if a child was heard in the room, then they would.
- The loudest they got was during the night when nobody was at the museum. Then they were free to “dream” and sing freely. “I found the fact that this was happening when no audience was present very beautiful” the composer mentioned.

Appendix 5: Transcriptions, (annotated) scores, analyses

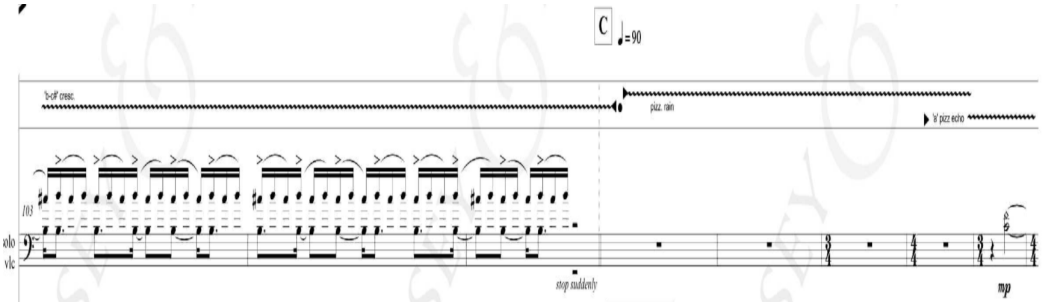
Analysis of scores

Analyzing the scores of pieces by Michel van der Aa, can shed more light to some of the characteristics of his work mentioned in the articles above, and the way he integrates different media in the dramaturgy of a performance. It's not only his clear concepts and specific function of every element of the performance that helps for a better integration, but also the fact that all the media are written in detail in the score and function themselves as instruments, interacting with, or accompanying the voices and acoustic instruments.

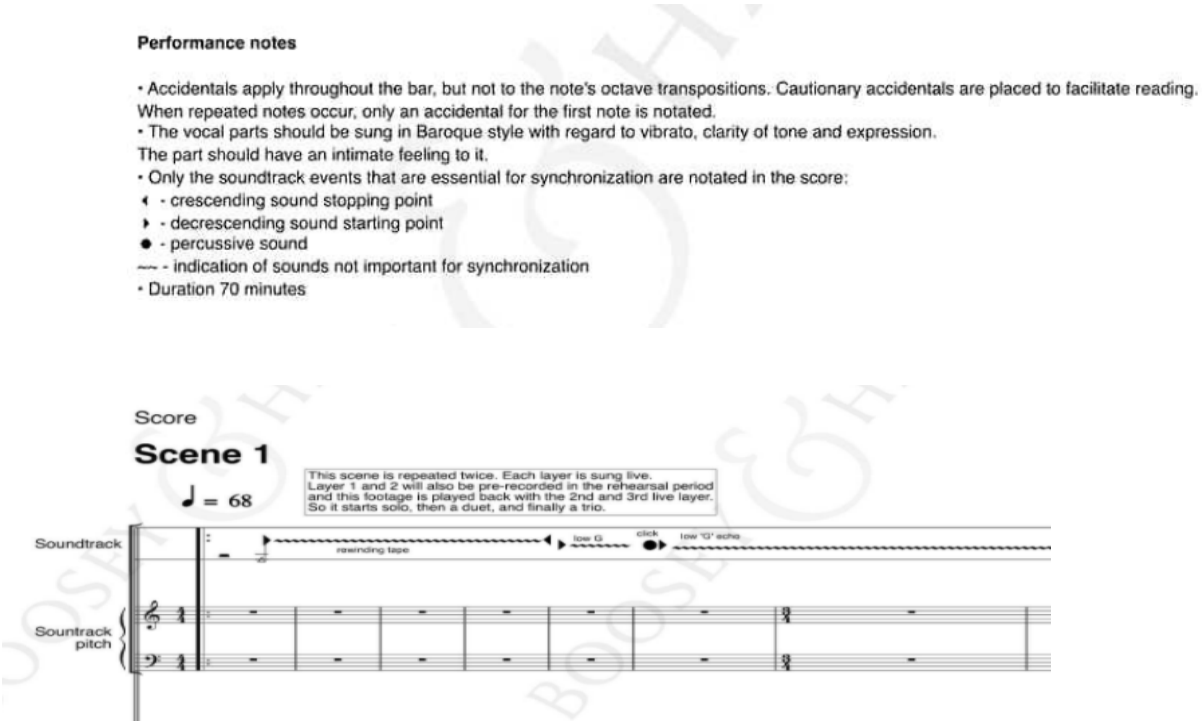
In the score of *Up- close* we can already see in the performance notes, that he introduces a scoring system specifically for the synchronization of the prerecorded soundtrack he uses in the piece.



