



LEUPHANA
UNIVERSITÄT LÜNEBURG

Site-Specific Multimedia Performance as a Contemporary Artform

**By the School of Culture and Society
of Leuphana University Lüneburg for the award of the degree of**

**Doctor of Philosophy
Dr. phil.**

**approved dissertation by
Dong Zhou**

born on 05 November 1992 in Shanghai, P. R. China

Submitted on: 22.06.2026

Oral defence (disputation) on: 08.04.2026

First supervisor: Prof. Dr. Rolf Großmann, Leuphana University

Second supervisor: Prof. Dr. Georg Hajdu, Hamburg University of Music and Drama

First reviewer: Prof. Dr. Rolf Großmann, Leuphana University

Second reviewer: Prof. Dr. Claus Pias, Leuphana University

Third reviewer: Prof. Dr. Georg Hajdu, Hamburg University of Music and Drama

Submitted as a dissertation under the title: Site-Specific Multimedia Performance as a Contemporary Artform

Year printed: 2026

Published by: PubData - Institutional repository of Leuphana University Lüneburg

Site-Specific Multimedia Performance as a Contemporary Artform

Table of Contents

Preface	4
Chapter 1: Introduction	6
Significance of Topic	6
Thesis	6
Methodology	7
Delimitation	9
Background	9
Chapter Organization	12
Chapter 2: The Genealogy of Site-specific Multimedia Performance	13
Understanding Multimedia Performance: Body, Technology, and Integration	14
Early Trajectory from the 1870s to 1960s	18
Non-everything: Happening and Fluxus	23
Three Tributaries: Music, Theater, and Computer Technology	27
Computer Technology and Game	32
Composers Include Multimedia	34
Conclusion	38
Chapter 3: Sound and Environment	40
Early Concerts in Unconventional Spaces	41
Involving the Environment Through the Composition of Electronic Music	43
Conclusion	58
Chapter 4: Mobile Technologies and Logistics	60
Devices in Spaces	62
Portable Loudspeakers	64
Portable Sound-picking Devices	70
Multifunctional Devices	71
Communication Devices	77
Logistics	78
Conclusion	81
Chapter 5: Case Studies	83
Alexander Schubert: <i>Control</i> (2018), Oslo	84
Georg Hajdu: <i>Symphony in St. Pauli Elbe Tunnel</i> (2019), Hamburg	98
Manos Tsangaris: <i>City Pieces (Window Piece)</i> (2016), Hongkong	121
Kirsten Reese: <i>Berlin Rosenthaler Platz</i> (2018), Berlin	132
Luna Valentin: <i>Quatuor pour la grotte Saint Marcel</i> (2020), Bidon	139
Dong Zhou: <i>Sound Ride</i> (2023), from Hannover to Lehrte	148
Conclusion	154
Chapter 6: Influences on Other Art Forms	157
Contemporary Classical Music	158
Contemporary Dance	160
Telematic Performance	162
Film	164
Conclusion	166
Concluding Remarks: Expanding Artistic Approaches	168

Bibliography	172
Index	188
Appendix	196
Excerpt of interview transcript with Luna Valentin	197
Excerpt of interview transcript with James Cheung	201
Excerpt of interview transcript with Panagiotis Botzios	204

Preface

Major performance festivals around the world, such as the Performing Arts Festival Berlin (Performing Arts Festival Berlin, “2023 Program”), Yokohama International Performing Arts Meeting (Yokohama International Performing Arts Meeting, “Program”), and Festival d’Avignon (Festival d’Avignon, “2023 Program by Place”), have recognized the significance of site-specific works. What was once a checkbox for festival organizers has now become a vital category for artists and audiences alike. Site-specific performances have transformed ordinary venues into immersive stages, where the boundaries between art and space dissolve, ushering in a new era of artistic exploration.

Central to the identity of site-specific multimedia performance is the seamless integration of multimedia technology. It is here that the genre takes on its true form. Whether through the use of virtual reality, projection mapping, or interactive soundscapes, the incorporation of multimedia elements has redefined the possibilities of artistic storytelling. The marriage of technology and site-specificity allows for experiences that are not only visually and sonically captivating but also deeply immersive and participatory.

In the realm of art, words matter. The term “site-specific multimedia performance” serves as a powerful communicative tool. It not only defines the presentation form but also hints at the level of technical support and complexity involved. This terminology has become the bridge that connects artists, audiences, and organizers, facilitating a clearer understanding of the immersive, multidisciplinary nature of the performance.

Within the realm of music, the introduction of site-specific multimedia performance is particularly transformative. In contemporary music, multimedia concerts often incorporate significant visual elements. However, it can be confused with the visual presentation added extra to a music piece to have better communication with the audience.

“If there is something that can be done in the performance or presentation of a work of art that may improve the communication of its essence and spirit to an audience, then it would seem reasonable and legitimate to use this means. It would seem logical to approach the whole issue of the use of visual effects in music performance with this as a basic rationale.” (Greckel 2021, p.5)

The term “Site-Specific Multimedia Performance” changes this perception. It invites audiences to embrace the entire experience, from the visual to the auditory, viewing the performance as a holistic artistic creation. This shift in perspective has the potential to redefine the way we engage with music in a live setting.

As Peter Weibel pointed out in today’s post-media condition, “any artistic method follows the script, the rules of the media” (Weibel 2006, p.13), site-specific multimedia performance is a phenomenon worth exploring to understand how artistic mediums and technological expression have evolved.

Chapter 1: Introduction

Significance of Topic

Nowadays, site-specific multimedia performance has gained significant attention from musicologists and sound researchers. However, current research primarily focuses on sound installations and concerts (music performances), emphasizing acoustic features and social-environmental impacts. Multimedia performance is rarely discussed, and often misunderstood as merely a concert with visual effects. Media technology applied to the combination of music and environment brings fundamental changes to performance, enabling site-based performances that create narratives beyond purely musical expression.

In performance studies, site-specific multimedia performances are often analyzed as a type of theater work. Consequently, references to music history, composition, and music-related theories are frequently overlooked.

Site-specific multimedia performance exists at the intersection of sound studies, media theory, musicology, and performance studies, yet remains absent from each of these fields. This project seeks to define site-specific multimedia performance as a genuine art form and seeks to establish its historical position.

Research on this topic requires literature from diverse fields. In the humanities, research has necessarily been interdisciplinary, incorporating ideas about music, sound, art, noise, environment, technology, and art marketing. My dissertation closely intersects with sound studies and media theory, both of which have gained attention in musicology and performance studies.

Thesis

This dissertation examines the history of site-specific multimedia performance and contemporary pieces with technological aid. By understanding the concept

behind selected pieces, especially the artistic ways of applying technologies, I aim to characterize and define this new art form. Site-specificity is part of multimedia performance history, and technology is key to making the site musically involved in contemporary multimedia performance. Site-specific multimedia performance is an interdisciplinary working mode that also influences other traditional art forms.

The investigation is based on selected examples. The six main works I chose demonstrate the tendency toward site-specific multimedia performance in recent years in Europe. I analyze site-specific multimedia performance pieces by Manos Tsangaris (b. 1956), Alexander Schubert (b. 1979), Georg Hajdu (b. 1960), Kirsten Reese (b. 1968), Luna Valentin (b. 1998), and Dong Zhou (b. 1992) in relation to their connection to historical multimedia pieces, theories, and commentaries by composers and sound artists. In selecting historical works, preference is given to those focusing on music. When reviewing works from the 21st century, a higher level of media hybridization appeared. Multimedia, especially telematic technology, has made site-specificity palpable in performance and has significantly tightened the relationship between music, narrative, and site. Therefore, the selected contemporary works are from composers, though music is not necessarily the center of these works.

Methodology

To find the historical root of site-specificity in musical performance and the historical process of how technology changed our perception of the sonic environment, I rely on primary and secondary resources that document these pieces and the commentary of composers and critics, as well as the definitions of site-specific performance, promenade concert, soundwalk, and other related art forms from different times and places (USA, Canada, Europe, and East Asia). I will provide a narrative explaining how the site became part of the composition and how

the situation changed with the development of media technology, parallel to the works of the six Europe-based composers.

The central primary source documents are the scores and video recordings of the six pieces. The lecture recording of Alexander Schubert introducing *Control* at Hamburg University of Music and Drama (HfMT) (Schubert, “Control Lecture at HfMT”, 2019) and Kirsten Reese introducing *Berlin Rosenthaler Platz* at 8. Salon in Hamburg (Reese, “Lecture at VAMH”, 2018)¹, the paper by Georg Hajdu and Rama Gottfried regarding the *Symphony in St. Pauli Elbe Tunnel* project (Hajdu, Gottfried 2019), the paper by Luna Valentin, Miriam Kolar, and Philippe Monteil regarding speleoacoustic research (Valentin, Kolar, Monteil 2022), and the composers’ websites also provided very important detailed information.

Besides these sources, I also conducted interviews with some of the composers and project participants. Excerpts of their thoughts can be found as quotations throughout all chapters, and the full interview transcripts are included in the Appendix.

Other sources include the video made by the Hamburg Port Authority reporting the *Symphony in St. Pauli Elbe Tunnel* project, critiques of *Control*, hardware manuals, software tutorials, and maps of the performance locations.

My position as a composer and performer should also be mentioned. My observation of site-specific performance occurs from multiple perspectives: as an audience member, performer, composer, concert technician, and researcher, benefiting from my previous study of computer music. I have worked on theater and performance projects since 2013, which is closely connected to my interest in performance studies and non-music pieces. I noticed the differences between site-specific works composed by people from various backgrounds and always

¹ Video recordings of both lectures can be found in the reference.

sought to understand how these technical changes were implemented. The sensitivity and curiosity regarding site, media, and performance are the key factors that motivated me to launch and continue working on this project.

Delimitation

This project will focus on site-specificity in multimedia performance and how multimedia technology has changed site-specific performance. These multimedia performance works center on music or sound, but due to their hybrid use of different media, they do not fit the traditional term “concert.” The dissertation does not aim to provide a complete history of site-specific performance or present a comprehensive overview of site-specific performance with multimedia elements. When selecting cases for analysis, the works were all realized within the past ten years, demonstrating a high level of interaction between the performer and the site, which introduces vital changes to the musical or sonic result. However, earlier pieces and composers are discussed when the focus is on the evolving process of site-specific performance.

Background

The history of compositions influenced by places had one of its apparent starting points in the Baroque period. At that time, many composers were hired by churches, and their works were always played in the same locations. They must have noticed how church acoustics affected the music and consciously or unconsciously altered their compositions. In the 16th century, Gabrieli composed his choir works in St. Mark’s Church and instructed musicians to form separate groups and stand in different locations (Arnold 1979, p.80). According to Ursula Rehn Wolfman, “The musical and architectural forms, as well as the character of the instruments crafted by the masters of the Italian Baroque mutually supported

each other—as did those of the contrasting German Baroque tradition” (Wolfman “Corelli and JS Bach: The Musical and Architectural Baroque Style” 2013).

Over the span of the 17th to 19th centuries, various factors such as shifts in employment, orchestra expansion, instrument advancements, growing audiences, and evolving compositional techniques prompted significant changes in concert halls’ size, shape, materials, and locations (Herr, Siebein 1998, p.146-150). During this period, a standard for concert halls gradually emerged, reflecting the prevailing norms and preferences of the time. However, by the late 20th century, a notable shift occurred as composers began to prioritize creating and seeking performance venues specifically “customized” for individual compositions. This departure from the traditional standard marked a new era in the relationship between composers and concert spaces, emphasizing a desire for unique environments that enhance individual pieces. For example, Iannis Xenakis designed the Phillips Pavilion in 1958 at the Brussels Expo partly for his own music; Stockhausen drafted the Spherical Concert Hall at the 1970 Osaka Expo; and Water Heaven was commissioned by Tan Dun and finalized by the architect studio Arata Isozaki (2010, Shanghai, China).

Phonography and recording technologies changed music consumption. With the Walkman’s release in 1979, music became portable, creating a personal hearing environment. It provided an alternative to concert halls (Hosokawa 1984, p.166). The Walkman Effect represented the final stage of modifying the hearing environment, giving listeners mobility and personal choice. People could now decide where and when to listen to music, with concert attendance becoming one of many options. Visiting a concert became increasingly attractive for its social function. Today, different perspectives dominate concert perception. It is often viewed—especially by young people—as authentic live communication, high-class, but also as an outdated, non-entertaining event.

This situation prompted composers to question a place's aesthetic function and overcome concert hall stereotypes. As John Cage observed in 1958, "It is now possible for composers to make music directly, without the assistance of intermediary performers" (Cage 1973, p.4). Composition is technically much less demanding. Consequently, composition diversity increased, with smaller audiences in each genre. Instead of repeating a piece everywhere, some composers prefer to cultivate a specialized audience and maintain their following. Thus, adapting a piece to all locations is no longer necessary; performing it in a single location has become a viable option. For example, in 1992, the concert *Long Strings* by Paul Panhuysen, Phill Niblock, Jo Truman, and Michael Delia was composed for the Plasy Monastery (Plasy, Czech Republic). Paul Panhuysen is famous for his long string installations in which he installed strings in rooms, "each installation made specifically for the site where it was displayed" (ZKM Archive, "Paul Panhuysen: Long String Installations"). And his installation was in tune with Phill Niblock's music amplified in a way specifically for the architecture's acoustics. "In Plasy, Phill Niblock performed his piece on tape with further amplification by way of the special acoustics in both chapels" (Agosto Foundation Archive, "Phill Niblock: Two Pieces for Resonant Architecture").

The changes in concert form came not just from composers' concerns. Early electronic music enhanced the range of musical instruments; soundscape composition made environment sound and geographic features a part of music; sound sculptures brought the connection between sound and object; the instrumental theater proposed by Mauricio Kagel showed a strong impact on Helmut Lachenmann's works which combined musical and theatrical performance (Williams 2013, p.76); and site-specific theater provided inspiration for musicians to move out of concert halls by blurring the boundary of music and theater, for example the work *Aufbrechen Amerika* that Christof Nel, Wolfgang Storch, and Eberhard Kloke realized in 1992 in and around Bochum (Lehmann 2006, p.152).

Chapter Organization

This thesis begins by considering the concept and practice of site-specific works from the late 19th century. Chapters Two and Three review the history of site-specific multimedia performance. Chapter Two assumes that site-specificity was already part of music and media works before this term was first coined in the fine art realm. Chapter Three will focus on the transition of site-specific performance from a concept of fine art to an art form in music and multimedia art.

Chapter Four will emphasize the technical aspects of these pieces and show how media technology has changed the methods and aesthetics of contemporary site-specific composition.

In Chapter Five, I expand my thesis with six case studies: Alexander Schubert's *Control*, Georg Hajdu's *Symphony in St. Pauli Elbe Tunnel*, Manos Tsangaris's *City Pieces (Window Piece)*, Kirsten Reese's *Berlin Rosenthaler Platz*, Luna Valentin's *Quatuor pour la grotte Saint Marcel*, and Dong Zhou's *Sound Ride*.

After discussing historical and contemporary site-specific performances, I aim to take this opportunity to think a step further. In Chapter Six, I connect site-specific multimedia performance to other art forms. In the final part, I will conclude the whole project and evaluate its potential research implications.

Chapter 2: The Genealogy of Site-specific Multimedia Performance

The term “Multimedia Performance” represents a radical transformation in artistic expression, where traditional boundaries between artistic disciplines dissolve into a fluid, technologically mediated landscape. From Richard Wagner’s revolutionary “Gesamtkunstwerk” to the avant-garde experiments of the 20th century, performance has progressively shifted its center from narrative and musical composition to technological intervention. This genealogical exploration traces how composers, artists, and technologists collaboratively reimagined performance—moving from isolated artistic disciplines to integrated, site-specific experiences that challenge conventional aesthetic boundaries. From early theatrical innovations to futurist experiments, from happenings to digital interventions, by examining key historical movements, we uncover how multimedia performance emerged as a complex, interdisciplinary practice that fundamentally redefines artistic creation and audience engagement.

Understanding Multimedia Performance: Body, Technology, and Integration

“Multimedia Performance”

To establish a theoretical framework for site-specific multimedia performance, it is first necessary to critically examine and reconceptualize the ontological dimensions of multimedia performance as a distinct performative modality. Charles London has described it as a “name given loosely to performance in which different forms, such as speech, song, dance, film or video, are mixed together” (London in Chambers 2006, p.545). Before I quote more definitions given by other researchers, I would first divide the term “multimedia performance” into “multimedia” and “performance” and raise two questions: First, can I add to London’s words that in multimedia performance, at least one type of media and one type of performance must be mixed? Second, would any way of mixing them be considered a “multimedia performance”?

For the first question, cyborg theatre² gives a hint for focusing on the relationship between body and technology:

“A cyborg theatre focuses on the metaphoric qualities of the cyborg, rather than overtly straightforward combinations, and the potential for both critical and possible merging between the organic and the non-organic, the body and technology.” (Parker-Starbuck 2011, p.37)

Using “body” to epitomize performance is widely accepted in theater and performance art. For example, Hans-Thies Lehmann pointed out “as postdramatic theatre moves away from a mental, intelligible structure towards the exposition of intense physicality...” (Lehmann 2006, p.96). In recent years, the “body” has also been regarded as an indispensable part of music:

“...all music is music theatre. Perhaps we are finally willing to accept that the bodies playing the music are part of the music, that they’re present, they’re valid, and they

² The term “cyborg theatre” is used here in its original published form, which employs the British spelling “theatre”.

inform our listening, whether subconsciously or consciously. That it's not too late for us to have bodies." (Walshe, "The New Discipline" 2016)

As the concept of "body" has become central to performance across artistic disciplines, the physical human form and technology have been integrated to a new level, giving rise to new theoretical frameworks. Cyborg theatre emerges at this intersection, exploring how the human performer's body interfaces with and is transformed by technological elements.

Cyborg theatre is just one kind of multimedia performance, and there are also multimedia performances that don't include human performance, such as immersive environments, hologram projection performances, and robotic theater. However, there are still "bodies", which are either the audience, illusionary characters, or both. I will discuss and expand on this in the next paragraph.

For the second question, I would like to mention that Klich and Scheer used "Dance + Virtual = Multimedia Performance" (Klich, Scheer 2011, p.105) as their exception to Auslander's opinion, "Dance + Virtual = Virtual" (Auslander 2005, p.93). Here, the left and right sides of the "formula" cannot be exchanged because multimedia performance includes not only dance and virtual elements, but they make a point: the body and technology neither overshadow each other nor simply coexist in the performance space, but instead create something different from the individual parts.

Parker-Starbuck has a further explanation of her definition of cyborg theatre, which can be generalized for all kinds of multimedia performances:

"Like the larger term of multi-media performance, cyborg theatre reflects a form of engagement with technology that has shifted over time, to reflect not only conceptual fears about technology's encroachment, but also an embracing of "new" technologies in content and form." (Parker-Starbuck 2011, p.3)

Dating back to futurist artists' electromechanical theater works, such kind of performance has existed for more than a century. However, research has typically examined these performances from a single perspective (such as music, dance, text, or stage). Technology was often treated as a supplementary element within

another art form. In 2001, researchers began to approach multimedia performance more holistically, considering all its elements as an integrated whole.

“Only in the past decade or so has there been an attempt to theorize the increasing use of on-stage technologies as a form...in terms of the integration with the body.”
(Ibid., p.5)

Since that moment, there has been a need to seek a unique criterion to appreciate and comment on multimedia performance. This criterion should differ from how we treat any single art form that comprises multimedia performance. Initially, this was a trend among theater scholars, but in the past decade, composers have become increasingly active in experimenting with multimedia performance. I will mention later in this chapter how they contributed theoretically to this topic, but practically, they are pushing beyond the theory. Site-specific multimedia performance is one of the experiments often undertaken by contemporary composers.

Why Body?

As I have written above, some multimedia performances don't use the human body as their (pre-made) medium. These are probably the multimedia performance works furthest from site-specific works. The reason I want to mention them is that even in these works, bodies exist. Gianacchi has offered the term “virtual theatre” for these works and a typology of the art form. She claimed it is “towards an aesthetic of virtual reality where everything is simulated, and the live performer has disappeared” (Giannachi 2004, p.123).

However, the live performer has never disappeared; it simply does not appear as a human performer accompanying the work. Instead, it manifests as the audience, as illusionary characters, or as both. I will examine three works that represent these distinct possibilities.

The first one is *Eavesdrop* by Jeffrey Shaw and David Pledger (2004, Sydney). It was filmed and displayed in 360 degrees, where the spectator can choose to move closer to any character on the screen (see Figure 1) and listen to their narratives. Spectators connect different pieces of the story in their own way. The spectator acts like an investigator and “performs” together with the virtual characters.



Figure 1. Demonstration of *Eavesdrop* by Jeffrey Shaw and David Pledger, *Eavesdrop* (2004). (Provided by Jeffrey Shaw Compendium)

The second example is the *Miku EXPO* produced by Crypton Future Media, INC., where the main character, virtual singer Hatsune Miku, is shown by hologram projection. Ironically, human musicians are indeed on the stage, but neither the light nor the video camera focuses on them. Launched in 2014, *Miku EXPO* has become a groundbreaking concert series that has toured across Asia, North America, and Europe, drawing thousands of passionate fans who cheer, wave glowsticks, and sing along with an enthusiasm that often surpasses traditional concerts with human performers. The virtual idol commands the complete

attention of the audience, while the talented live band remains in relative obscurity despite its crucial role in creating the music. The concerts feature a sophisticated projection system that creates a life-sized, three-dimensional appearance of Miku performing on stage through a special transparent screen. What makes these shows particularly fascinating is how they've redefined the concept of a "live" performer—the audience fully embraces and connects with a virtual character as their idol, demonstrating that emotional resonance and star power are not limited to human performers.

More recently (2018-2023), teamLab has composed a series of works with the theme of flowers. In all these works, the spectator's movements directly influence the blooming and fading of flowers. Here, there are no virtual characters, but the spectator interacts with the environment. Furthermore, this series of immersive environments became popular photo-shooting spots. While people take photos of each other, they watch each other as "performers."

As Hans-Thies Lehmann said, theater means the collectively spent and used-up lifetime in the collectively breathed air of that space in which performing and spectating take place (Lehmann 2006, p.17). In these examples, whether there is a story or not, the audience's acts and thoughts directly changed their experience, their bodies, or the imaginary body that completed these works.

For site-specific multimedia performance, the geographical existence of a place makes the physical presence of the performers (or at least part of the participants) even more important.

Early Trajectory from the 1870s to 1960s

The trajectory of multimedia performance can be traced to ancient times. From the origin of the phrase "deus ex machina" (Chondros 2013, p.1), we can find evidence of using mechanical instruments in theater to create illusions in ancient

Greece. However, Wagner's 1876 premiere of *Der Ring des Nibelungen*, which introduced the concept of "Gesamtkunstwerk" or synthesis of artistic integration, opened a new chapter of its paradigmatic transformation.

Richard Wagner and Adolphe François Appia

Wagner's Bayreuther Festspielhaus (Bayreuth Festival House) and his opera cycle *Der Ring des Nibelungen* were significant milestones in putting different media in one music theater. As Salter described it as "a total synthesis of elements: staging, image, music, and text" (Salter 2010, p.2), it set a form that later multi-media performances would often reference.

Wagner, based on the Romantic notion, was unable to achieve what he described in his theory: "to include all phases of art and in doing so to consume, to destroy each one, so to speak, in favor of the total purpose of them all" (Wagner 1912, p.115). Looking at his design today, we can see that most of his decisions were driven by the visual and acoustical presentation of his music. For example, the auditorium's shape was designed to control reverberation under 1.55 seconds; its wooden material was chosen as a low-frequency resonator, and columns were added along the wall for better sound reflection. The stage was designed to create a sense of distance and to let the audience feel "it was the unapproachable world of dreams" (Wagner 1964, p.366). He also tried to hide the musicians in a space below the stage and keep the auditorium in total darkness to immerse the audience in the story's virtual world.

For Wagner, the performance environment (the theater as interior architecture) should be invisible, as should everything that doesn't directly serve his musical expression. For example, he considered the physical appearance of the musicians to be excessive. Though he created the Bayreuth Festival House for his music theater, he didn't recognize the building as part of it.

Wagner's follower Adolphe François Appia, had a very similar mindset to Wagner. "The key to a true realization of Wagner's vision, Appia claimed, lay in the musical

score...” (Salter 2010, p.5). With enormous respect for Wagner’s music and concept, Appia—with his theoretical writings (1895/1899)—delved deeper into the possibilities of using space and light in theater.

While Wagner and Appia used technology to create illusions on stage, there was a clear hierarchy: narrativity was at the top, performers were the conveyors of music and story, and the audience passively accepted them. Appia changed stage design and lighting, but only bound the visual presentation more tightly to music. He abandoned the idea of the distance between the audience and performers and removed barriers between them, but he didn’t seek audience subjectivity, nor did he give performers the freedom to react to the audience.

Futurism and Constructivism

In the Futurists’ early practice of *Serate Futuriste* (Futurist Evening) between 1909 and 1914, they made provocative gestures toward the audience to “create between ourselves and the crowd, through continuous contact, a current of confidence without respect, so as to implant in our spectators the dynamic vivacity of a new futurist theatricality” (Marinetti 1915/1970, p.146).

Among these Futurists, Filippo Tommaso Marinetti, Bruno Corra, and Emilio Settimelli were strongly inspired by Wagner’s “synthesis” idea but no longer used it to protect plot supremacy. In their “The Futurist Synthetic Theatre” (Ibid.), they used eight sentences starting with “it’s stupid” to attack theatrical tradition and proposed a new form of theatre creating “synthetic expressions of mental energy...” (Ibid.). Their works were from, about, and for machinery and the mechanized world: inspired by modern theater space, showing the beauty of futuristic life, composed for audiences to forget their mundane daily lives and train their spirit for the industrialized world’s demands.

The Futurists writing most of their theater works inside theater spaces wasn’t yet a site-specific concept but gave “space” an unprecedented position in theater composition.

In 1913, Luigi Russolo wrote “The Art of Noise” and, with his brother Antonio Russolo, Ugo Piatti, and Marinetti, organized machine, human, and animal noises as music. World War I caused most concert cancellations, making them the only “Futurist musicians” directly using noise in composition. Their concept influenced composers like George Antheil, Arthur Honegger, and others in Italy and Russia. Though these composers still wrote tonal music, they began using orchestral instruments to make or imitate various noises. Ideas like Francesco Balilla Pratella’s “ending singer domination, making them like any other orchestra member” and “opera composers writing their own librettos” (Pratella 1910) were quickly accepted in the music world.

After recording technology advanced, musique concrète composers used recorded noises as sound material. While often linked to Futurist campaigns, their use of noise was purely aesthetic. They sought to remove sounds from their original context, conceptually differing from Futurist ideas.

In the later phase of Futurism, Enrico Prampolini proposed the “personification of space” (Prampolini in Salter 2010, p.10), where the theater space itself, rather than human performers, conveyed the drama. In his “L’atmosfera scenica futurista (Futurist Scenic Atmosphere)”, he argued that a stage should actively communicate with the audience like an actor, not serve as mere decoration. Fortunato Depero shared a similar vision of embodying film characteristics in physical space. As Salter noted, Depero and Prampolini developed “the construction of stage machinery where the human element was integrated into, made equal with, and ultimately subordinated to a technical apparatus” (Ibid., p.11).

Just a few years after the Futurists began their movement, Constructivists in Russia launched their own influential wave. While their main contributions were to visual art—painting, graphic design, sculpture, and architecture—stage designs by artists like Popova and Lissitzky advanced theater’s decentralization, notably by elevating the role and visibility of stage design and designers.

Constructivist stage design, characterized by its innovative approach, encompassed diverse creative elements. Stage installation became an art form itself. Drawing inspiration from the film industry, Constructivist designers reshaped the theatrical experience. The futuristic opera *Victory Over the Sun* (1913) was initially performed with groundbreaking supremacist stage designs by Kazimir Malevich. Later, El Lissitzky reimagined this work in his unrealized concept of an “Electromechanical Peep Show” (1923), which paralleled Depero and Prampolini’s ideas. An unrealized stage design can be found in Figure 2. This theoretical approach would have combined mechanical elements, cinematic influences, and architectural precision to create immersive stage environments, representing a bold vision for the future of theatrical performance.

In *Victory Over the Sun* (composed by Mikhail Matyushin, 1913, Luna Park Theater, St. Petersburg), a microtonally tuned piano functioned as both a scenic element and a musical instrument. The libretto, written in Zaum—a transrational language developed by Aleksei Kruchenykh that deliberately transcended conventional linguistic meaning through phonetic associations and rhythmic structures—was complemented by quarter-tone vocal compositions. The opera’s sonic innovations culminated in its dramatic denouement, where the cacophonous intersection of an aircraft collision with the stage synthesized the work’s revolutionary approach to theatrical soundscape, paralleling its radical scenic experimentations.

From Wagner to Futurism and Constructivism, theater's focus shifted from music and plot to theatrical space. According to Futurist and Constructivist ideals, theater space evolved beyond its role as a mere container to become an autonomous element capable of generating theatrical meaning. While their radical theories on the human-machine relationship in theater were not fully implemented in practice, these movements successfully challenged theatrical tradition by prioritizing pure expression over conventional narrative structures.



Figure 2. El Lissitzky's stage design (unrealized) for *Victory Over the Sun* (1923).
(Photo: © Tate, London 2026)

Non-everything: Happening and Fluxus

For Futurists and Constructivists, elements from daily life—sounds and mechanical installations—became artistic materials, combined at the artists' will. Yet everyday life was still regarded as “monotony,” maintaining a boundary between life and art. Even as they sought to “abolish theatre technique” and achieve “liberation from the past and from ‘well-made’ music” (Marinetti 1915/1970, p.146), they remained as devoted to creating illusions as their predecessors.

Marinetti called it “stupid” to “worry about being faithful” and “to attempt to explain everything represented on the detailed logic” (Ibid.). Their fascination with spatial control and fetishization of strength and speed reflected the era’s imperialist ideology, rooted in global power struggles. While competition for global influence persisted, World Wars I and II still led to increased international cooperation, particularly among the USA, Germany, and other European nations. This period of simultaneous cooperation and rivalry facilitated the migration of artists, theories, and cultures beyond their origins.

Like John Cage, who had read extensively about Indian, Japanese, and Chinese philosophy, Allan Kaprow was also inspired by Zen Buddhism. They both had a strong interest in “indeterminacy” and “found” materials in the environment. In 1959, Kaprow introduced the concept of “Happening.”

“Forget all the standard art forms. ...Repeating it makes it stale, reminds you of theatre, and does the same thing as rehearsing: it forces you to think there is something to improve on...” (Kaprow 1968, p.1-2)

Following the spirit of “Sera Futuriste” (Futurist Evening), which began in 1910 in northern Italian theaters, traditional terms like “concerts,” “poetry,” or “exhibition” could no longer adequately describe this new art form. These non-traditional forms moved performance from theater to non-theater spaces, from gallery to non-gallery venues. Kaprow claimed Happenings even “eliminated the audience” since everyone present was creating it, though “composers” and “performers” engaged with the program earlier than the “audience.” The distinction between these roles disappeared.

For Happening artists, the finished artwork or musical piece was no longer crucial. The lack of a clear beginning and ending strongly influenced later art forms like sound installations and soundscape composition.

As temporal experiences, these events couldn’t be repeated or recorded. Documentation of Happenings exists only through programs, oral accounts, and rare photographs.

Here is an excerpt from a program:

“Naked women eat giant bowls of Cheerios and milk atop a mountain of used tires. Children disgorge barrels of whitewash over the mountain. A hundred yards away, men and women swimmers in brightly colored plastic pools continually leap out of the water to catch with their mouths rubber gaskets festooned with lifesaver candies that hang from chains of men’s belts.” (Kaprow 1968, p.5)

Fluxus emerged as another influential art movement during roughly the same period as Happenings. While these two art movements share many connections, most Fluxus artists had musical backgrounds, and their conventions in making and perceiving art prevented them from dissolving the boundary between performer and audience. They maintained the term “audience” because, as mentioned earlier, performers and audience members could only appear to be doing the same things in performance; technically, they could not achieve the same level of preparation.

La Monte Young’s 1960 series exemplifies early Fluxus artists’ experiments in pieces 3, 4, and 7. He focused on the audience’s role. In piece 6, he wrote: “The performers (any number) sit on the stage watching and listening to the audience in the same way the audience usually looks at and listens to performers” (Archive of MoMA, “1960”). In pieces 2 and 5, he transformed daily life into performances by making a fire and releasing a butterfly in the concert venue. In piece 2, he emphasized the fire’s sound by instructing, “In the event that the performance is broadcast, the microphone may be brought up close to the fire,” specifying that the fire served as both performance and musical instrument. In piece 15, he wrote, “This piece is little whirlpools out in the middle of the ocean,” describing an image that the performer must transform into music. In pieces 9 and 10, he provided or defined a shape (a line) as the score, an approach closely resembling graphic notation, which requires synesthetic transcription.

But when Nam June Paik performed piece number 10, he didn’t use the “straight line” as abstract information to be transcribed; instead, he took it as a literal instruction, drawing a line with his ink-dipped head. As a former composition and

musicology student, he expanded upon his teacher Cage's approach. In seeking musicality through non-sonic media, Paik conducted wide-ranging experiments: from his early audio-visual interaction in *Paik-Abe Video Synthesizer* (1969) to the audience-engaging installation *Schallplatten-Schaschlik* (1963/1980), from his performative collaborations with Charlotte Moorman in the 1960s and 1970s to the video-sculpture *Piano Piece* (1993), which combined augmented instruments with multichannel video. As a result, he combined music, video, installation art, and performance with consciousness in his works (Ballengee 2020, p.158).

Among Paik's many works, performance played an important role, but only a few were documented through video or photos; the rest were preserved only as installations. Paik did not notate the performance aspects, indicating that by 1960, he was already treating interactive installations differently from musical works, even though he hadn't yet termed them "interactive music." Charlotte Moorman and Paik himself were almost exclusively the "official" performers of these installations, but their interactions were not the only possible ways of "playing" them. For instance, while exhibiting *TV Buddha*, Paik conversed with the Buddha and repositioned the TV in various directions. After this performance, only the "instrument" was preserved, and the method of interaction became less significant.

The *TV Cello* (1964) is largely self-explanatory in its use, though aspects like solo versus ensemble performance, tempo, and duration remain open to interpretation. These pieces demonstrated Paik's shift from concert and performance pieces to sound installations, legitimizing interactive installation as a form of musical work (rather than merely an extension of fine art).

After this, Paik frequently used TV sets as his instruments. Compared to the *TV Cello*, these works had more distinct interactive installation characteristics: they were open to audience interpretation, with sounds and visual effects reflecting the environment. In *Participation TV* (1969), audience members were encouraged to make sounds with microphones, and a sound-frequency amplifier altered the

colored lines in the middle of the TV screen according to the noise type and volume.

Happenings opened new possibilities for art forms to merge under “performance art.” However, Fluxus artists—particularly former composition students like La Monte Young, Nam June Paik, George Maciunas, and George Brecht—maintained the forms of “music” and “concert.” This made both them and their audience, including critics, more aware of what was absent from traditional music and concerts, as Brecht described the music of his event scores as “getting down to facts” (Nyman 2011, p.72). Consequently, regardless of their stance on this approach, their pieces were labeled “intermedia.”

Three Tributaries: Music, Theater, and Computer Technology

After 1970, performance art and intermedia pieces continued to evolve, while distinct developments emerged in music, theater, and technology. Site-specific installations broke out the limitation of gallery spaces by integrating environmental and architectural elements. Soundscape composition, pioneered by R. Murray Schafer and the World Soundscape Project (Schafer 1994, p.xi), treated environmental sounds as musical material. In theater, practitioners like Robert Wilson and The Wooster Group developed what Hans-Thies Lehmann would later term “post-dramatic theatre³,” rejecting traditional narrative structures in favor of non-linear, multimedia performances. Meanwhile, the emergence of computer technology spawned new forms: artists like Jeffrey Shaw and Lynn Hershman created computer-assisted installations that responded to audience movement, while early game artists like Chris Crawford began exploring video games as an artistic medium. These parallel developments, though distinct from Happenings and Fluxus, shared their interest in interdisciplinary exploration, audience participation, and environmental awareness.

³ The term “postdramatic theatre” is used here in its original published form, which employs the British spelling “theatre”.

Site-specific Installation

Though Paik's sound installations gained recognition in the music world, Dinkla still positioned sound installation "between fine art and music" (Dinkla 2006, p.9). Site-specific installation emerged from non-musical origins, with Lynn Hershman's 1973 Dante Hotel installation using the hotel's existing furniture and function as "found" material. While not a sound installation itself, this approach influenced later sound artists.

Max Neuhaus's Times Square (1977, Figure 3) installation utilized the existing architecture to resonate with his droning sound, running continuously⁴ and integrating with the urban soundscape.



Figure 3. *Times Square* in 1977. (The Estate of Max Neuhaus)

In site-specific installations, artists incorporate and respond to environmental elements—climate, architecture, and human activity—while complementing the location's existing soundscape.

⁴ By May 2026, this installation still runs in Times Square.

Soundscape Composition

After a period of celebrating industrialization's conveniences, its negative impacts gained attention. As pollution became a global concern, artists shifted from glorifying industrial sounds to addressing acoustic problems. In the late 1960s, R. Murray Schafer established the World Soundscape Project (WSP) to highlight noise pollution. The group's members later expanded their work from observation and investigation to actively modifying environmental sound, transitioning from "acoustic design" to soundscape composition.

Schafer proposed that "acoustic design is to regard the soundscape of the world as a huge musical composition." This perspective suggested environmental sound could be musical without traditional rituals (like concert halls) or techniques (like recording). Though later soundscape compositions incorporated recording technology, they maintained environmental context. As Ferrari noted, he "thought it had to be possible to retain absolutely the structural qualities of the old *Musique Concrète* without throwing away the content of reality of the material it had originally" (Ferrari in Emmerson 2007, p.7).

The traditional approach to sound creation can be characterized as "additive," whereas soundscape composition, particularly in its use of field recordings, employs a "subtractive" methodology. Rather than generating sounds from imagination alone, composers engage with their acoustic environment, applying compositional frameworks to filter and interpret ambient sounds. This approach, sometimes termed "found composition," shares conceptual parallels with the use of "found objects" in Dadaist works and "found material" in Happenings.

Hildegard Westerkamp's *Fantasy for Horn I* (1978) and *Fantasy for Horn II* (1979) exemplify soundscape composition without and with instrumental accompaniment, respectively. The first composition utilizes various recorded horns, both self-recorded and sourced from the World Soundscape Project's environmental recordings collection, edited while preserving the distinct character of 1970s coastal Canadian soundscapes. The second piece incorporates a live French horn

with the recorded material. Westerkamp selected horn sounds for their capacity to “rise above any ambiance, even that of large cities... sound marks that give a place its character and give us, often subliminally, a ‘sense of place’” (Westerkamp, “Fantasy for Horn (I).” 1978). The addition of the French horn serves a purely musical function, providing a live timbral complement to the recorded sounds, particularly in concert settings.

Postdramatic Theatre

While sound installation and soundscape composition emerged as independent artistic forms, exploring the spatial and temporal dimensions of sound beyond traditional musical frameworks, postdramatic theatre developed by deconstructing conventional theatrical hierarchies and narrative structures. Both fields retained Fluxus’s emphasis on process over product and its challenge to artistic boundaries. Sound artists increasingly incorporated visual and spatial elements, while postdramatic theatre practitioners explored acoustic environments and sonic materiality as autonomous theatrical elements. This mutual expansion into interdisciplinary territories, though developing separately, reflected their shared heritage in Fluxus’s radical questioning of artistic categorization and its emphasis on experiential, event-based art forms.

“Postdramatic theatre” encompasses theatrical forms that have diverged from text-centricity since the mid-1960s. While Hans-Thies Lehmann, who coined the term, maintained its broad scope, Bonnie Marranca’s description of “theatre of images” highlights a key characteristic: “Value came increasingly to be played on performance with the result that the new theatre never became a literary theatre, but one dominated by images—visual and aural” (Marranca 1996, p.ix). This emphasis on visual and aural elements remains relevant in multimedia performance discourse, as digital media extends these “images” while raising questions about the relationship between media and live performers.

Musicalization represents another significant aspect of postdramatic theatre, particularly in its approach to language. Robert Wilson labeled his works “operas”

because he prioritized the phonetic and musical qualities of language over its semantic content. He observed that actors from different cultural and linguistic backgrounds brought distinct tonal qualities to their performances, noting that “what is of interest to them is precisely the diverse speech melodies, cadences, accents, and in general the different cultural habitus in the act of speaking” (Varoupoulou 1998, in Lehmann 2006, p.91).

On the other hand, it also means a method in which directors work like music composers. Heiner Goebbels called this method “conceptual composing,” where he “combines the logic of texts and the musical and vocal material in many variations” (Goebbels in Lehmann 2006, p.92). It becomes possible to manipulate and structure the entire sonic space of a theater in a targeted fashion. When staging *Hamlet* in 1999, Lithuanian director Eimuntas Nekrosius used objects on stage as instruments to produce music, which was later widely adopted in music theater and other forms of performance art (Lehmann 2006, p.92).

The provocation in postdramatic theatre is applied as a way to activate the audience. Roger Vitrac’s *Les Mystères de l’amour* (1923) exemplifies how attacking the audience and even gesturing to shoot them constitutes the dramatic element of a theater work. It pervaded the surrealist theater of that time but was abandoned until it was revived in the 1960s. This revival significantly impacted Fluxus artists. In 1960, Paik played Chopin in a performance, then “threw himself on the piano and rushed into the audience, attacking Cage and pianist David Tudor by cutting their clothes with scissors and dumping shampoo on their heads” (Muchnic, “Nam June Paik, 74; Free-Spirited Video Artist Broke Radical New Ground.” 2006).

One of the highlights where provocative actions extended into a whole-evening-long theater is *Publikumsbeschimpfung* (Offending the Audience) by Peter Handke (1966). In this work, four actors on stage deliver offensive speeches addressed to the audience. There is no story, logic, or aim; the speech brings only emotion and sound. This work, although performed in a traditional theater space

where the stage and audience are clearly separated, challenges the role of the audience from beginning to end. Yan Jun has noted its connection to experimental improvisation music and commented: “*Publikumsbeschimpfung* is absolutely not to insult the audience, but a refusal of the concept that the ‘audience’ is separated from other parts of the theater” (Yan Jun, “Offending the Audience”, 2015; translated by the author).

The numerous experimental theater works and their unprecedented level of musical participation showed their influence on music very soon. Mauricio Kagel’s instrumental theater pieces are probably the most famous among the early attempts to include theatrical elements in contemporary classical music through composition (rather than at a later stage). Pieces like *Mare Nostrum*, scenic play for countertenor, baritone, flute, oboe, guitar, harp, cello, and percussion (1975), and *Kantrimusik*, pastorate for voices and instruments (1973/1975), became classic examples of writing scenic ideas in scores.

Similar to Happening and Fluxus artists, postdramatic theatre practitioners were also influenced by non-Western culture, especially Noh theater, Bunraku, Peking Opera, and ritualistic actions in East and West Asia. The realistic imitation of real life was abandoned, and all departments in the theater were liberated from their traditional functions so that all elements could have equal importance.