Michel van der Aa requests the use of a specific computer program (doubleAplayer), for the playback of prerecorded samples and synchronization with the ensemble. One musician is assigned to control the program and synchronize the soundtrack with the live orchestra, following indications in the score.



The composer seems to follow the same system for the soundtrack synchronization also in next pieces, as we can see in the score of his piece *Blank out (2015).* He uses the same notation system for the soundtrack synchronization.



Performance notes

- Accidentals apply throughout the bar, but not to the note's octave transpositions. Cautionary accidentals are placed to facilitate reading. When repeated notes occur, only an accidental for the first note is notated.
- The vocal parts should be sung in Baroque style with regard to vibrato, clarity of tone and expression. The part should have an intimate feeling to it.
- Only the soundtrack events that are essential for synchronization are notated in the score:
  - ◂ - crescending sound stopping point
  - ▸ - decrescending sound starting point
  - ● - percussive sound
  - ~~ - indication of sounds not important for synchronization
- Duration 70 minutes

Score

Scene 1

♩ = 68

This scene is repeated twice. Each layer is sung live. Layer 1 and 2 will also be pre-recorded in the rehearsal period and this footage is played back with the 2nd and 3rd live layer. So it starts solo, then a duet, and finally a trio.

Soundtrack

rewinding tape

low G

click

low 'G' echo

Sountrack pitch

Kyriakides, Yannis. “ASK ADA : Music Theatre for Voice, Ensemble and Multimedia,” 2021. https://webshop.donemus.com/action/front/sheetmusic/20223/ASK+ADA.

Ask Ada is a music theatre work for a singer, 6 instruments, electronics and video. The work revolves around Ada Lovelace, daughter of Lord Byron and famously credited as having written the first computer algorithm in 1843. Commissioned by The Greek National Opera, it premiered at the Alternative Stage in June 2021 and was streamed on GNO TV in October 2021.

Form:

1. Prologue/Dear Babbage
(2:18 Fixed time)
2. Afterlife 1
(1:48 F)
3. Remembering 1
(2:14 Open time)
4. Fare the(e) well 1
(1:28 O)
5. Fare the(e) e well 2
(0:49 O)
6. Afterlife 2
(0:47 F)
7. Afterlife 3

(1:18 F)
8. Afterlife 4
(0:22 O/F)
9. Remembering 2
(2:24 O)
10. Fare the(e) well 3
(1:23 O)
11. Dear Babbage 2
(2:15 F)
12. Remembering 3
(0:47 O)
13. Afterlife 5
(1:56 F)
14. Afterlife 6
(1:35 F)
15. Remembering 4
(2:19 F)
16. Fare the(e) well 4
(1:36 O)
17. Dear Babbage 3
(1:19 F)
18. Dear Babbage 4
(0:43 F)
19. Note G 1
(0:46 F)
20. Note G 2
(0:59 F)
21. Note G 3
(1:45 F)
22. Note G 4
(1:15 F)
23. Note G 5
(2:05 F)
24. Fare the well 5
(1:19 O)
25. Ada Remembering 5
(1:47 O)
26. Remembering 6
(1:12 O)
27. Uchronia 1
(0:48 O)
28. Uchronia 2
(0:46 O)
29. Uchronia 3
(1:26 O)
30. Uchronia 4
(1:20 O)
31. Death 1
(0:32 O)

32. Death 2
(3:25 O)
33. Death 3
(1:39 F)
34. Afterlife 6
(1:19 F)
35. Dear Babbage 5
(1:45 O)
36. Epilogue

Instrumentation:
Voice
Percussion [Vibraphone & Marimba]
Harp
Piano
Violin
Viola
Cello
5 music boxes (30 note) played by ensemble
Live electronics and soundtrack
Live video and projection [2 screens]

Text:
In *Ask Ada* (and other works by Kyriakides) text plays a very important role and is communicated to the audience in 7 different ways.

1- projected in large screen
2 - projected in small screen
3 - by the singer
4 - singer with autotune
5 - singer speaking with autotune/vocoder
6 - computer voice
7 - conductor's voice (processed)

Staging- Dramaturgy:
The staging of this theater work is mentioned in the score in a very detailed way. The position of the two screens, the position of the music boxes, the instruments and the singer. All the elements of the performance are primarily controlled through an Ableton Live file containing all the audio, midi files, and electronic instruments, and whose structure corresponds directly with the sections in the score. Some parts, (as mentioned in the form), are automated and strictly timed, others are free and cued on the conductor and singer. Sync points at the beginning of every section are sent to a second computer running Touch Designer (programmed by Darien Brito) which send out the text films and live visuals to the two screens[127].

[127] Kyriakides, "ASK ADA, page 5.