Computer Technology and Game

Before the computer was invented, composers sought different possibilities through recording technology and electric instruments such as synthesizers. The history of electronic music and sound art is tightly connected to the history of recording technology.

The first personal computer emerged in 1975; shortly after, in 1977, the first Digital Audio Workstation (DAW) followed. From 1990, software DAWs like Pro Tools and Cubase enabled composers without specialized computer knowledge to produce electronic music independently. For sound artists, it became possible to realize more complex ideas with computer programs. Some game designers made initial attempts to achieve human-machine interaction through computer programs. Beyond technical assistance, computer gaming, a new industry that emerged alongside computer science development, brought revolutionary changes to how people perceive stories and how artists express themselves.



Figure 4. Screenshot of *Gossip* (1983).
(From Wikipedia)

Gossip (1983, Figure 4), designed by Chris Crawford, is a game where players take the role of one person in a group of seven. Players can call any other character to discuss people in the group. These conversations affect the protagonist's popularity. What makes this game special is that the narrative is not merely an introduction to a series of simple actions but forms the core of its playability. The emotional connection between players and characters became a typical feature of later computer game genres like visual novels and art forms like interactive theater.

At almost the same time, Lynn Hershman made her installation *Lorna* (1979-1984), where the participant can choose how to develop the story. A similar approach

was also used by artists like Rosa Freitag in her work *Mixed Emotions* (1995), which she labeled as an “interactive film” (ISEA Symposium Archives, “Interacting With Human Characters: An Engaging and Rewarding Interactive Storytelling Experience” 1996). In these artists’ works, they have not necessarily used computers as media, but we can find that the mindset of these works is very much influenced by the way people interact with computers.

An example of computer-aided installations for musical purposes is David Rokeby’s *Very Nervous System* (1982), where he used a computer program to recognize the participant’s kinetic activity and convert it to music.

As Chris Crawford said, interactive storytelling is an extension of computer games. Interactivity made the computer a medium for artistic creation rather than a tool (Crawford 2012, p.43). The “storytelling” here does not necessarily mean showing a plot but instead giving the participant some materials to connect and build something meaningful.

In 2016, the site-specific augmented reality game *Pokémon Go*, developed by Niantic, had great success. It showed how a system activated the interaction between players and connected to the geographic location, which affected real life through a game. This concept has been borrowed by site-specific multimedia performance works, such as one of the case studies, *Control*, in Chapter Five.

Composers Include Multimedia

Composers have a long history of composing or adapting their pieces for specific performance spaces, making site-specific composition an enduring focus. I will explore this perspective in a later chapter. But here the question is: why are so many composers creating multimedia performance works? Unlike much research in performance studies and theater, the pieces I will discuss in this dissertation are composed primarily by music composers. This raises the question: Are composers taking over directors’ jobs?

Such questions still expect composers to write musical notation. And when composers work in opera, theater, film, or other interdisciplinary art forms, they traditionally serve the plot through written music. However, as mentioned above, in performance art, text is no longer necessarily central; conceptually, any art form can take a dominant position in performance work. For example, in music videos, visual imagery is subordinate to music.

Redefine Composition: “The New Discipline”

Is it technically possible for anyone to work in any field of art? Technology development offers great potential. With just three months of learning, a director could produce music, a composer could create visual art, and a choreographer could design lighting. Equipment is becoming cheaper, reducing barriers to experimentation. Someone with ideas needs only a brief time to achieve professional-level competence comparable to years of traditional experience. Thus, practitioners from any discipline could lead multimedia performance trends.

It’s unsurprising that composers began incorporating media beyond music into their compositions. This tradition began with opera, which inherently blends multiple artistic forms. In early operas, composers maintained significant creative control, with Richard Wagner’s concept of “Gesamtkunstwerk” being particularly influential. Earlier composers like Verdi were also deeply involved in the theatrical aspects of their operas. For instance, Verdi repeatedly intervened in Piave’s libretto writing during *Macbeth*’s development in the 1840s (Budden 1978, p.271).

Theater’s traditional power dynamics gave composers substantial influence. In the 19th century, musical directors often held more artistic authority than stage directors. Composers like Wagner meticulously controlled every production aspect, from musical score to stage design, establishing a precedent for interdisciplinary artistic control.

This compositional approach continued through 20th-century avant-garde movements. Composers like John Cage and Karlheinz Stockhausen actively experimented with multimedia performances, deliberately breaking traditional

boundaries between sound, visual art, and theatrical space. Their work challenged conventional performance structures, positioning the composer as a multidisciplinary creative force.

Through these evolutionary stages, the composer's position strengthened and expanded, transforming from a purely musical role to a complex, interdisciplinary artistic practice.

Additionally, electronic music and sound art integrated technology as part of music, facilitating the quick adoption of media technology into their artistic language. In 2016, Jennifer Walshe proposed the concept of "The New Discipline" and identified numerous composers working in performance and multimedia.

"The New Discipline is a way of working, both in terms of composing and preparing pieces for performance... In the rehearsal room, the composer functions as a director or choreographer, perhaps most completely as an auteur." (Walshe, "The New Discipline" 2016)

At the end of the manifesto, she defined everything a composer creates as music.

"Maybe what is at stake for the New Discipline is the fact that these pieces, these modes of thinking about the world, these compositional techniques—they are not "music theatre," they *are* music." (Ibid.)

In other words, "composition" returns to its original meaning: putting things together. We should embrace this traditional yet renewed usage of the word. It's understandable that people without musical or academic backgrounds call themselves "composers" when they create multimedia works.

The Revival of Physical Existence:

Choice of Post-digital and Choice of Composers

After digital media became part of our daily lives, it was no longer revolutionary or cutting-edge to involve it in art. The "post-digital" aesthetic chose to reuse non-digital or "old" media as materials or tools, but with concepts deeply influenced by digital media. These media usually have physical forms, making the physical presence of space important again.

Beyond referencing analog media, post-digital aesthetics also focused on “the background”—elements present in the art-creation process but previously ignored. “The data hidden in our perceptual ‘blind spot’ contains worlds waiting to be explored if we choose to shift our focus there” (Cascone 2000, p.13). The concert space exists in this niche. John Cage’s *4’33”* and its exploration of ambient concert hall sounds marked just the beginning.

The composers’ current situation is another factor driving them to compose for specific places. Since the release of the Walkman, there has been an increasingly broader range of choices of portable music. Recorded music became readily accessible outside concert venues. Attendance in live performances became increasingly valued for the unique social and experiential aspects of concerts.

This situation led composers to question the aesthetic function of performance spaces and challenge concert hall stereotypes.

As Georg Hajdu noted in “Disposable Music,” the composer’s traditional role faced many new challenges. “The prosumers” (producers and consumers) have altered audience relationships. One consequence is greater compositional diversity but smaller audiences for each genre. Rather than creating pieces for widespread performance to reach large audiences, some composers prefer to cultivate a dedicated, small following. This eliminates the need to adapt pieces for multiple locations; performing in a single space becomes a viable option.

“Nevertheless, as in any dynamic system that is subject to change, artists and musicians react by adapting to the new economic and media structures, and the result is in no way to be considered inferior compared to the previous period. Here, we could launch a discussion about the unfortunate role of the public broadcaster, the fact that pieces rarely see more than a single performance, the reluctance of publishers, the self-publishing activities of young composers, and how ‘prosumers’ (producers and consumers) have altered the connection with audiences.” (Hajdu 2016, p.26)

Conclusion

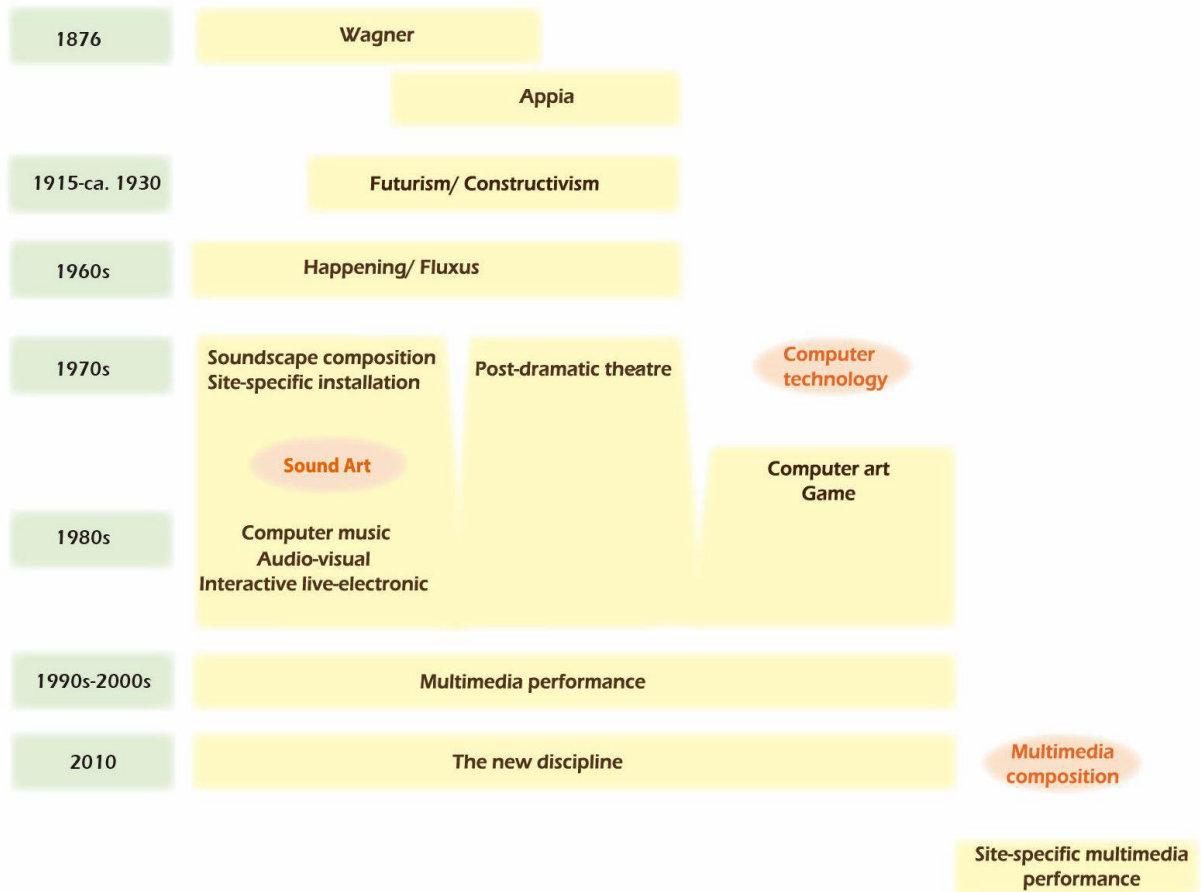


Figure 5. Artforms related to site-specific multimedia performance in timeline.
(Created by the author)

In exploring the genealogy of multimedia art, three pivotal shifts mark its historical transformation: the convergence of disciplines, the evolution of performer-audience dynamics, and changing environmental engagement. These shifts transformed art forms, creating new artistic expressions and evaluative paradigms. A diagram of these art forms in a timeline can be found in Figure 5.

The Romantic era maintained clear boundaries between music and theater, even within shared spaces. While Wagner's Gesamtkunstwerk concept moved toward synthesis, hierarchical structures persisted. The goal of creating immersive illusions influenced later artists' approaches. Appia's work extended this concept, innovating theatrical spaces. From 1876 to around 1915, performance spaces served as unobtrusive vessels, carefully crafted to fade into the background while supporting performers and audiences.

The transformation continued through futurism, Fluxus, sound installations, contemporary theater, and games. These movements catalyzed change—creative centers merged, bridging artistic divisions. Futurism's energy, Fluxus's focus on process, sound installations' innovations, gaming's interactivity, and postdramatic theatre's perspectives interwove art forms, revitalizing artistic approaches.

The rise in site-specific multimedia performances represents a natural evolution of these historical developments. In this collaborative landscape, disciplines contribute equally while participatory audiences reshape performance concepts. Composers now bridge tradition and innovation, creating site-specific multimedia performances that connect past and present.

Chapter 3: Sound and Environment

This chapter explores the evolving relationship between sound art and environmental spaces from the mid-20th century onward. Beginning with experimental performances beyond traditional concert venues, artists developed new ways to integrate sound with physical environments. Electronic music composition expanded these possibilities, enabling direct incorporation and manipulation of environmental sounds.

Key figures like John Cage fundamentally redefined noise, challenging the distinction between musical and non-musical sounds. This shifting perspective, along with growing awareness of environmental changes, gave rise to the Acoustic Ecology movement. Led by R. Murray Schafer and developed by Hildegard Westerkamp, Barry Truax, Francisco López, and many more, this movement established new frameworks for understanding environmental sound and its cultural significance. Pauline Oliveros's Deep Listening practice emphasized environmental awareness and sonic meditation, while Max Neuhaus pioneered site-specific sound installations that transformed public spaces. Alvin Lucier's work explored architectural acoustics, treating physical spaces as instruments.

Parallel developments by composers like Iannis Xenakis, Luc Ferrari, and Brian Eno diverged from traditional *musique concrète*, creating new relationships between electronic composition and environment. Contemporary artist Yan Jun represents a critical perspective from the field, challenging the dominance of laboratory-based, high-fidelity sound production. His work argues for art emerging from real-life environments rather than controlled studio conditions, embodying a broader movement toward authentic environmental engagement in sound art.

Early Concerts in Unconventional Spaces

Concerts in unconventional spaces emerged in the United States from 1929-1938, primarily due to socioeconomic conditions: “Musicians, in need of work and hoping to boost morale across the country, came together to perform in new territory... These unconventional spaces for music rose to prominence during the Great Depression, as they gave access to music for all people and provided a means for performers to continue playing” (Carey 2018, p.1).

By the 1940s, outdoor concerts had become common musical events. During the Great Depression, these venues provided more employment opportunities for musicians and made music more accessible to the masses. However, the repertoire remained unchanged from concert hall performances, with no compositions specifically written for outdoor spaces.

The artistic choice of unconventional performance spaces emerged in the 1960s alongside the Fluxus movement. Meredith Monk, a pioneer of site-specific performance and composition, began working in unconventional spaces in the summer of 1967.

In 1969, Meredith Monk’s *Juice* was presented in three installments: first at the Solomon R. Guggenheim Museum in New York on November 7th; second at Barnard College’s Minor Latham Playhouse from November 29th to December 1st; and third at Monk’s Manhattan loft on December 7th. The first installment featured 80 dancers and singers performing both outdoors and inside the museum. The second revisited most elements from the first but on a smaller scale. The final installment displayed only props and costumes from the previous parts, with characters appearing solely through video recordings. The trilogy’s structure, with extended breaks between performances, allowed audiences to connect the parts through their memories and understanding, creating unique personal interpretations (Kaye 2000, p.119-121).

This courageous experiment with time, space, and interdisciplinary artistic expression established a precedent for using diverse locations and combined art forms as standard tools in composition.

This comparative analysis examines the evolution of site-specific multimedia performance, questioning whether contemporary manifestations differ primarily through technological complexity. Despite early site-specific works incorporating diverse artistic elements, the distinction of “multimedia” in contemporary discourse warrants examination.

An investigation into site selection criteria reveals compelling insights. “In this piece, the map would be a continuous process (during the piece) and a residue of the process of the entire piece.” (Jowitt 1997, p.18) In *Blueprint*, another site-specific performance by the composer, “spectators sat outside a building to view events in windows. Some of the events were live performed, some filmed, some a combination of projected film image on identical live-action” (Banes 1978, p.12).

The selection criteria predominantly encompass visual, theatrical, and conceptual dimensions, notably excluding acoustic or musical considerations. In “Site-specific Art Performance: Place and Documentation,” Kaye positions Monk’s performances alongside works by various artists, sculptors, and scriptwriters. Despite the inherent musicality of her performances, Monk’s environmental approach remains predominantly visual. The three environments function as static landscapes or backgrounds for kinetic elements. These environments tangentially influence conceptual aspects, including audience-performer dynamics and temporal manipulation through extended duration. Significantly, the sonic dimension remains notably absent from this discourse.

This lack of sonic awareness distinguishes early site-specific performance from its post-1990s counterparts. The emergence of sound art and computer technology in the 1990s intensified composers’ environmental engagement. The acoustic properties of environments became so crucial to later site-specific works

that earlier performances lost their musical relevance historically. This chapter examines the evolutionary phases of composers' perspectives on sound and environment.

Contemporary "multimedia performance" encompasses audio, video, and telematic technologies, transcending mere artistic synthesis. In early site-specific performance, the environment functioned as a found stage, with multimedia elements (music, film, etc.) serving as content. Contemporary multimedia, particularly its technological aspects, constitutes the stage itself, with the environment becoming content or a content component. The "Case Study" chapter explores this compositional approach in detail.

To address these questions comprehensively requires an examination of composers' site selection criteria. Early electronic music pioneers laid crucial groundwork in considering performance spaces as integral compositional elements. Their explorations of spatial acoustics and sound diffusion provide essential historical context for understanding how site-specific works evolved from visual-centric to sonically aware compositions. Examining these early electronic composers' approaches reveals how technological advancement gradually shifted environmental considerations from background to foreground in multimedia performance.

Involving the Environment Through the Composition of Electronic Music

Drawing an analogy from sound synthesis methods, additive and subtractive approaches represent two foundational paradigms in electronic music creation. Additive synthesis builds sound from sine waves, while subtractive synthesis shapes sounds from existing sources. Similarly, early electronic music followed two paths: one generating music from pure electronic tones (as in Stockhausen and Boulez's early works), and another transforming recorded sounds (as in GRM's

musique concrète). While these approaches cross-pollinated, composers like Stockhausen favored the “additive” method, creating environment-independent music. His 1968 project *Musik für ein Haus* (Music for a House) attempted environmental integration by having musicians perform simultaneously in different “houses” for a collective audience experience. However, Stockhausen considered this a collaborative student exercise rather than a personal composition (Iddon 2004, p.88), explaining its exclusion from his catalog.

Conversely, composers following the “subtractive” approach demonstrated greater environmental engagement. While pioneers like Pierre Schaeffer worked with isolated environmental sounds, the act of recording didn’t automatically enhance environmental awareness. However, some composers developed active listening practices through this engagement with sonic environments.

Barry Truax’s observation that environmental sound composition represents “theory in practice” (Truax, “Interview at Wrocław University” 08:38) illuminates why composer-theorists’ works and writings proved particularly influential. Though their theoretical frameworks often emerged after their compositions, their practical work validated these theories. This analysis examines select composer-theorists whose ideas shaped environmental sound discourse. Despite temporal and geographical distances, rapid communication enabled their ideas to cross-pollinate, collectively forming contemporary sonic environmental theory.

Rethink of Noise—John Cage

John Cage’s *4’33”* exemplifies site-dependent performance, with each rendition yielding unique results based on location and timing. While the pianist remains silent, audiences experience the concert space’s ambient sounds. Cage emphasized this intentionality: “I said that the purpose of this purposeless music would be achieved if people learned to listen; that when they listened, they might discover that they preferred the sounds of everyday life to the ones they would presently hear in the musical program” (Cage in Griffiths 1981, p.124).

Cage maintained that environmental sounds constitute music's essence, particularly for composers: "Those [sounds] not notated appear in written music as silences, the doors of the music to the sounds that happen to be in the environment" (Cage 1973, p.7-8).

In 1958, Cage predicted electronic music's evolution, foreseeing environmental sounds transcending mere film effects to become musical instruments. He demonstrated this through works like *Kitchen Music* and *Child of Tree*, employing daily and natural objects as instruments. These compositions necessitated innovative techniques like open and text notation. To theorize this approach, he redefined composition as "organization of sound" and termed this inclusive musical practice "all-sound music" (Ibid., p.11).

Cage envisioned environmental sound not merely as an addition to existing musical language, but as a revolutionary force in composition. "Most inventors of electrical musical instruments have attempted to imitate eighteenth- and nineteenth-century instruments..." he then gave the example of the Theremin, which could be used easily to create a new sound, but the players only used it to play old, classical music. "We are shielded from new sound experiences" (Ibid., p.4).

Cage's prophecies took years to materialize, yet his work profoundly influenced electronic music composers both contemporaneously and subsequently.

Despite creating works like *Roaratorio* (1979) using field recordings, Cage's compositions and theories predominantly focused on ephemeral rather than recorded sounds. While some attribute his interest in silence and environmental sound to Asian philosophy, the development of his sonic perception lacks definitive documentation. This theoretical opacity, sometimes viewed as provocative, may explain why widespread environmental listening practices emerged long after his 1950s discourse.

"...instead of hearing music in my head before I write it, I write in such a way as to hear something that I have not yet heard...I haven't heard it any more than they (the audience) have heard it." (Cage in Duckworth 1995, p.27)

Deep Listening⁵: Pauline Oliveros

In contrast to Cage, Pauline Oliveros developed structured “Deep Listening” practices accessible to both musicians and the general public. In her interview with William Duckworth, she acknowledged her early sonic awareness but initially didn’t consider environmental sounds musical (Duckworth 1995, p.162). She distinguished between composing with environmental sounds and what she termed “inner listening.” Her most relevant insights emerge from her discussions of field recording, improvisation, and listening practices.

“...I immediately began to record from my apartment window whatever was happening. I noticed that the microphone was picking up sounds that I had not heard while the recording was in progress. I said to myself then and there: ‘Listen to everything all the time and remind yourself when you are not listening.’” (Oliveros 1999, p.3)

Oliveros developed her listening practice through extended-tone improvisation: “When I arrive on stage, I am listening and expanding to the whole space/time continuum of perceptible sound” (Oliveros 2005, p. xxi). This “alert state” enabled her to respond to environmental stimuli while monitoring her internal state. She incorporated this expanded awareness into her compositions, performances, and daily life. Her listening practice emphasized non-pitched instruments—small gongs, breath, and voice—over traditional pitched instruments.

These foundational practices, including those noted in her book “Sonic Meditation,” evolved into Deep Listening workshops, where participants explored sonic awareness in resonant spaces. Deep Listening stemmed from a trip into a giant underground cistern with a 45-second reverb. Those echoes led to an exploration of the difference between hearing and listening and a pursuit of a heightened state of awareness of sound. “We thought it was really funny to have it called Deep Listening since it was coming from underground, 14 feet underground” (Oliveros’ interview with RA Exchange, 2016).

⁵ The term “Deep Listening” is used here in its original published form, which employs the capitalization.

The underground cistern's remarkable acoustics inspired systematic exercises combining meditation, bodywork, and sonic exploration. Through these sessions, Oliveros developed a comprehensive methodology for environmental listening that extended beyond musical performance into ecological and social awareness.

Listening opportunities exist everywhere, yet novel environments often heighten listening awareness. Deep Listening practitioners explore varied locations, recording from different positions—a practice that influenced recordists like Hildegard Westerkamp. Oliveros's perspective aligned with acoustic ecologists, noting how urban soundscapes shape listening habits and advocating for listening awareness among scientists and architects to enhance spatial design (Oliveros 2005, p. xvi).

While sharing viewpoints with R. Murray Schafer, Oliveros focused less on historical and social research, instead developing Deep Listening as internal meditation. This approach made her workshops accessible to non-musicians but added complexity. The training's experiential nature requires substantial time investment—three years for certification and extensive workshop hours (The Center For Deep Listening 2021)—often impractical for professional musicians.

Nevertheless, Oliveros maintained Deep Listening's musical foundation: "The source for Deep Listening as a practice comes from my background and experience as a composer of concert music, as a performer and improviser." (Ibid., p.14) This practice transcends both found sound appreciation during musical silences and found object instrumentation, emphasizing environmental engagement through performance. "Such expansion means that one is connected to the whole environment and beyond" (Oliveros 2005, p. xxiii).

Max Neuhaus: A Turning Point of Site-specific Art

As Nick Kaye classified, site-specific art is a concept from visual art (Kaye 2000, p.11). Max Neuhaus acknowledged this fully but added the aural aspect to site-specific areas. Initially, these works were categorized as "sound art" because they were made of sound and related to a place. However, this term was later used for

all kinds of visual artworks with sound, regardless of whether they were “transportable” or not. Consequently, Neuhaus stopped using this term in the mid-eighties and began calling his works “sound installations” or “sound works.” This choice referred to the visual art essence of these works because they dealt with space. “That context is not only aural but also visual and social...because the visual arts, in the plastic sense, have dealt with space” (Neuhaus 1994, p.42).

This aligned with Brian Eno’s idea that technology-enabled sound to be a medium presented in space: “The effect of recording is that it takes music out of the time dimension and puts it in the space dimension” (Eno 1983, p.7).

His practice began around the same time as Meredith Monk’s; during 1967-68, he created his first sound work, *Drive-in Music*, which could only be heard when people drove by a specific location. However, this work did not last long, and the idea behind it was not widely understood until the late 80s. By then, the term “sound installation” was already reserved for site-specific sound works, so the site-specificity of Neuhaus’s sound installations took even longer to be aesthetically recognized.

In this work, he “used them (synthetic sounds) as a counterpoint for the random noises produced in a particular place” (Föllmer 1996, pp.216-218). This compositional approach, which can also be found in his other sound installations, demonstrated that he regarded environmental sound as music.

Neuhaus’s practice was a turning point in site-specific art because he chose sites for musical reasons and composed music based on the aural, visual, and social features of each place. As he stated, his works are “sound works without a beginning or an end, where the sounds are placed in space rather than time” (Neuhaus 1994, p.42).

He completely abandoned all conventional musical structures that were constructed based on time. While his works do change according to time—for example, the synthesis produces different sounds at different times of the day—they

lack a beginning or end, thus losing the performative aspect of music. In Neuhaus's broadcast pieces, he deliberately removed this aspect of music: he tried to make the system of *Public Support* (which began in 1966) as autonomous as possible until *Radio Net* (1977), when he achieved a fully independent system. We can observe that he made similar efforts with his sound installations to make them permanent. Thus, the performative part of the music was intentionally removed by Neuhaus. This also gave "sound installation" a non-performative character so that later, when people did perform with a sound installation, they often called it "concert installation."

Acoustic Ecology

R. Murray Schafer was the one who proposed a series of terms: soundscape, Hi-fi, Lo-fi, Muzak, sound wall, and noise pollution. He established the field of acoustic ecology, which is famous for its impact on environmental and sustainability studies, but it is also important for the music world because it cultivated generations of "active listeners." Through institutional-level exchange, the necessity of practicing listening was understood by musicians and composers within just a few years. Some of these active listeners also became composers who used environmental sound as their musical material.

As John Cage said in the 50s, technology could be ahead of people's imagination. Recording technology was already mature at that time, but people only used it to make film sound. What was lacking was people's imagination. Schafer changed this with his educational practice and left teaching materials such as 100 listening and sound-making exercises. Although the aim of these listening practices was similar to Deep Listening workshops, they were explained in a much more technical way. The exercises were not time-demanding and could be completed within a weekly college seminar or in fragments of time available to working people.

Having acoustic ecology as a university major has also given national and international projects like the *World Soundscape Project* and *Five Village Soundscapes* (Truax 2019, pp.1-2) financial and organizational support from academia.

These projects involved vast numbers of people in different areas. Eventually, they became catalysts for changing people's listening habits, and "soundscape" became a globally recognized term.

In his book "The Soundscape: Our Sonic Environment and the Tuning of the World," he regarded the world as a "macrocosmic musical composition" (Schafer 1994, p.5). Although his musical experiments in unconventional spaces are less well-known than his theoretical work, he composed many scores for performance in outdoor environments. However, only a few documentaries can be found.

Hildegard Westerkamp, one of the very first students to major in acoustic ecology, demonstrated what a typical "soundscape composition" is. She composed many pieces, including soundwalks, radiophonic programming, electroacoustic music (with and without acoustic instruments), and sound documentaries, most of which used field recordings as their main musical material. Later, Barry Truax established the four principles of soundscape composition:

- Listener recognizability of the source material is maintained.
- Listener's knowledge of the environmental and psychological context is invoked.
- Composer's knowledge of the environmental and psychological context influences the shape of the composition at every level.
- The work enhances our understanding of the world, and its influence carries over into everyday perceptual habits. (Truax 1996, p.63)

Westerkamp's compositions serve as paradigmatic examples in the field of soundscape studies, as her work demonstrates a sophisticated synthesis of musical interpretation and sociocultural preservation. Her methodological approach distinctively balances the transformation of acoustic properties inherent in field recordings with the retention of their embedded sociogeographical contexts, thereby maintaining the dual significance of these sonic documents. She has also demonstrated how field recordings can be used as one of the instruments in an

ensemble, playing not just background noise but actively engaging with acoustic instruments or voices. These works became practical evidence supporting acoustic ecology theories; they also presented the aesthetic of an acoustic ecologist: scientific, communicative, sympathetic, and yet musically exploratory.

Beyond her compelling musical works, Westerkamp has written extensively about composition and perception. She has meticulously explained the technical details of her works, providing other composers with a practical toolbox that enables them to compose with soundscapes. Additionally, she has expanded the practice of active listening by connecting her personal experiences as a composer, a woman, and a field worker, thereby enriching the diversity of subjects within acoustic ecology and strengthening the bond between acoustic ecology and society.

The concept of soundscape has faced some criticism, with two of the most prominent critiques focusing on the idyllic fantasy of rural soundscapes and the elitist understanding of field recordings. Musician and entomologist Francisco López has distanced himself from acoustic ecology and raised an opposing voice in public. Although his famous work *La Selva* (1998) was recorded during his fieldwork, and he extensively uses field recordings as musical materials, he categorizes his works as “nature sound environments,” which take a different approach from acoustic ecology. In his compositions, he deliberately avoids highlighting the scientific information carried by the sounds or enabling listeners to identify individual sound sources. As he states, “My attention was ‘focused’ on the sound environment as a whole” (López in Cox 2004, p.83).

López’s perspective is not rooted in a greater interest in the holistic environment over individual sound sources, but rather in his understanding that once a sound exists within an environment, it undergoes environmental processing, rendering the final acoustic experience distinct from its original source. This understanding of sound closely parallels the conceptualization of “instruments” in site-specific composition. For instance, a violin recorded in a studio produces markedly

different acoustic characteristics from one played in a tunnel, as certain techniques may only become perceptible in specific environmental contexts.

Furthermore, López has argued that recordings cannot objectively represent a location's "authentic" condition. He introduced the term "phonographic falsification" to describe the cognition based on recordings, explaining that microphones inherently alter sound characteristics, while the act of recording imposes a temporal frame upon a continuous environmental soundscape. The subsequent processes of selection, editing, and additional processing introduce further layers of subjective decision-making that shape the final sonic outcome.

"I was specifically referring to the idea of field recordings making you 'feel transported to the place,' so common in New-Agey interpretations of environmental recordings. Sitting comfortably in our favorite armchair -without the heat, the cold, the thirst, the flies, etc.- might indeed be an engaging experience, but certainly of a very different nature than that of 'being there'." (López in Bailey 2012, p.246)

López most strongly opposes Schafer's personal bias against industrial noise. He contends that the diverse nature of noise renders it inappropriate for any individual or theoretical framework to make categorical determinations about which types of noise should be avoided and which possess aesthetic value.

"The main concern of the World Forum for Acoustic Ecology, which is based on the ideas of Schafer, is to tell people that the world today is very noisy. And indeed, it is, but isn't that the way it should be? Is nature better when it's quieter? Are machines evil because they make a lot of noise? Is that noise boring because it's always the same?" (Miyake 2003, p.140)

Subsequently, Barry Truax, who is both a pioneering figure in computer music and an influential researcher in electronic music, has expanded acoustic ecology theory by incorporating additional perspectives that help address potential biases. He has introduced the concepts of "acoustic design" and "virtual soundscape" to create a more inclusive framework for understanding soundscapes.

The concept of acoustic design represents a more open approach to human-generated noise. While Schafer's theory viewed the noise of human activity, particularly industrial production, as a problem requiring solution, Truax has argued that noise is not inherently detrimental to human health. His perspective

acknowledges the complex relationship between human activity and the sonic environment.

“...thereby framing noise as not merely the source of negative health effects which needed to be regulated and mitigated but placing it within the concept and practice of ‘acoustic design’ of the soundscape as a whole.” (Truax 2019, p.1)

This conceptual shift has made acoustic ecology a more inclusive field of research, enabling diverse cultural perspectives to contribute their unique interpretations of particular sounds. While Schafer’s view on noise was idealistic, his identification of “problems” did not come with practical solutions. A more effective approach involves improving soundscapes in specific locations with solutions tailored to each community’s needs, rather than simply imposing universal restrictions on sound producers to reduce noise levels.

Truax also introduced the concept of “Virtual Soundscape,” which expanded the boundaries of soundscape composition as a genre. This framework formally incorporated synthesized sounds and instrumental music into soundscape composition, provided they were designed to stimulate listeners’ imagination and transport them to a virtual landscape (Truax 2016, p.253).

In 2014, approximately four decades after Schafer first introduced the term “soundscape,” the International Standard Organization (ISO) established a formal definition based on the collective research of Truax, Schafer, and other scholars. They defined soundscape as an “acoustic environment as perceived or experienced and/or understood by a person or people, in context.” (ISO 2018)

The ongoing work of connecting composers to the environment continues to evolve, as evidenced by Truax’s concerns expressed in 1991:

“Their (people in computer music) work doesn’t influence the environment and they don’t let the environment influence their music...The great irony is that society is in desperate need of the kind of aural sensibility associated with music, particularly in the soundscape and the humane use of technology, but the composers are busy with their esoteric concerns that answer neither society’s practical needs nor its search for meaning. Of course, to change that, we’d have to broaden the notion of what being a composer means and what constitutes serious music. That’s not likely to happen within the traditional music schools.” (Truax 1994, pp.17-24)

While music schools still maintain some aspects of their traditional isolation, contemporary young composers have developed in an environment rich with music created from environmental sounds, accompanied by frequent campaigns promoting noise abatement and sonic diversity. Educational practices such as active listening and field recording have become integrated into many university curricula. Even established composers have been influenced by this shifting cultural and artistic atmosphere. Since the turn of the millennium, soundscape composition and other environment-related compositional forms have gained prominence in major contemporary classical music festivals. These institutional transformations, particularly within academic settings, can be largely attributed to the persistent efforts of acoustic ecologists.

Diverging from Musique Concrète

In any discussion of environmental sound exploitation in music, musique concrète represents an essential historical period. While the sonic results of musique concrète might sound similar to other compositions using environmental sounds, such as soundscape compositions, their underlying objectives differ significantly. According to the principles of musique concrète, composers should eliminate the identifiable characteristics of recordings, directing listeners to focus solely on the acoustic features of sound rather than the sound source or its environmental context.

Both Iannis Xenakis and Luc Ferrari worked at GRM (Groupe de Recherches Musicales) and composed musique concrète pieces. The techniques they acquired there enabled them to develop more individualized styles in electroacoustic music. However, after their early experimentation, both composers departed from this genre. While Pierre Schaeffer's musique concrète concept influenced them initially, they later abandoned key principles such as "a sound object should be an abstract sonic unit" (Solomos 2011, p.1).

Many of Xenakis's compositions, including *Bohor* (1957-1962) and *Diamorphoses* (1957-1958), failed to gain Schaeffer's approval. Schaeffer disagreed with both

Xenakis's approach to using recorded samples and his attempts to apply mathematical principles to musical composition.

Diamorphoses particularly exemplifies this opposition to Schaeffer's viewpoint. Its sounds are considered "too long" and "eccentric," with their sources often remaining recognizable, contrary to the principle that a "sound object" should function as an abstract sonic unit. As in his instrumental music, Xenakis's electroacoustic compositions challenge the traditional opposition between material and syntax. One of the primary objectives of *Diamorphoses* is to construct complex sonorities that emerge directly from basic sound sources. The piece is distinguished by its melding of noises rather than their combinations (Paparrigopoulos 2012, p.3).

Despite Schaeffer's criticism, Xenakis maintained and further developed his distinctive compositional strategy. Although Schaeffer disapproved of sine waves, Xenakis continued to work with synthesizer sounds and computer-generated music. He introduced the term "stochastic music" to describe "random choices made by computer or nature," essentially viewing environmental sound as one manifestation of randomness in his compositional methodology.

Ferrari similarly employed extensive, long-duration recorded sounds in his work and later expanded into field recordings. His approach to processing these recordings was more conservative than Xenakis's, and he readily incorporated recordings containing conversations and other human activities. However, Ferrari's interest did not lie in the semantic content of these recordings. He termed this approach "anecdotic/anecdotal music," indicating that the organization of sonic events followed purely musical principles, describing it as "a way to use field recording with the aesthetic inherited from musique concrète" (Ferrari, "Artist website").

While both composers primarily focused on electroacoustic music and sound installations, their distinct approaches to using field recordings have profoundly in-

fluenced subsequent generations of composers. The concept of stochastic music, for instance, found an unexpected resonance in Brian Eno's personal experience. Following a car accident that left him bedridden and unable to adjust his tape recorder's volume, Eno found himself listening simultaneously to a cassette and rainfall at equal volumes. This serendipitous circumstance inspired him to reconceptualize environmental sound as music and led to his development of ambient music. After the success of *Discreet Music* (1975), an album that combined synthesized tonal materials with environmental sounds, Eno began incorporating computer-generated music as a partial substitute for environmental sounds.

Yan Jun

Theories about listening and composing with environmental sounds initially gained widespread acceptance in North America and Europe before evolving distinctively across different regions according to their unique cultural contexts. Yan Jun, who developed a deeply humanistic interpretation of these theories (particularly acoustic ecology), implemented them collaboratively with fellow artists in China under challenging circumstances: amid noisy environments, under the influence of state-controlled mainstream media, using limited equipment, and working outside traditional conservatory settings. When these theories reached China, the country had just opened its markets to foreign trade, leading to emerging wealth disparities and accompanying social challenges. This context differed significantly from the developed nations where these listening theories originated. Consequently, these artists interpreted the theories from a fresh perspective, introducing innovative forms and content to sound art, and their work continues to influence composers working with environmental sounds globally.

The increasing accessibility of computer music technology has facilitated the emergence of low-budget, non-academic, and highly personalized sound artworks across many countries. As a result, the ideas and practices of artists like Yan Jun not only reflect China's specific circumstances but also serve as a theoretical framework for understanding similar sound artworks worldwide.

His practice includes electronic music and sound performance, much of which is site-specific.

The wide range of urbanization and the dense population in China made it almost impossible to avoid manmade noises while recording. However, Yan Jun argued that human activity is part of the soundscape, and the activities of the recordists and passersby are interactions with the environment.

“As Murray Schafer said, to understand soundscape music, you need to see the world as a stage with continual performances: I am passionately immersed in rearranging this stage.”

“My footsteps are omnipresent. Most film or radio sound recordists avoid background noise as such and highlight the one sound they want from millions of others. A directional microphone assists with this, but I have never used one because I cannot imagine a city without ‘background’ noises: it would be a kind of creation, not documentation. To me, these noises are more meaningful than those clean, highlighted, sampled sounds.” (Yan Jun, “Stereo Worlds as Everyday Art” 2008)

He compared field recordings made in China with those made in North America and Europe at that time, noting that the Chinese recordings “often have humanity, humor, and liveness,” while the North American and European ones focus more on nature and sound quality (Yan Jun, “How to be Changed by the World—The Chinese Sound Practice in Reality” 2013-2014; translated by the author).

He wrote that field recording as a practice is comparable to slang poetry (e.g., poetry by Charles Bukowski and Raymond Carver), personal documentary photography (e.g., photography by Nobuyoshi Araki and Takuma Nakahira), low-budget DV films, and vernacular humor. He concluded that it shares these characteristics: it is cheap and amateur in nature, stands against macro-narratives, contains hidden romanticism, and represents concrete, minor individuals who withdraw from public representation.

“I have no idea what to do with these sounds I have collected, and I rarely revisit them. I vaguely understand that these sounds are related to contemporary Chinese politics and economics, but that is not something I am particularly concerned about; or should I say, even though I want to care, I do not know how to link everything up.” (Yan Jun, “Stereo Worlds as Everyday Art” 2008)

“I could say field recording is the art of the poor... or let’s say, it has a low threshold to start. The equipment, theory, or skill is not important. What is important is to listen through the technology... It is the same time the technology and the doubt to the myth of technology; it is the same time the art, but the sabotage of the art tradition.” (Yan Jun, “How to be Changed by the World — The Chinese Sound Practice in Reality” 2013-2014; translated by the author)

Field recording’s position as ‘the art of the poor’ later emerged in other regions, including North America and Europe. Because it breaks down class barriers and does not require extensive formal education, it has become an art form that enables diverse participation and respects personal expression.

Musicians like Peter Ablinger and Otomo Yoshihide embraced this democratizing aspect of soundscape composition and began creating works for non-professional musicians and unconventional venues. This compositional approach, which emphasizes communication and sharing, has had a profound impact on site-specific composition: participation by both performers and audience has become more vital than professional expertise.

Conclusion

Monk’s early site-specific musical performances demonstrated that technology need not be an essential component of site-specific performance practice. In contrast, Stockhausen’s electronic compositions represent a historical approach wherein composers utilized technology while deliberately maintaining independence from environmental influences. This historical dichotomy between site and technology persists in contemporary practice. Nevertheless, technological advancement has fundamentally altered environmental perception, with composers being among the earliest practitioners to recognize and respond to these perceptual shifts.

The composer-theorists examined in this chapter serve as pioneering figures who introduced alternative frameworks for environmental perception and musical re-definition through novel sonic perspectives. Although these theorists emerged in different historical periods, their conceptual frameworks continue to be debated,

adapted, and renewed within contemporary site-specific multimedia performance practice. Their innovative contributions to artistic form—including soundscape composition, ambient music, soundscape installation, and music for unconventional venues—remain foundational elements of site-specific multimedia performance.

The substantial contributions of composers in this domain have established site-specific multimedia performance as a distinct musical form. Historical analysis reveals continuous evolution in listening practices and sound production methodologies across different periods. This evolution stands in marked contrast to site-specific theatrical works analyzed in performance studies, where the relationship between site and media technology appears less developmentally significant. While contemporary theater increasingly incorporates multimedia technology, narrative remains the primary focus of these works. Site-specific theatrical productions typically emphasize accessibility and community engagement, particularly through place-based narratives. Although technology enhances theatrical storytelling capabilities, it has not fundamentally transformed the underlying aesthetic strategies of theater practice.

Chapter 4: Mobile Technologies and Logistics

Mobile technologies have significantly facilitated the implementation of site-specific multimedia performance, making previously complex technical setups more accessible and manageable. While the conceptual foundations of site-specific work existed before widespread mobile technology adoption, these portable tools have simplified the execution of multimedia ideas and expanded the practical possibilities available to artists working in non-traditional spaces.

This chapter examines how various mobile technologies support and enable site-specific performance practices, beginning with an analysis of how portable devices function within different spatial contexts. Understanding the relationship between devices and spaces provides essential context for categorizing and evaluating different technological tools based on their practical applications and limitations in site-specific work.

We then explore specific categories of portable sound technologies that have become instrumental in realizing site-specific performances. The evolution of portable sound reproduction, from boom boxes to Bluetooth speakers, piezo loudspeakers, and silent disco headphones, has provided artists with flexible options for sound distribution across diverse environments. Similarly, developments in portable sound-picking devices, including professional field recorders and experimental tools like the anti-radio, have enhanced capabilities for environmental sound capture and manipulation.

The emergence of multifunctional devices such as MP3 players, tablets, and VR headsets has further streamlined technical requirements while offering new possibilities for audience engagement. These technologies have simplified the practical aspects of multimedia integration while maintaining artistic integrity. Communication technologies, including radio systems, mobile phones, GPS, and Wi-Fi networks, have become essential tools for coordinating performances and creating new forms of interaction between performers and audiences.

The chapter concludes with an examination of the logistical considerations that remain crucial despite technological advances. This includes analysis of location-specific challenges, facility requirements, and environmental factors such as climate conditions that continue to influence equipment selection and performance execution.

Devices in Spaces

As Nadja Masura observes in “Digital Theatre,” “site-specific performance can be done without the use of digital technology. The addition of digital technology smooths the way to re-imagine the past and transition spaces into flexible, layered performance environments” (Masura 2020, p.49). The frequent intersection of digital theatre—performances that utilize a wide range of technologies and their multiple applications—with site-specific work is not coincidental. Working in unconventional spaces without standard theater technology often necessitates creating customized technical setups for each performance. While in some cases technology serves purely pragmatic purposes and follows conceptual development, many recent projects have positioned technology as a key factor in establishing site-specific performances.

Artists working in unconventional spaces typically have access to venues for limited periods, after which they must restore the space to its original state to accommodate other functions. Many venues, whether due to historical preservation requirements, environmental protection measures, or institutional regulations, prohibit permanent modifications. Under these constraints, artists have increasingly turned to portable solutions. From the precise sound reproduction of portable loudspeakers to the versatility of lightweight computers and the immersive capabilities of VR systems, practitioners continually seek ways to transport their audio, visual, communication, and productivity tools to even the most remote locations. This chapter examines the application of mobile devices—including portable loudspeakers, MP3 and MP4 players, tablets, VR systems, portable routers, and portable stage lights—that enable the transformation of any space into a performance venue. Additionally, we explore the logistics of managing and optimizing multimedia technology to ensure its seamless integration into the performance experience.

Traditional categorization of multimedia devices has been based on their primary functions, dividing them into three categories: input, process, and output devices. Input devices, such as microphones and cameras, enable users to capture and record audio and visual data. Process devices, including mixing consoles and computers, handle the processing and manipulation of multimedia content, facilitating editing, storage, and other computational tasks. Output devices, such as loudspeakers, lights, and projectors, deliver the final audiovisual experience to users.

In “Digital Theatre,” Nadja Masura employs this same tripartite classification method to categorize the hardware and software used in digital theatre productions:

1. gather impulses (ideas, triggers, stimulus, expressions, artforms); then
2. translate, shape, and manipulate this data information; and
3. finally export (via projection, sound, etc.) media as an observable and essential part of the production’s total theatrical experience. (Masura 2020, p.9)

The emergence of portable technology has necessitated a reconsideration of traditional device categorization in multimedia performance through the introduction of multifunctional devices. While these devices, such as MP3 and MP4 players, were initially developed for consumer entertainment and were often considered qualitatively inferior to specialized single-function equipment, their role in site-specific performance has proven more complex and significant. These portable technologies integrate both input and output capabilities, enabling users to simultaneously consume, create, and interact with multimedia content across diverse locations. Contemporary devices combine multiple functionalities—including image capture, audio playback, video reproduction, and communication capabilities—within a single unit. This convergence of functions has challenged traditional categorization schemas, necessitating a separate analysis of multifunctional devices following our examination of single-function equipment.

The selection of examples in this analysis encompasses both site-specific installations and performances, acknowledging the interconnected nature of their approaches to achieving site-specificity. This inclusive examination allows us to explore how different practitioners navigate similar technological and spatial challenges. Through investigating the intersection of multimedia technology and site-specificity, we can develop a deeper understanding of innovative artistic approaches while critically examining the resource implications—both technical and economic—underlying each creation. This dual focus on artistic innovation and practical implementation provides valuable insights for practitioners working across the spectrum of site-specific multimedia work.

Portable Loudspeakers

While technically most loudspeakers are portable, certain locations present unique challenges that demand even more compact and self-contained options. In such contexts, smaller loudspeakers with integrated or easily portable battery solutions become indispensable, offering flexibility and mobility. Although the use of these devices involves a trade-off in sound quality—particularly in the lower frequency range—composers and sound designers often embrace these limitations as creative constraints. By focusing on the specific frequency bands that such devices reproduce effectively, new aesthetic possibilities emerge. In this regard, Cathy van Eck’s “Composing with Microphones and Loudspeakers” offers a critical framework. Her thesis systematically introduces the possibilities of composing with loudspeakers as musical instruments, arguing that their instrumental potential lies not only in their capacity to reproduce sound but also in their materiality and spatial affordances. As van Eck observes, “Reproducing a sound originally produced by another source is never technically perfect. The audible result needs only to evoke a recognizable musical performance for the audience” (van Eck 2017, p.149). This perspective encourages a compositional practice that embraces the imperfection and specificity of loudspeaker-mediated sound.

Building on this approach, I will introduce four types of smaller loudspeakers and the contexts in which they were used: the boombox, Bluetooth loudspeakers, piezo loudspeakers, and silent disco headphones.

Boombox

The boombox, a classic icon of portable audio, combines a powerful sound system with a built-in battery. These devices can have multiple speakers and even subwoofers, providing a rich audio experience even in outdoor or remote settings. With their retro charm and ability to deliver booming sound, boomboxes have remained popular for decades, making them a reliable choice for parties, gatherings, or any situation that demands a portable sound system with substantial output.

In December 1992, Phil Kline's *Unsilent Night* was performed in New York. His boombox orchestra consisted of several dozens of his friends who marched through Greenwich Village, where thousands of students and international visitors lived. The music on tapes was produced using samples from typical Christmas music in the USA, as well as bells, harps, and synthesizer sounds. This event did not sell tickets; the audience consisted of people who happened to be on the street. It was very much in the holiday celebration spirit—social and participatory—and finally became a Christmas tradition in New York and other major cities like Philadelphia and Berlin.

In this case, the boombox not only provided technical convenience but also brought the party atmosphere through its roots in youth culture. Phil Kline also used techniques like tape looping and phasing to produce the music. “The first instrument I learned to play really well was the tape recorder” (Duckworth 2005, p.36), he wrote in his biography, which made the boombox, originally also a type of tape recorder, the perfect playback tool for his music.

Bluetooth Loudspeaker

A Bluetooth loudspeaker refers to a compact, chargeable loudspeaker that is usually used for entertainment purposes, regardless of whether it can be connected through Bluetooth. These devices offer the convenience of portability combined with a wide range of sound quality and features, catering to different preferences and budgets.

In my site-specific performance on a bus, *Sound Ride*, I used four Bluetooth loudspeakers collected from local residents. When I received the commission to compose a piece for a bus, my first idea was to connect to the broadcast system. There was no power supply on the bus. Additionally, I needed to bring everything from the countryside where I lived to Hannover center, where the bus stopped, so I had to choose the most portable options. I hesitated between piezo loudspeakers and Bluetooth ones until I was designing the content. I found this work to be very participatory because the audience needed to be confident in handling the devices. Bluetooth loudspeakers had the advantage of being familiar to most people. Furthermore, since Bluetooth loudspeakers are popular, I could borrow them from the neighborhood, and this avoided unnecessary waste after the project.

During the performance, three of the loudspeakers were connected to an iPhone, a Soma Ether, and an MP3 player, while the fourth had an integrated SD card slot for playing files directly from memory. The space in the bus resembled a long corridor, and the bus itself generated significant static noise, so the Bluetooth loudspeakers were not loud enough to be audible to all passengers simultaneously. I had this in mind while composing, so I always played one track several times in different parts of the vehicle. For each passenger, it created an echo effect, and they maintained a clear sense of my location, allowing them to prepare if they wanted to react to my actions.

Bluetooth loudspeakers are one of the easiest playback devices to use. Nevertheless, they vary significantly in sound quality, and their loudness is limited.

Piezo Loudspeakers

Piezo loudspeakers are unique in their design and functionality. They do not require traditional cone-shaped drivers because they employ piezoelectric elements that vibrate in response to electric signals to produce sound. These devices excel in applications where space is limited, or power efficiency is crucial. While their sound reproduction capabilities may be limited compared to those of larger counterparts, piezo loudspeakers provide a practical solution for situations where size and power constraints take priority.

My site-specific installation, *“Here Could Be a Camera”* (2021, Altonaer Museum, Hamburg), was commissioned by STAMP Festival for installation in public restrooms. Through this sound installation, I aimed to draw attention to the widespread problem of unauthorized photography in restrooms throughout East Asia. Although the installation of hidden cameras in restrooms for surreptitious recording occurs predominantly in East Asia, and the victims are primarily East Asian women, the associated distribution network extends worldwide. The illegally obtained videos are distributed across international pornographic websites, with consumers including many Europeans.

I installed this device in male, female, and gender-neutral restrooms. The loudspeakers were concealed and played subtle background sounds of mouse clicks and disk spinning. Additionally, I positioned a distance sensor above each toilet fixture. Whenever someone approached the toilet, the loudspeakers would activate and play a voice message stating: “Here could be a camera.”

The installation’s physical requirements demanded a setup that would minimize visual presence while maintaining functionality. The exhibition space presented several technical constraints: the restroom walls were tiled, making permanent modifications impractical, as any drilled holes would be irreparable. This necessitated the development of a completely removable installation system. Furthermore, the public nature of the space, combined with limited security

measures, required the implementation of cost-effective and easily maintainable components.

The technical solution comprised a Raspberry Pi running a Pure Data patch as the central processing unit. The audio output from this system was routed through a compact amplification board, which processed and transmitted the signal to the piezo loudspeakers. For mounting the components, I employed a non-invasive installation method: the loudspeakers were affixed near the ceiling using industrial-grade adhesive pads, ensuring both stability and removability.

Throughout the exhibition period, the installation performed according to specifications, maintaining its intended functionality. The system remained largely unobtrusive, with occasional technical interventions required only when adhesive failure led to component displacement. This experience provided valuable insights into the challenges and considerations inherent in creating temporary installations in public spaces with specific structural limitations.

Silent Disco Headphones



Figure 6. One of the silent.move concert in August 2023. (Photographed by the author)

Silent disco headphones represent an innovative approach to delivering immersive audio experiences. Rather than employing traditional loudspeaker systems for music broadcast, this technology relies on wireless headphones that receive audio signals directly from the source. This format has gained particular prominence in environments with noise restrictions or sensitivity concerns, as participants can engage fully with music and dance activities without creating external sound disturbance. The headphones incorporate integrated batteries that provide extended periods of uninterrupted operation. Additionally, these systems frequently feature multiple channel capabilities, enabling participants to select from various DJs or musical genres, thereby enhancing the interactive and personalized nature of the experience.

silent.move, a company specializing in unconventional concert and disco event organization, demonstrates the practical application of this technology. Their project #Hiddengarden comprises a series of concerts conducted in a private garden setting. The concert situation can be seen in Figure 6. According to their website description, the project delivers “an overall immersive experience for the audience” (silent.move GmbH, “silent.move”). The company develops customized stage and technical configurations for each event, taking into consideration the specific audience demographics, musical genre requirements, and environmental conditions. The implementation of silent disco headphones, as opposed to conventional PA systems, has enabled the organization of open-air concerts in central Berlin while addressing two significant challenges: eliminating neighborhood noise disturbance and providing resistance to light precipitation. Furthermore, this technological approach has fostered a more relaxed concert environment by allowing attendees to engage in conversation without disrupting others’ listening experience.

Portable Sound-picking Devices

Field Recorder

The field recorder’s portability is a critical aspect that significantly enhances the experience of soundwalks. The soundscape composition and audio art workshops led by Hildegard Westerkamp could serve as examples (Westerkamp, “Soundwalk Workshop”). These compact and lightweight devices empower participants to become agile sonic explorers, unburdened by heavy equipment. Its design ensures that soundwalkers can effortlessly move through diverse environments, from bustling urban streets to serene natural landscapes, capturing the evocative soundscape of each locale with ease. This flexibility enables participants to respond intuitively to the ever-changing acoustic landscape and change their listening focus spontaneously. The microphone attached to the field recorder

makes it easy to operate, even an inexperienced participant can get high-quality sound in a few minutes.

Anti-radio

The anti-radio represents a specialized magnetic device that detects and interprets the invisible yet omnipresent electromagnetic fields permeating our modern urban environments. Christina Kubisch first introduced this technology in her *Electric Walk* project during the 1970s (Kubisch, “Electric Walk”), implementing it in the form of magnetic headphones. The anti-radio functions as an intermediary between the electromagnetic spectrum and the audible realm, possessing the distinctive capability to amplify previously imperceptible electromagnetic fields and transform them into audible frequencies that human ears can perceive.

The evolution of this technology has led to significant developments. Through continuous innovation and refinement, mass-produced anti-radio devices such as the Soma Ether have emerged in the commercial market. These devices have made electromagnetic field exploration more accessible to the general public, enabling deeper engagement with the intricate electromagnetic landscapes that pervade urban environments. This technological advancement has fundamentally transformed our relationship with urban spaces, converting the previously undetectable electromagnetic emissions into an engaging and immersive auditory experience.

Multifunctional Devices

Multifunctional devices have revolutionized both media consumption and artistic expression, particularly in site-specific installations and performances. Their versatility enables artists to create immersive and engaging experiences through diverse technological capabilities. This analysis explores significant artistic works that employ multifunctional devices, including MP3 players, MP4 players, iPads, and VR sets, as creative mediums.

MP3 Players

The MP3 player represents a streamlined playback device incorporating integrated memory and battery systems. While initially celebrated for its ability to make music portable, it has gained additional recognition for its operational stability and cost-effectiveness. Artists have recognized the interactive potential of MP3 players, incorporating them as narrative tools in site-specific installations.

Audio walks exemplify a primary application of MP3 players in artistic contexts. In these experiences, participants traverse specific locations while engaging with carefully curated soundtracks that complement their surroundings. This methodology dissolves the boundaries between physical and auditory experiences, transforming environments into expansive canvases for narrative exploration. In 2022, artist Lucie Schroeder demonstrated this approach in her dance performance *Re-Member* at Künstlerhaus Sootbörn in Hamburg (Künstlerhaus Sootbörn, “Re-member”).

Schroeder conceived the dance walk as a prelude to the main performance, requesting audiences to arrive 15-30 minutes before the scheduled time. Each participant received an MP3 player with headphones and could choose to begin the experience either individually or in small groups of two to three people. The audio track provided instructions for environmental observation through varied gestures and walking speeds. Additionally, it facilitated group interactions, such as trust exercises where one participant, with closed eyes, would be guided by another.

In this context, the MP3 player successfully delivered individualized audio instruction without creating physical impediments that might interfere with participants’ environmental engagement. The technology enabled participants to move freely within a 100-meter radius, unencumbered by concerns about internet connectivity or power supply limitations.

MP4 Players

MP4 players have evolved beyond their original function as video playback devices, similar to the transformation seen with MP3 players. Artists have

recognized and harnessed these devices' portable nature and visual capabilities to create innovative site-specific video installations. This technological adaptation enables artists to project looped video content onto architectural surfaces, creating an integration between structural elements and dynamic visual imagery that serves to evoke emotional responses or communicate specific messages. The compact design of MP4 players provides exceptional positioning and projection flexibility, allowing artists to transform public spaces into comprehensive cinematic environments.

Janet Cardiff's implementation of MP4 technology in her video walks demonstrates the medium's artistic potential, particularly evident in her work *Alter Bahnhof Video Walk* (2012, Documenta 13 in Kassel). For this installation, Cardiff developed a complex audiovisual narrative by combining historical footage of the location with newly recorded on-site material, including performances by actors and musicians. Through careful editing, she integrated instructional elements, commentary, and musical compositions into the final composition. Participants engaged with the work by walking through the Alter Bahnhof while simultaneously wearing headphones for audio guidance and holding the screen at eye level.

The synchronization between physical movement and video content created a remarkable perceptual experience. As participants followed the provided instructions, their movements aligned precisely with the video's perspective, presenting them with views of their immediate surroundings that incorporated subtle variations or dramatic performative elements. A comprehensive documentation video of this installation, available on YouTube, effectively demonstrates how participants navigated this unique spatial experience. The installation established an uncanny atmosphere of simultaneity, where different layers of reality intermingled, and temporal boundaries between past and present became increasingly indistinct. This technical and artistic achievement generated a profound psychological effect, inducing a sense of temporal and spatial uncertainty.

iPads

iPads have emerged as powerful tools for both creative expression and interactive performance. In site-specific performances, these devices serve as interactive interfaces and visual displays. For instance, the Symphony in St. Pauli Elbe Tunnel project, among many other productions, utilizes iPads as synchronized score-reading tools, enabling musicians to coordinate their parts and communicate effectively even when physically separated. The iPad platform offers artists a portable and intuitive medium through which they can expand the boundaries of interactivity and seamlessly integrate digital and physical elements.

In 2023, I experienced the immersive video walk, *Corporate Unconscious* by Studio Noclip (Diego Muhr and Robin Plenio). This site-specific performance re-defined traditional storytelling and audience engagement through its innovative implementation of iPad technology. Each participant received an iPad, which served as their portal into a dynamic and interactive narrative experience.

The iPad functioned as an intermediary between the audience and the performance, guiding participants through the narrative's complexities. Through a custom-designed application created specifically for this project, participants received both narrative segments and movement instructions, creating an exploratory sequence. This technological system directed participants to walk, pause, and converge at designated locations where they would encounter performers or other audience members.

Corporate Unconscious coordinated a sequence of encounters through precise timing. Each participant received a specific starting time, ensuring their progression through the narrative aligned with the real-world events unfolding around them. The iPad, functioning as a temporal guide, directed intersections between participants and performers, transforming the narrative into an immersive reality. This integration of technology and human interaction transformed spectators into active participants in the performance.

While this work shares conceptual similarities with Janet Cardiff's pioneering use of MP4 players in video walks, the incorporation of iPads in *Corporate Unconscious* enhanced the transformation of physical space into a multidimensional performance environment. The advanced capabilities of the iPad posed a specific challenge for composers: preventing technological distractions from overwhelming the intended experience. The solution resided in the application's playback system, which eliminated individual video manipulation and preserved the intended timeline. Instead of offering a traditional user interface, the application determined participants' locations using temporal algorithms. This method shifted the emphasis from screen-based human-machine interaction to fostering direct human-to-human connections through technological mediation.

VR Headsets

Virtual reality headsets have transformed our experience of media consumption by providing personal, immersive, and interactive environments. While initially developed as market products for entertainment, they also offer a powerful medium for artists to explore new dimensions of storytelling and audience interaction. Artists have discovered VR's potential to create site-specific installations that transport participants to otherworldly realms within specific locations. By combining VR technology with real-world elements, such as sculptures or architectural structures, artists can blur the boundaries between physical and virtual spaces, resulting in a heightened sense of presence and engagement.

The duet F.Wiesel's *Flintridge oder: Der Mensch erscheint im Holodeck* (2021) was a mixed reality installation that premiered in Frankfurt (F. Wiesel—Hanke Wilschmann & Jost von Harleßem GbR, "Flintridge"). A 16-square-meter room was built as the venue for the performance, and audience members were invited to enter it one at a time. Initially, they interacted with a basic setup, experimenting with a crude apparatus and a computer hosting a text-based game. The experience shifted when they donned VR glasses, which transported them into a parallel virtual environment that mirrored the room they were standing in.

As the VR experience progressed, the narrative unfolded in the virtual world. Participants found themselves in a scenario of impending disaster, observing their virtual surroundings crumbling and decaying. Mirroring the physical room, only a handful of objects remained intact, creating an unusual and distinct quality to the experience.

The installation's approach centered on the layers of narrative that the artists constructed. By recreating the physical environment digitally, they created an interplay between the real and virtual worlds. The physical room, seemingly ordinary, became a representation of tangible reality, encouraging reflection about the nature of perception and existence.

A notable aspect of *Flintridge oder: Der Mensch erscheint im Holodeck* was its approach to immersing participants in a narrative without traditional performers. Over the course of 30 minutes, the environment itself served as the medium, shaping the space and influencing the audience's experience. The absence of performers allowed participants to engage with the story from a first-person perspective, responding to the changing environment around them.

In site-specific performance, multifunctional devices like MP3 players, MP4 players, iPads, and VR sets serve as more than repositories of media displays. These portable devices offer artists a canvas to blur realities and reinvent the familiar, creating a dialogue between physical and digital realms. As artists reference, recreate, and reimagine spaces through these technologies, they transform them into artistic mediums that enable audiences to traverse the boundary between tangible and virtual worlds. The fusion of multi-functionality, portability, and artistic vision shapes performances where innovation and interpretation merge, offering experiences that bridge reality and imagination.

While these devices primarily focus on creating immersive experiences, communication devices add another layer to site-specific performances by enabling real-time interaction and connection.

Communication Devices

Radio

As demonstrated in early telematic music projects such as Alvin Curran's *Crystal Psalms* (1988), radio serves as a foundational tool for transmitting sound and instructions across distances, enabling collaborative performances across physical spaces since the early days of multi-space performance.

This telematic performance united six European radio stations in a simultaneous broadcast commemorating the 50th anniversary of Kristallnacht. The project, coordinated through RAI Rome as its technical center, demonstrated radio's unique capacity to synchronize live performances across geographical boundaries. Each location—Denmark, Germany, Austria, France, Italy, and the Netherlands—featured complementary ensembles of chorus, strings or winds, percussion, and accordion, all synchronized through a recorded time track heard by the conductors.

The work combined live performances with pre-recorded sounds of Jewish life, including shofar calls, prayers at the Western Wall, archival cantor recordings, and personal family recordings. Radio transmission enabled these diverse sonic elements—from Renaissance Jewish composers to breaking glass, from ship horns to Yiddish lullabies—to be woven into a complex tapestry of sound that transcended physical distances. Through the radio's interconnective capabilities, Curran created a distributed yet unified memorial that emphasized both remembrance and the potential for transnational artistic collaboration.

Mobile Phones

Mobile phones emerged in the site-specific performance world with a significant presence in flash mobs (Salter 2010, p. 345). Today, while they have become ubiquitous in daily life, smartphones' new functions have enabled even more possibilities. For example, in *Radical Dance Series* (see Chapter Six), the AR function built into a website created opportunities for augmented reality experiences within performances.

GPS

GPS supports site-specific art projects, especially long-distance ones, by enabling location-based interactions, navigation for exploration, and geotagging and documentation of installations. It is especially common in participatory art and scenarios that need to respond to their surroundings. GPS allows artists to create immersive, site-specific experiences and engage audiences in new ways.

For example, Marek Choloniewski and his team's *GPS-Trans Series* (2000-2016), which experimented with everything from generative music to long-distance co-operative music ensembles, created new media transmissions adaptable to diverse environments, from urban landscapes to remote terrains.

Wi-Fi Systems

Wi-Fi technology enables wireless data transmission. It can send large files like pictures, audio, and video without adding clutter to the performance space, thereby supporting remote monitoring and control of technical equipment, as well as cooperation between performers. Wi-Fi systems also enable interactive experiences for the audience, such as accessing additional content or participating in live polls during the performance.

As demonstrated in projects like the *Symphony in St. Pauli Elbe Tunnel*, Wi-Fi systems facilitate real-time data transmission and synchronization, enabling the transmission of real-time generated notation to 144 iPads and allowing the creation of intricately coordinated performances in complex, unprecedented settings.

Logistics

The logistics involved in organizing a site-specific performance are of utmost importance, particularly when the chosen location is not typically designated for such purposes. Several key factors must be carefully considered and managed to ensure a smooth and successful event. From power supply and networking requirements to lighting, climate control, storage, lavatory facilities, and catering,

each aspect plays a crucial role in creating a conducive environment for both performers and audience members.

Technical Requirements

Power supply is fundamental, as it directly impacts the functionality of various equipment and devices used during the performance. Assessing the available power sources at the location and determining whether additional generators or power outlets are needed is vital to ensure that sound systems, lighting rigs, and multimedia devices can operate effectively.

Networking requirements also need to be addressed, especially if the performance involves live streaming or interactive elements. Establishing a reliable and secure Internet connection enables real-time communication, data transfer, and audience engagement.

Lighting is a critical component that sets the mood, enhances visibility, and accentuates the artistic elements of the performance. Understanding the site's existing lighting infrastructure and determining whether additional fixtures or specialized lighting equipment are necessary is essential for creating the desired ambiance.

Climate control systems are equally important components of the technical infrastructure, particularly in locations where temperature and humidity can affect equipment performance. While installing heating, cooling, or humidity adjustment systems ensures the proper functioning of acoustic instruments and digital devices, implementing monitoring systems allows teams to respond quickly to environmental changes that might affect equipment operation. These systems work alongside other technical elements to maintain optimal conditions for both equipment and performers while preventing damages to the environment.

Practical Facilities

Transportation and storage space are vital for safely storing equipment, props, costumes, and other materials. When performance spaces are remote, the

volume of transportable items must be calculated precisely. Adequate storage facilities must be secured to protect valuable assets and ensure efficient access during rehearsals and performances.

Lavatory facilities should be readily available for both performers and audience members. Based on the expected number of attendees and performance duration, appropriate restroom arrangements must be made.

Catering arrangements are essential, especially for extended performances. Providing refreshments or meals for performers and crew ensures their well-being and sustains their energy throughout the event.

Making site-specific performances accessible to disabled individuals presents unique challenges as well. Since locations cannot typically be permanently modified, temporary solutions must be considered, such as portable ramps, alternative accessible routes, adjustable lighting, subtitles, and reserved areas for wheelchair users. In case of the budget constraints limiting these accommodations, improving pre-event communication and staff training remain practical solutions.

For example, when Luna Valentin conducted the speleoacoustics research, namely, the acoustics of caves, she and her team met several logistical challenges (Valentin 2022, p.71).

First, cave locations and conditions presented significant access and transportation challenges. Since caves are often situated in remote rural areas, all equipment had to be transported both to the cave entrances and through the cave systems themselves. This necessitated the use of compact, lightweight, and durable gear that could withstand the challenging environment while remaining portable.

Second, the remote nature of caves meant no access to standard power sources. All equipment—including both sound-generating tools (loudspeakers and impulse generators) and recording devices (microphones, preamplifiers, and audio re-

corders)—had to be self-powered. This requirement ensured that researchers could operate independently of external power infrastructure.

Third, the unique climate conditions within caves required careful monitoring. Temperature, humidity, and CO2 levels not only affected equipment performance but also impacted sound propagation measurements and posed potential risks to human health and safety, particularly in limestone cave systems.

To address these challenges, the research team developed specific strategies. They carefully selected and tested audio and documentation equipment for cave compatibility, particularly for impulse response measurements—a standard technique for analyzing enclosed space acoustics. The team exclusively used self-powered equipment to overcome power limitations and employed an Amprobe CO2 meter to monitor environmental conditions, ensuring both equipment reliability and accurate sound velocity measurements.

Through careful attention to these logistical considerations, site-specific performances can effectively overcome the challenges presented by non-traditional venues. A well-planned and executed logistics strategy allows performers to focus on their artistic expression while ensuring audiences experience an engaging and memorable event in spaces that have been thoughtfully transformed into unique performance venues.

Conclusion

Technology and logistics not only determine the feasibility of site-specific performances but also actively shape their creative direction. Technical capabilities and limitations often inspire new artistic approaches, while logistical constraints can lead to unexpected creative solutions. Through innovative technologies like VR headsets and multifunctional devices, artists have expanded the boundaries of

creativity, blurring the lines between reality and imagination, while careful logistical planning ensures seamless operation of all practical elements.

The following chapter, case studies examine how artists have successfully navigated these technical and logistical challenges in their site-specific multimedia performances, often discovering that such constraints became catalysts for artistic innovation.

Chapter 5: Case Studies

The following case studies explore diverse approaches to site-specific multimedia performance, examining works that engage with urban spaces, natural environments, and transportation infrastructure. Each project demonstrates unique ways of integrating technology and addressing logistical challenges while responding to their specific locations.

Alexander Schubert's *Control* (2018) transformed an abandoned architecture in Oslo into an augmented reality experience, while Georg Hajdu's *Symphony in St. Pauli Elbe Tunnel* (2019) turned Hamburg's historic tunnel into an innovative performance space utilizing networking technology. In Hong Kong, Manos Tsangaris's *City Piece* (2016) engaged with the city's urban rhythms, while Kirsten Reese and David Wagner's *Berlin Rosenthaler Platz* (2017/2018) reimaged a busy Berlin intersection through sound art.

Moving to natural environments, Luna Valentin's *Quatuor pour la grotte Saint Marcel* (2020) explored the unique acoustics of cave systems in Bidon, while Dong Zhou's *Sound Ride* (2023) created a mobile performance experience between Hannover and Lehrte, transforming the journey itself into a sonic event.

These diverse projects illustrate how site-specific multimedia performances can adapt to and transform various environments, each presenting distinct technical and logistical challenges that influenced their artistic outcomes. Through examining these works, we can better understand the interplay between artistic vision, technological innovation, and practical constraints in site-specific multimedia performance.

Alexander Schubert: *Control* (2018), Oslo

Before composing the participative installation *Control*, the composer Alexander Schubert (b. 1979) had dealt with themes like Organism vs. Virtuality, Conception vs. Intuition, Expressivity vs. Introversion, and Technology vs. Romance for years and coined the term for his method as “Binary Composition” (Schubert 2020, p.14). Drawing from his computer science background, he integrates different media and uses them as his compositional language.

In 2007, he began studying multimedia composition, focusing on live audiovisual effects for performers with and without instruments. His iconic use of glitch aesthetics, strobe effects in light and video, stark contrasts between sections, and later, the interactive use of VR devices all support his exploration of the essence of technology.

In 2018, when the Ultima Festival commissioned the participative concert installation *Control*, he explored these themes even further through this interactive work.

“As the title of the work *Control* already gave it away, it has to do with control, hierarchy, dominance, but also with virtuality, distance, intimacy. It’s pretty much a system with certain rules, which is hard to understand.” (Schubert, “Control Full Documentation”, 05:46)

As mentioned in the official documentary, this piece is a “system” that offers a colorful palette of highly diverse materials, with every audience member encountering a different selection of them. It resembles a promenade theater, but its narrative is highly abstract, and rather than focusing on storytelling itself, the method of storytelling is much more critical. The audience must experience the piece three times from three different perspectives; by playing different roles in the system, they understand it step by step.

“Of course, it has this kind of hierarchy system with an autocratic feel to it. But it also gives the possibility for other kinds of interaction. To see that, and to see what people make out of that, and how people react to the fact that they are giving rules, is interesting and surprising. That is one of the major goals of this piece.” (Schubert, “Control Full Documentation”, 10:50)

The performance took place on Saturday, September 22nd, 2018, from 1 p.m. to 7 p.m. Every 30 minutes, a new group of audience members (participants) entered the building and stayed for 90 minutes, while the performance continued uninterrupted for six hours. Additionally, people could enter the concert installation as observers and stay for two hours. The long duration of the performance strengthened the sense of a “system”; it demonstrated that they were not experiencing a programmed show but rather were part of an underground cyborg space that seemed as if it could last forever.

The Building

The physical “base” of the system is the former building of The Museum of Contemporary Art at Bankplassen in central Oslo (Figure 7). Before being used as an exhibition space, it served as the headquarters of Norges Bank. This beautiful Art Nouveau-inspired building in Norwegian granite and marble, designed by architect Magnus Olsen Hjorth (1862-1927), was completed in 1906. According to the website of the Norwegian National Museum, the exhibition area was approximately 2000 m² over two floors, meaning each floor was around 1000 m². The



Figure 7. The former building of The Museum of Contemporary Art. (Photo: Morten Thorkildsen / The National Museum)

basement, where the two major scenes of *Control* took place, also has a similar amount of space. Its function as an exhibition area ended on September 3rd, 2017. When Schubert and the team took over this space, it was totally empty.

“You meant whether things were already there when we arrived? Unfortunately, no. We actually borrowed a lot of things. We got some props from a theater. It was a full-scaled truck. One truck full of stuff like furniture from a theater, and one truck of things we brought from Hamburg, which was a combination of super high-tech stuff and things like mattress, trash we’ve been picking from everywhere.” (Schubert, “Control Lecture at HfMT”, 50:47)

Two trucks of props were still very little for a 1000 m² space. The emptiness and the relatively poor maintenance after one year without visitors in the building had set a basic atmosphere for the piece. This was especially noticeable in the basement because there were no windows to let in natural light. The situation resembled a black box theater. Everything added to the space could easily catch people’s attention and take on immediate meaning without explanation. However, unlike a black box theater, the space had a neutral atmosphere; its huge size and maze-like structure daunted visitors at first glance. It also contained more than 25 rooms; Schubert used 22 of them for separate scenes. The thick walls made the transmission of audio and visual signals difficult, but they also created excellent soundproofing and prevented unwanted interference between rooms.

“There were basically two technical challenges, one was to set up the wireless video transmission, especially because all the walls in this bank building were super thick...we must find something that is strong enough to transmit through them.” (Schubert, “Control Lecture at HfMT”, 18:45)

This became the stage for the first and second phases for the audience participants. They viewed this space through their Virtual Reality glasses, which, apart from the technical functions I will introduce in a later paragraph, made their view narrower and darker.

The ground floor, however, had a warmer impression due to the daylight and its interior design, such as the wooden floor remaining from its former function as an exhibition hall.

“The visitor who came to the building are face to something like a dark maze. It’s a fairly complex building with a lot of hallways, and coming from these hallways are several rooms, in the rooms there are performers. And all these rooms offer certain possibilities to interact.” (Schubert, “Control Documentation”, 4:35)

Modifying the Building

The basement was where the audience entered this manmade, glitchy world; it was also where most of the dramatic scenes took place. Schubert modified this floor into a labyrinth-like structure. He reconfigured the space into 10 major rooms, each with clear performance settings, offering a dynamic and versatile environment for various exhibits and events. Additionally, Schubert designed different rooms that provided visitors with a more immersive installation experience. A room plan can be found in Figure 8. Visitors entered these spaces adjacent to the control rooms, creating a seamless transition between different aspects of the installation. What made Schubert’s design particularly remarkable was the incorporation of two interconnected circles, allowing easy access to all areas from any point within the building. This layout struck a balance between size and manageability, enabling the installation to host a wide range of activities while remaining comprehensible to visitors unfamiliar with the building’s structure. Schubert’s modifications not only expanded the possibilities within the space but also made it user-friendly, as the room layout itself indicated the directions where the audience should go.

“...what we had to do with the building was really beyond what is realistic to go through in this time frame... everybody was doing everything.” (Schubert, “Control Full Documentation”, 31:20)

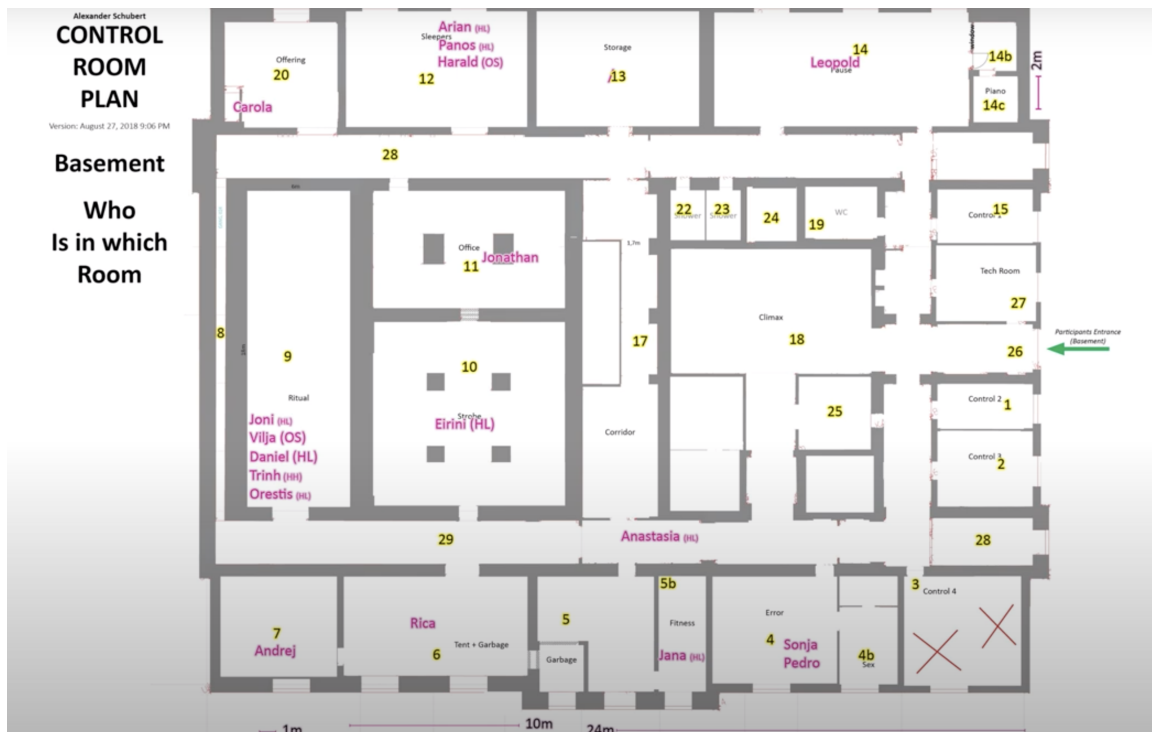


Figure 8. Room plan of *Control*. (Screenshot from Control Full Documentation)

The stark contrast between rehearsal and performance spaces fundamentally transformed the performers' experience. The rehearsal process at Kraftwerk Bille, a repurposed industrial facility, took place in a segmented space that, while divided into multiple rooms, offered a more cramped setting than the eventual performance venue. Under the guidance of a choreographer, performers grappled with specific movement sequences, including challenging slow-motion techniques that proved particularly demanding for non-professional dancers (Botzios, interviewed by the author, 24th of July 2021). The transition to the museum's labyrinthine basement marked a dramatic shift in the performance dynamics: in contrast to Kraftwerk Bille's naturally lit, proximate environment, the museum presented a vast, artificially illuminated space that disrupted performers' temporal awareness and their perception of distance. This spatial transformation fundamentally altered the performance experience, as the intimate rehearsal process,

where performers alternated between roles and test audiences, gave way to continuous performance loops for unknown spectators within Schubert's carefully designed circular pathways, significantly intensifying the physical and psychological demands on the performers.

Three-Phase Playing Process

As Figure 9 demonstrates, audience members were always divided into groups of four. They entered the building (main setting) with VR glasses equipped with a camera and a headset. The cameras transmitted their view to another audience member in the control room (in some scenes, also to the performers), and they could communicate with that audience member through the headset. After 30 minutes, the group in the control rooms moved to the public exhibition room, the

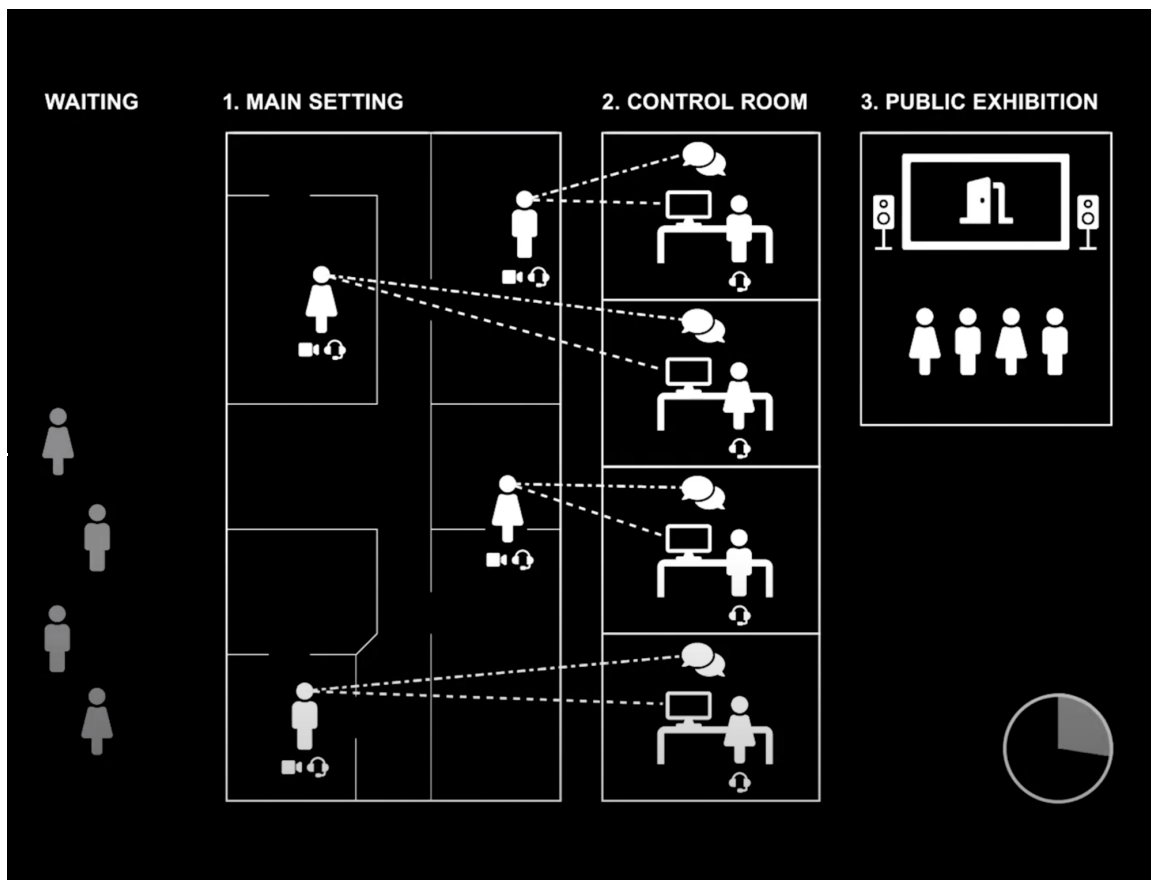


Figure 9. Diagram of the three phases. (Screenshot from Control Full Documentation)

group in the main setting switched to the control rooms, and a new group of audience members entered the main setting with the same wearable devices. Every audience participant experienced the three phases, each lasting 30 minutes. The three-phase process gave the piece a time structure and marked the most important turning points in the narrative.

1. Main Setting

In the main setting, audience members played the roles of wanderers and command receivers. They received commands through their headsets about where they should go and how they should react to the performers. The performance scenes were all composed for interaction. For example, in one room, a performer dropped a box of papers in front of the audience members and gave them a broom; in another room, two performers behaved like broken robots, making the audience feel compelled to offer help.

“Also, it’s a lot about personal relationships, for one it’s the relationship between those two people, then we tried to design these rooms in a way, like none of them are like a concert or like a performance that you observe, all of them were explicitly designed to make it necessary that you have to react to them in some way.” (Schubert, “Control Lecture at HfMT”, 13:41)

The design was intended for command receivers to execute what they hear passively. However, during the performance, most command givers and receivers had discussions and decided together what to do next. The empty and isolated space made them rely more on their conversational partner at the other end of the audio transmission. There were always only four audience members in the main setting, and it was difficult to distinguish between audience members and performers by appearance. One of these situations can be seen in Figure 10.

“It was designed so that there would be no differentiation between the performers and the audience, but in the end, it didn’t work 100%.” (Schubert, “Control Lecture at HfMT”, 47:00)



Figure 10. A scene from *Control*. (Screenshot from Control Full Documentation)

When audience members began their first phase, they were unaware that the person on their headset was also an audience member.

The first phase of this experience involved putting the audience members in a massive unknown space, placing them in a helpless situation. Although they did not become as receptive as expected, this did make them more likely to trust the voices in their headsets.

2. Control Room

After the first 30 minutes, the audience members were led to four individual control rooms (Figure 11). They still had headsets but no cameras or VR glasses; instead, they sat in front of screens to see one of the audience members from the new group who had just entered the main setting. The role they played this time was that of a remote escort and command giver. They could either revisit the same scenes they had experienced or let the command receiver explore areas they had not seen. Similar to the first 30 minutes, they made decisions with their conversational partners. Although the person in the main setting was physically

making the changes, those in the control rooms might begin to feel as if they were performing the actions themselves.

“...after a while you get so much into this perspective that you really feel like (it is) your own (perspective).” (Schubert, “Control Full Documentation”, 01:07)



Figure 11. An audience member in the control room.
(Screenshot from Control Documentation)

This space was like a cinema, where the screen was the only source of illumination in the darkness. It caused the physical surroundings to be quickly ignored and allowed the player to focus on the screen’s content. Through the mediated first-person perspective, they virtually wandered into the main setting again.

3. Public Exhibition



Figure 12. Audience watching the “surveillance” video.
(Screenshot from Control Full Documentation)

For the last 30 minutes of the experience, participants went to the exhibition hall upstairs (Figure 12). The audience members could have a glass of wine and watch the “surveillance” videos from downstairs. On the largest screen, live footage was chosen by Schubert’s team from the views of the four current command receivers. There were also several small screens transmitting all four views without interruption.

The third-person omniscient perspective helped people understand the entire system. They recalled their experiences from the first two stages by watching others go through them. Seeing it from the outside made them reflect on their own behaviors and showed them alternative ways to react to situations, enriching the overall narrative.

Game-like System

Physical experience within a piece has always played a dominant role for me, whether in contexts where sensor-equipped performers manipulate music or in

immersive settings where the presence, perception, and position of listeners or spectators are of great importance.

This game-like system broke linear narrativity and gave people absolute power to control an unknown person, giving them space to create their own movements and conversations. Most of the scenes were abstract and had open endings; people could give them meaning from personal perspectives.

Music as a Part of Holistic Experience

“How is the music in this piece?” or even “Is there music in this piece?” were frequently asked questions about this piece (Schubert, “Control Lecture at HfMT”, 01:01:35). And for me, the question would rather be: “Was the music in the piece composed for the site?”

The musical framework of *Control* employs a strategic approach reminiscent of interactive game audio design, where ambient tracks without distinct beginnings or endings create continuous atmospheric layers across the fragmented basement space. The majority of compositions function as connective tissue between otherwise separated rooms, operating on a flexible scheduling system that adapts to unpredictable visitor movement and varying dwell times.

While most tracks serve as ambient connective elements, several standout pieces punctuate the experience: *Error* delivers dynamic tension through glitch-heavy distortion and digital artifacts, while *Ritual* establishes meditative spaces through ethereal, contemplative soundscapes. In addition, the installation extends beyond the basement through a live-streamed piano performance that bridges the underground space with the ground floor, creating a vertical sonic relationship that allows the musical experience to transcend physical boundaries.

The performers are all instrumentalists, but except for one pianist, none play instruments. Acoustic instruments don’t fit the environment either musically or visually, since everything else is artificial to some extent. The speech voices are

transmitted through the interactive system, thus having an electronic quality different from voices transmitted directly through air; the images caught and presented by the camera and VR set replaced direct eye contact. These elements created a very electronic environment where anything organic would seem unnatural. Additionally, the communication between audience members and between the audience and performers has priority in the piece, leaving little space for purely musical expression.

As Schubert composed the piece, his primary focus was the concept of “control.” It is the core of the experience. Music had to be adapted to other elements to give the audience this multi-sensory experience. While this indeed placed some limitations on the music, the other elements became musical. For example, as Schubert typically does in his pieces, the lighting design and choreography are always connected to the music’s rhythm. These visual elements contain musical information that strengthens the overall musical expression.

Beyond the lighting design, choreography, and set design, the room isolation also plays a role in the music. As in game design, the tracks change from one space to another with a crossfade. When people walk through these rooms, they experience a physical crossfade, making them more sensitive to changes in music and location.

The conversation with another “player” through the headset is also part of the composition. Schubert mentioned in the lecture that video transmission had many analog glitches due to the building’s thick walls, and the sound had different qualities through transmission. Except for footsteps and some noises made during the performance, most sounds were played through loudspeakers, creating a vast electronic soundscape.

The building has good isolation, ensuring that what the audience hears inside is all intentionally designed by the composer. Whether the sound is produced for the environment or is a by-product of other parts of the mechanism, all sounds are site-specific.

Unfortunately, the multi-sensory experience cannot be fully documented. If you were not in the first or second stage of the piece, you missed the musicality in the visual elements. But as observers, if we can appreciate birdsong and raindrops and let them remind us of a journey, why can't we appreciate electronic environmental sound? It is part of the environment, and when we listen to it, we remember or imagine the virtual world of *Control*.

"Those are all analog videos and real, live glitches... they're just the leftover by-products of the think walls.

There are no instruments... besides one, that is the pianist. And the pianist was locked away in a room where nobody could eventually see him. But he was playing very beautifully all the time. Only on the third stage, there was a live transmission to him...If you go to the phone, he will pick up the phone." (Schubert, "Control Lecture at HfMT", 49:10)

This directly relates to the fundamental goal of creating works with holistic experiences. The multisensory experiential dimension holds paramount significance in this context, encompassing various visual elements such as lighting design, video projections, and performative aspects. The artistic intention has consistently been to develop compositions that possess a compelling aesthetic force, capable of transporting audiences into constructed alternative realities.

"What holds these together is a bit of music or a light aspect to it. All the sounds and the lights kind of underlie the bigger structure that is synchronized throughout the whole building. So you have the feeling that the system works together continuously and you're part of it." (Schubert, "Control Full Documentation", 09:10)

Every element served as a tool to direct the audience's attention within the crafted space of the installation. Facing the challenge of synchronizing an expansive exhibit spanning twenty disconnected rooms, Schubert approached the task from a technical standpoint. He orchestrated a sophisticated system where various elements ran in a loop and maintained interconnections. A central mainframe computer served as the nucleus, harmonizing the entire experience. Supplementary substations were strategically positioned to ensure synchronization, with notable integration of dedicated computers for sound and light coordination.

The timeline graph (Figure 13) provides an overview of all events in linear order. By breaking down the experience into manageable, independently functioning sections, Schubert utilized music, sound, and light to facilitate the audience's immersion into the composed world, allowing them to focus their attention on different aspects of the installation with precision.

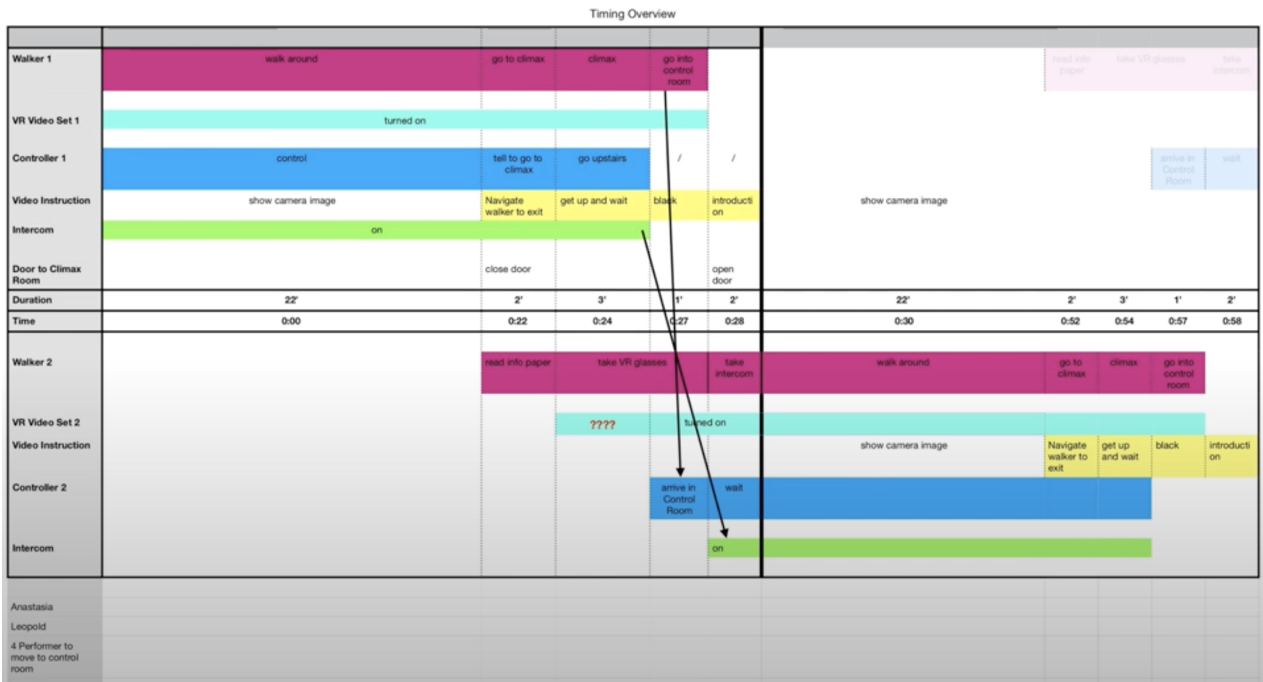


Figure 13. Timeline of *Control*. (Screenshot from Control Lecture at HfMT)

Schubert's approach to synchronizing *Control* across multiple disconnected spaces demonstrated how technological coordination could unite disparate environments into a cohesive artistic experience. His use of centralized computing systems and strategic substations to maintain temporal unity across twenty rooms established important precedents for large-scale, spatially distributed performances.

However, the principles of digital synchronization could also be applied to the coordination of acoustic instruments, particularly those of massive size and performing in challenging environments. The *Symphony in St. Pauli Elbe Tunnel* project led by Georg Hajdu provides a compelling case study for examining these methodological applications.

Georg Hajdu: *Symphony in St. Pauli Elbe Tunnel* (2019), Hamburg

Musical cooperation across different locations has been a challenging subject for musicians and music program developers since the 1980s. Pioneered by groups like The Hub (Duckworth 2005, p.62) and Sensorband (Bongers 1998, pp.20-21), or platforms like NetJam (Duckworth 2005, p.65) and Rocket Network (Duckworth 2005, p.67), musicians began playing music in different places by exchanging MIDI data. Later, improvements in internet speed and computer memory enabled them to exchange audio signals.

Georg Hajdu's Quintet.net, an environment designed for networked multimedia performance, was an early attempt to share scores in real-time. It allowed performers to see the real-time produced music on screen in "space" notation across five grand staves. A "conductor," who does not produce sound but coordinates with the performers, could also send musical parts to display on the performers' screens. The system was used in many networked multimedia performances, including Manfred Stahnke's opera *Orpheus Kristall* (2002), which premiered simultaneously in Munich, New York, Berkeley, and Amsterdam.

Since scores (performance instructions) could be shared across concert halls in different locations, Hajdu wondered why the same approach couldn't be applied within a single, unconventional location. "When you compose contemporary music, you also think about off-the-wall places to perform it," Hajdu said in a news report (Hamburg Port Authority, "Symphony in the St. Pauli Elbtunnel" on YouTube 2020), reflecting the consideration of site has become embedded in contemporary music practice and discourse.



Figure 14. One of the two tubes of St. Pauli Elbe Tunnel.
[Photographed by Markus Daarms (Pixabay)]

The St. Pauli Elbe Tunnel (alternatively known as the St. Pauli Elbtunnel, or the Old Elbe Tunnel, Figure 14) is a historic infrastructure in Hamburg, comprising two parallel tubes extending 864 meters in length. As documented in a popular tourism blog: “With every step you hear, its echo reverberates” (Typisch Hamburch, “Der alte Elbtunnel—ein Blick in die Röhre”). The tunnel’s architectural design creates a characteristic acoustic environment distinguished by extended reverberation times.

The tunnel’s acoustic potential had been previously explored through various artistic interventions. A notable example occurred in September 2008, when artist Katrin Bethge, musicians Hannes Wienert, Wu Wei, and Sascha Demand presented a multimedia installation incorporating overhead projection and improvised music on brass and woodwind instruments.

The 2019 project, however, represented a significant departure from previous artistic endeavors in the space. Rather than adapting existing compositions or relying on improvisation, this initiative marked the first composition specifically created for the tunnel's unique acoustic environment. The project received financial support through the Stage 2.0 grant, administered under the Innovative Hochschule initiative of Germany's Federal Ministry of Education and Research (BMBF) (Hajdu 2019, p.5). The performance coincided with the reopening of the renovated historical tunnel on May 25th and 26th, 2019. The innovative production featured 144 musicians, whose performances were synchronized through digital conducting instructions displayed on individual iPads. Four concerts were presented across both tunnel tubes, each attracting approximately 350 attendees who were permitted to move freely through the space.

This analysis builds upon the foundational work of Hajdu and Gottfried (2025), who first documented this project in "The Symphony in the St. Pauli Elbe Tunnel" published in *Contemporary Music Review*. While their study established key insights into networked performance and interactive notation systems (pp.4-6), the present analysis extends this framework by examining the project's site-specific dimensions.

A Shared Instrumentation

Although this project included a piece (a suite of three short movements) by Hajdu, his contribution extended far beyond that of a traditional composer. The concert program comprised 19 pieces by 19 different composers, and Hajdu and his team's primary innovation lay in creating a shared instrumentation framework for all these works.

This instrumentation framework encompassed not only the arrangement of 144 musicians but also incorporated the two tubes of the Elbe Tunnel as resonant bodies for all the instruments within. The tunnels' unique architecture transformed both the acoustic properties of the music and fundamentally altered the ways in which the musicians could collaborate.

The ensemble of 144 musicians was organized into 12 distinct groups. Each group maintained a consistent instrumental composition consisting of the following:

- Two violins or a violin and a viola.
- Two flutes or two instruments from flute, recorder (different types), and oboe.
- A clarinet.
- A saxophone (different types) or a trumpet.
- A trombone, a bassoon, a French horn, or a tuba.
- A violoncello or a double bass.
- A percussion instrument (different kinds).
- An electric guitar.
- An accordion.
- A voice (different tessituras).

The instrumental arrangement closely resembles that of a contemporary classical ensemble or modern orchestra, though structured on a smaller scale. This configuration allows composers considerable flexibility in combining these groups to achieve diverse musical styles.

According to the musician recruitment notice issued by the Hamburg University of Music and Drama (HfMT), the participation requirements were relatively accessible: candidates needed to be at least 15 years old, possess a minimum of four years of musical training, and have a basic knowledge of reading musical notation. While the final ensemble included numerous professional musicians and HfMT students, the performance's success heavily depended on the participants' sight-reading abilities due to the innovative conducting methods and notation presentation system, which will be examined in detail in the subsequent section of this chapter.

Practice and Rehearsal

To facilitate individual practice, the team developed a web-based interface where musicians could access and review their specific parts through a browser. This digital platform served as a crucial tool for preparation before the collective rehearsals.

The interface featured a simple but user-friendly control system: musicians could initiate automatic score scrolling by clicking a play button positioned in the upper-left corner, while a draggable cursor above the work's title enabled navigation to specific sections of the piece. This digital presentation introduced performers to the concept of "proportional notation," a system that fundamentally differs from traditional musical notation. Rather than requiring musicians to count beats, proportional notation represents the duration of notes through horizontal lines extending from each note head. This temporal representation system eliminates the need for conventional rhythmic indicators such as stems or rest symbols. Musicians read from a fixed cursor position as the notation scrolls horizontally, with the score's lateral movement providing a real-time visual representation of musical duration and pacing.

Please select the instrument-number you would like to view:

- 1 violin
- 2 violin
- 3 flute
- 4 flute
- 5 clarinet in Bb
- 6 alto sax in Eb
- 7 trombone
- 8 violoncello
- 9 percussion
- 10 soprano
- 11 e.guitar
- 12 accordion
- 13 violin
- 14 viola
- 15 flute
- 16 soprano recorder
- 17 clarinet in Bb
- 18 trumpet in Bb
- 19 tuba
- 20 violoncello
- 21 percussion
- 22 soprano
- 23 e.guitar
- 24 accordion
- 25 violin
- 26 violin
- 27 flute
- 28 oboe
- 29 clarinet in Bb
- 30 tenor sax in Bb
- 31 trombone
- 32 violoncello
- 33 percussion
- 34 soprano
- 35 e.guitar
- 36 accordion

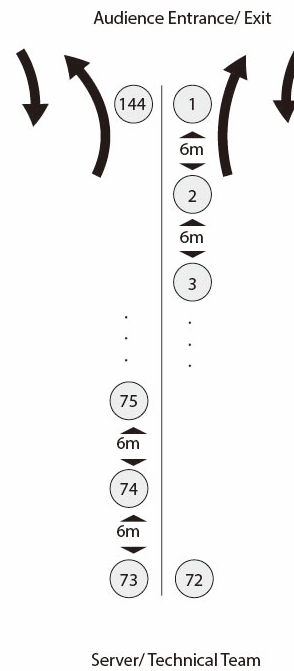


Figure 15. Interface of the practicing system. (Screenshot by the author)

Figure 16. Musician positions in two tubes. (Created by the author⁶)

Despite the user-friendly design of the practice interface (Figure 15), musician participation in individual preparation was limited by several factors. While theoretically accessible through any web browser, varying levels of browser compatibility created technical barriers to proper notation display. Users' preferences for outdated browsers occasionally resulted in rendering difficulties. Furthermore, interview data revealed that the limitations of proportional notation, specifically its reduced contextual information about phrasal structure and overall compositional form, combined with the isolation of individual parts in the interface, impeded musicians' comprehensive understanding of the works. This lack of musical context diminished practice motivation, resulting in many participants' first engagement

⁶ Figure 16 presents a simplified overview of the system architecture, focusing on elements most pertinent to the site-specific analysis. For a more detailed schematic, readers are directed to Hajdu and Gottfried's comprehensive diagram with names of each instrument (2025, p. 3).

with the scrolling notation system occurring during supervised rehearsals with technical support. In response to these identified challenges, the MaxScore development team developed a hybrid notation mode in 2025 that combines proportional and measured notation systems.

Rehearsals were conducted in Kraftwerk Bille, where the rehearsals of *Control* took place. The spatial arrangement attempted to simulate the tunnel environment by positioning musicians in two parallel lines along opposing walls. However, this simulation presented notable differences from the actual performance space in terms of inter-musician spacing, visual access to opposing performers, and acoustic properties. The rehearsal environment afforded greater visual and auditory communication between musicians compared to the tunnel setting. This modified environment potentially facilitated the initial adaptation to unconventional performance conditions while allowing focused attention on technical systems and musical interpretation. The rehearsal schedule comprised two three-hour sessions, a notably compressed timeframe for preparing nineteen pieces, most of which were world premieres.

As James Cheung, a technician and composer involved in the project, observed: “I think that rehearsal is not really about rehearsing the piece; it’s mostly about rehearsing the whole process. And it’s about whom to go to when there’s a problem or how to let the people at the console know if there’s a problem with a certain part. And how to play with other people, and how to read the score. And you knew how it feels like to have 144 people to do this thing together” (Cheung, interviewed by the author, 21st of March 2023). The technical team’s extensive pre- and post-rehearsal preparations enabled multiple test iterations of the novel performance setup.

A Special/Spatial Constellation

The St. Pauli Elbe Tunnel exhibits distinctive acoustic properties that significantly influence musical performance. In an acoustic test featuring a violin playing scales

at mezzo forte dynamics, it could be heard at a 50m distance as if it was still being played right next to the observer (Hajdu 2019, p.1).

These unique acoustic properties fundamentally alter the effectiveness of various performance techniques. Rapid pitch variations become susceptible to temporal smearing, while rapid successive articulations across multiple instruments prove particularly challenging due to the space's significant reverberation. Conversely, certain techniques acquire enhanced prominence in this acoustic environment. Pizzicato on string instruments and articulations on resonant percussion instruments (such as triangles) exhibit dramatically extended release times, substantially increasing their perceptual salience. While these techniques traditionally serve ornamental functions in conventional classical compositions, the tunnel's acoustic properties elevate them to potential primary compositional elements.

The linear distribution of musicians (Figure 16) fundamentally transformed their methods of coordination. The performance design specified even spacing throughout the tunnels, with musicians positioned at six-meter intervals.

This arrangement significantly limited performers' visual and auditory connections: musicians could only observe their immediate neighbors to the left and right, while acoustic clarity was compromised beyond these proximate positions. Although initial tests demonstrated that individual sounds remained audible at distances up to 50 meters, the simultaneous performance of multiple parts created complex sound reflections that further impeded acoustic differentiation between voices.

While the real-time score system facilitated precise coordination of distinct musical lines, it is particularly noteworthy to examine Nicolas Collins's compositional approach, which embraced rather than circumvented the space's acoustic properties. Instead of treating the unusual performance configuration as an obstacle to overcome, Collins conceptualized the combination of instruments and tunnel acoustics as a unified sonic instrument, integrating the space's resonant characteristics as fundamental compositional elements.

Roomtone Variations (2013-2014), composed for variable instrumentation and live computer score, has been performed in multiple venues, including Oakland, Santiago, and Padova. Rather than prescribing specific pitches, Collins developed an algorithmic system that generates musical material in response to the acoustic properties of each performance space. In the Elbe Tunnel performance, this system demonstrated particular sensitivity to the tunnel's distinctive acoustic characteristics.

The composition's initialization process employs computer-generated test signals: through acoustic feedback analysis, the system maps resonant frequencies of the performance space in real-time, converting these frequencies to their nearest equivalent tempered pitches. These pitches are then presented as traditional staff notation, arranged hierarchically from left to right according to resonant intensity. Upon completion of the stave population, performers execute

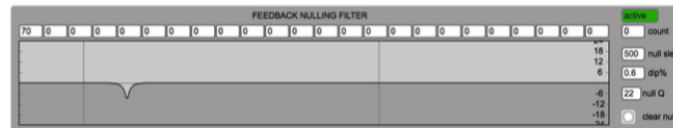


Figure 1



Figure 2

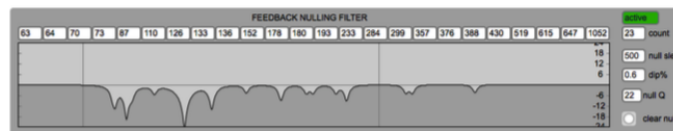


Figure 3



Figure 4

Figure 17. Notation of *Room Variation*. (From the composer's website)

variations on the identified pitches (including octave transpositions) as they are highlighted, progressively realizing a site-specific architectural pitch sequence. An example of the notation can be found in Figure 17.

The Technical Setup

The technical setup for the Elbe Tunnel performance used a central computer system that coordinated all the musical elements. To ensure every musician could receive their music in real-time, the team installed eight high-quality Wi-Fi access points throughout the tunnel. These Wi-Fi points were connected using fiber-optic cables, which can carry data over longer distances than standard CAT 7 cables. A diagram of this setup can be found in Figure 18.

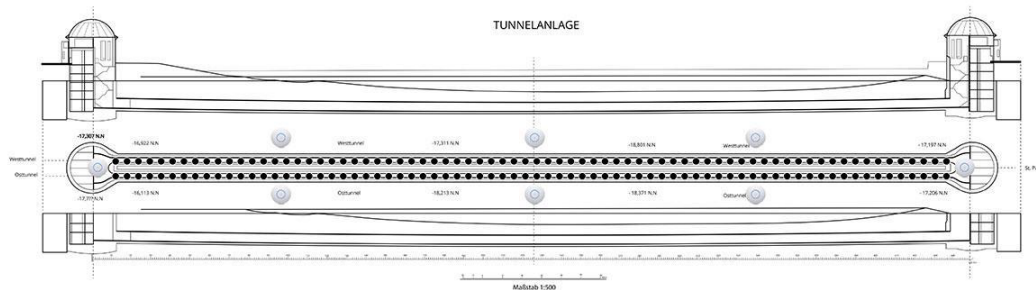


Figure 18. Network setup in the tunnels. (Hajdu 2019, p.4)

Each of the 144 musicians had an iPad mounted on their music stand. These iPads were connected to the main computer through addresses with individual labels, similar to how different users can access the same website simultaneously but see their own personalized content. This system allowed each musician to receive their specific musical part while staying synchronized with the entire ensemble (Hajdu 2019, p.5).

Drawsocket: A Browser-based Notation Project

Drawsocket is an open-source platform designed to create synchronized, browser-based musical representations across networked devices. The system was developed as a framework to transmit drawing commands from a central server to each orchestra member, effectively turning an Internet browser into a

remote conductor. Originally conceived for the distributed display of musical notation in spatial performance contexts using SVG graphics and animations, Drawsocket provides a unified interface for controlling various media features in web browsers. Furthermore, the system offers access to browser mouse and multi-touch gesture data, along with the capability to create dynamic custom callback methods, making it a versatile tool for developing graphical user interfaces (Gottfried 2019, p.1).

In the *Symphony in St. Pauli Elbe Tunnel* project, Drawsocket served two distinct functions in score distribution: for pieces like *Roomtone Variations*, it broadcast real-time generated scores to all iPads simultaneously, while for pre-composed works, it synchronized score scrolling across all devices. In both scenarios, Drawsocket effectively replaced traditional conducting or page-turning functions, managing these tasks simultaneously for all 144 musicians. Figure 19 shows a situation where all 144 iPads were running Drawsocket.



Figure 19. A test of all iPads with Drawsocket. (Photographed by the author)

MaxScore

MaxScore is a notation environment engineered for both conventional and experimental musical notation. It provides sophisticated tools for notating micro-tonal music and complex rhythmic structures, facilitating the creation of text and graphic scores, and enabling seamless integration of these unconventional elements with traditional five-line staff notation.

A critical function of MaxScore in this project was its conversion of traditional musical notation into proportional notation (Figure 20). In proportional notation, tempo markings are eliminated, and notes are represented solely by note heads followed by horizontal lines. The length of each line represents the absolute duration of the note in milliseconds. This system eliminates the need for musicians to count beats; instead, they observe a stationary cursor on their iPad screens as the score scrolls past it, playing each note as it intersects with the cursor position.

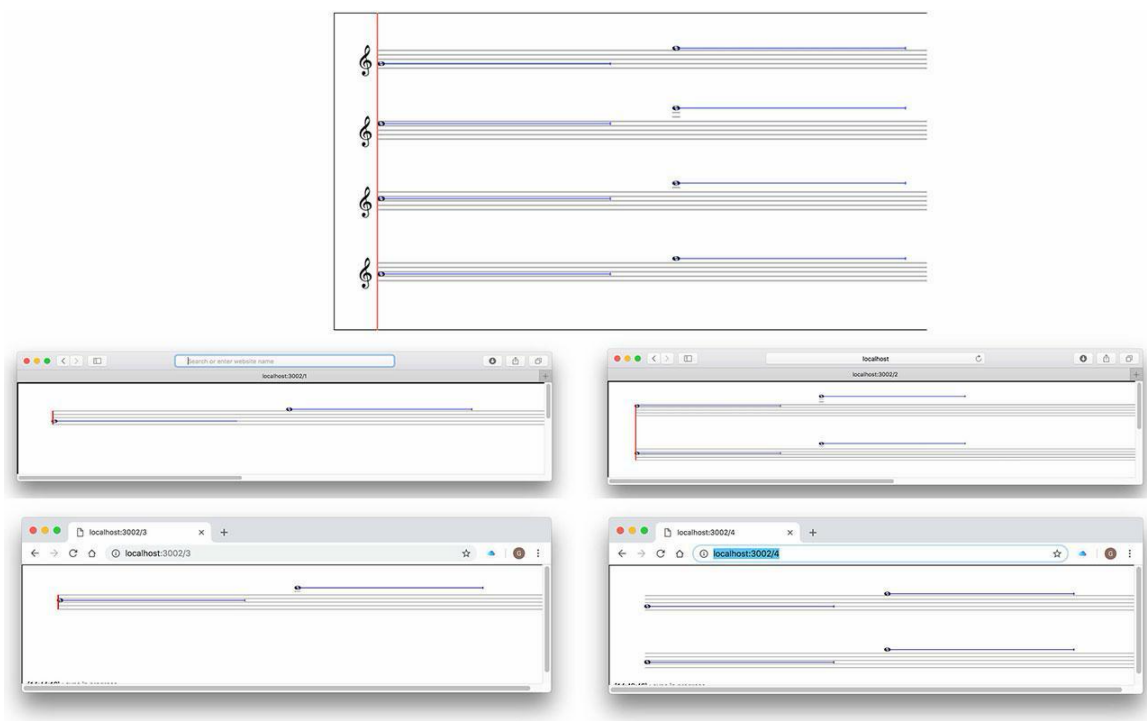


Figure 20. MaxScore displaying proportional scores in a web browser.
(From the website of Stage 2.0 Project)

Orchestral Music vs. Street Music

The compositional approaches to organizing the ensemble of 144 musicians primarily manifested in two distinct paradigms. The first conceptualized the ensemble as an orchestral body with specialized instrumentation, emphasizing timbral cohesion and unified sonic expression. The second approach treated the performers as discrete musical entities, creating a spatial distribution of independent voices that bore similarities to the dispersed nature of street performance, particularly given the linear arrangement of musicians along the tunnel walls.

A comprehensive list of works, including detailed information about titles, composers, and comparative analysis of their notation approaches, can be found in Hajdu and Gottfried's documentation (2025, p.8). Their systematic examination of the diverse compositional strategies employed across the project provides

valuable insight into how different creators approached the unique challenges of networked performance within the tunnel's spatial constraints.

While most of the compositions combined elements from both approaches, certain works demonstrated a marked predilection for one paradigm over the other. A notable example of the orchestral approach is manifested in Shing-Kwei Tzeng's *Der Frühling des goldenen Schweins* (The Spring of the Golden Pig, 2019). This composition employs traditional orchestral writing techniques (Figure 21), incorporating quotations from the Chinese folk melody *Mo Li Hua* (Jasmine Flower) and Beethoven's *Ode to Joy* while preserving their fundamental harmonic structures. Tzeng's arrangement exhibits characteristics of Romantic and Neo-classical stylistic practices, achieving seamless transitions between these iconic melodic materials. Despite the unconventional spatial distribution of performers, the work maintains sonic characteristics typically associated with philharmonic orchestral performance.



Figure 21. Score excerpt of *Der Frühling des goldenen Schweins* in conventional notation. (Provided by James Cheung)

Kinderszenen (Scenes from Childhood, 2019, composed by the author) represents the opposite end of the compositional spectrum, employing a highly

individualized approach to ensemble organization. The work deliberately appropriates its title from Robert Schumann's celebrated piano suite to establish a dialectical relationship between romanticized perceptions of musical childhood and the often-challenging realities of early musical training. The composition predominantly eschews traditional ensemble coordination, with only occasional moments of collective action or silence. Instead, performers receive diverse improvisational directives based on specified materials.

These materials encompass both extended instrumental techniques (including deliberately incorrect playing methods) and verbal/vocal elements such as utterances of “practice,” “music,” “play,” along with vocalizations of distress. Two examples of the notation can be seen in Figures 22 and 23. These sonic elements serve as direct metaphorical references to the work's thematic content. While the simultaneous execution of these diverse elements creates apparent sonic chaos, this complexity invites audience members to engage in proximate listening experiences with individual performers. The comprehension of the work's overarching conceptual framework becomes readily accessible through the observation of these individual performance moments.

play start at time 143.75

82 soprano

Dong Zhou: Kinderszenen
keywords: fliehen/ aufhören/ egal/ warum nicht

free portamento with any syllable

f

f

Figure 22. Excerpt of the 82nd part (soprano) of *Kinderszenen*. (Created by the author)

play

start at time

101.68:

86 viola

Dong Zhou: Kinderszenen

arco, sub ponticello

p

Figure 23. Excerpt of the 86th part (viola) of *Kinderszenen*. (Created by the author)

Alvin Curran's *Notes from Underground 2*, scored for solo shofar and 132 mixed winds, brass, strings, and percussion instruments (2019), exemplifies a synthesis of collective and individualized compositional approaches. While the ensemble generates a sustained, drone-based sonic environment, the solo shofar, performed by the composer, traverses both tunnel spaces. An excerpt of the score can be found in Figure 24.

Despite the shofar's considerable acoustic power, its audibility varies significantly based on spatial positioning, particularly when the audience and performer occupy different tunnel sections. This spatial distribution creates varying perceptual experiences dependent on the listener's proximity to the sound source.

This configuration raises fundamental questions regarding audience comprehension in spatially distributed performances, particularly for works employing traditional orchestral writing. While historical precedent for promenade concerts dates to the 18th century, these typically featured discrete musical selections at separate locations without attempted synchronization (Weber 1997, p.690). Contemporary technology enables precise coordination of musicians across the 430-meter tunnel spans, yet audience members remain constrained to

single physical locations at any given moment. The space inherently lacks an optimal listening position, necessitating selective auditory focus.

While theatrical promenade performances might benefit from multiple viewings to construct a complete narrative, music's abstract nature presents distinct challenges. Composers cannot reasonably expect audiences to synthesize discrete orchestral sections across multiple performances into a cohesive whole. This necessitates careful consideration regarding the relative importance of a comprehensive musical overview versus localized details in conveying compositional intent.



Figure 24. Score excerpt of *Notes for Underground 2*.
(Private collection)

These spatial considerations significantly influenced documentation methodology. While mobile cameras captured the ambulatory audience perspective, technical and safety constraints required stationary microphone placement. Sound engineers subsequently constructed mixed recordings based on observed patterns of audience perception for each composition.

Assistive Notation?

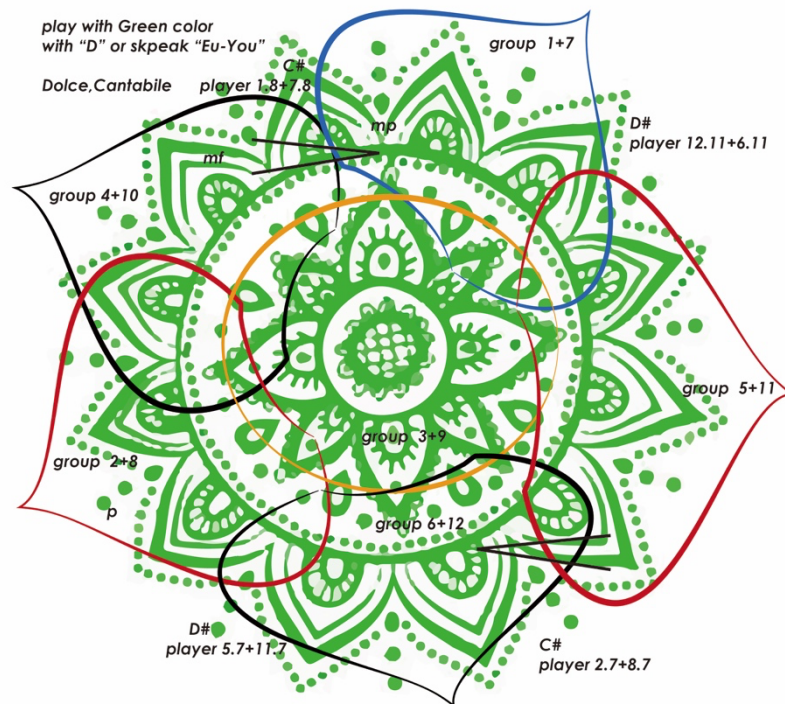


Figure 25. Score excerpt of *Chakra*. (Provided by the composer)

play

start at time 105.86 73

37 violin

only play with D pitch, or speak/sing "Eu-You"
Spiele nur auf dem Tone D oder spricht/sing "Eu-You"

Figure 26. Score excerpt (the 37th part) of *Chakra*. (Provided by the composer)

The implementation of proportional notation and real-time scrolling technology was conceptualized as an “assistive” framework (Hajdu 2019, p.5), facilitating the participation of semi-professional and amateur musicians in large-scale performances with minimal orchestral experience. This system theoretically could mitigate certain challenges, such as those encountered in the interpretation of complex notational systems, as exemplified by potential transcriptions (ibid., p.5) of Ligeti’s *Atmosphères* (1961).

However, the acoustic conditions of the St. Pauli Elbe Tunnel created a unique performance environment where traditional ensemble awareness became largely irrelevant. The spatial distribution of performers effectively absolved them of conventional synchronization responsibilities, as direct aural communication between distant sections was severely limited.

These acoustic constraints necessitated careful consideration of how notational systems could either compensate for or purposefully embrace this limited ensemble awareness. While some composers chose to focus performers’ attention solely on their individual parts and leave the mixed sound unpredictable, others preferred approaches to maintaining ensemble cohesion through score design.

Tzu-Ning Liao’s *Chakra* (2019) divided large-scale graphic notation (Figure 25) into pieces and delivered each piece to one voice (Figure 26). The score’s distribution methodology, whereby each performer accessed only a fragment of the complete visual score, serves as an apt metaphor for the broader perceptual experience of musicians throughout this project. Interview data indicate that performers maintained intense focus on their individual parts, with many encountering the composite sonic result only through subsequent recordings.

This performance context illuminates the valuable role of individually assigned parts can play in complex works. Liao’s method of fragmenting graphic notation demonstrates methodological parallels to the process of breaking traditional scores into proportional parts: both approaches segment complex musical information into manageable units for each performer. When adapted into proportional

notation, such works become more accessible to performers while maintaining compositional integrity. The clarity provided by precise transcription can enhance performers' creative agency by offering a reliable foundation from which to explore interpretative possibilities, providing performers with the structural confidence needed to engage meaningfully with the composer's vision.

Lindsay Vickery's composition *Dekompression* (2019) presents a different approach of employing graphic notation. Rather than receiving individual parts, performers accessed the complete score, with instrumental assignments denoted through color coding (Figure 27).

This comprehensive visual presentation enabled performers to reference other instrumental lines, facilitating both vertical and horizontal orientation within the musical texture. While the cursor remained the primary temporal reference, the availability of complete orchestral information provided additional contextual cues for performance navigation.

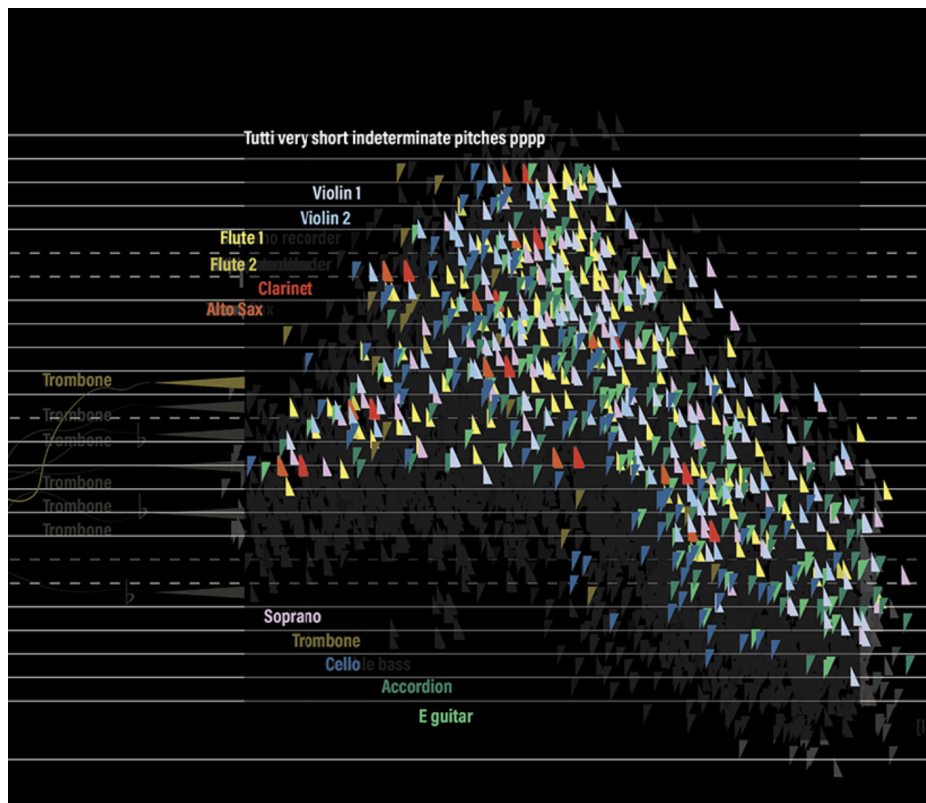


Figure 27. Score excerpt of *Dekompression*. (Screenshot by the author)

The composer's organization of the orchestra into twelve discrete groups was reflected in the score's visual hierarchy, with inter-group relationships indicated through reduced color intensity. This notational strategy emphasized the primacy

of intra-group coordination while maintaining access to the complete musical texture. While this approach did not simplify the interpretation of fundamental musical parameters such as pitch and rhythm, it enhanced performers' conceptual understanding of the work's overall sonic architecture, thereby facilitating more informed interpretative decisions.

While the *Symphony in St. Pauli Elbe Tunnel* project demonstrated the possibilities of digital synchronization within a highly specific acoustic environment, site-specific multimedia performance does not always require a tight bond to one architecture. The principles of site-responsive composition can also operate on broader urban scales, where the character of a city area, rather than individual buildings, becomes the compositional starting point.

This more flexible approach to site-specificity finds expression in Manos Tsangaris's *City Pieces (Window Piece)*, which engages with urban environments through adaptable compositional frameworks rather than fixed architectural parameters.

Manos Tsangaris: *City Pieces (Window Piece)* (2016), Hongkong

Manos Tsangaris has established himself as a composer, musician, sound art installation and performance artist, and poet. Since the 1970s, Tsangaris has consistently positioned performance conditions as the central theoretical framework for his compositions across diverse artistic media (Wise Music Classical, “Manos Tsangaris”). His body of work includes a significant series categorized by musicologist Jörn Peter Hiekel as “Processional Theatre” (Hiekel, “Permanent Quest: The Processional Theatre of Manos Tsangaris” 2012), referring to theatrical works comprising discrete stations distributed across multiple spaces. These works employ varied dramaturgical strategies regarding audience engagement, either constraining spectators to single locations or enabling their movement alongside the performers.

Analysis of these works reveals that questions of musical perception become paramount due to their heterogeneous formats and dynamic strategic approaches. Tsangaris’s compositional development leading to *City Pieces* includes several experimental precursors: the multi-site theatrical work *Bathsheba. Eat the History!* (2008/2009), *Botenstoffe. Orestie* (2006/2007), and *Schwabe* (2011). These works demonstrate early manifestations of site-specific elements in their documentation and execution.

Central to these experimental works is the investigation and interpretation of highly specific spatial environments. The performance venues function as communal spaces, facilitating collective experiential opportunities. These works consistently activate unconventional spaces or recontextualize familiar environments through novel approaches, generating innovative theatrical situations within often miniaturized music-theater compositions. Following Hans-Thies Lehmann’s theoretical framework of postdramatic theatre, these works can be characterized by their deliberate rejection of traditional artistic macro-structures that typically provide coherence, such as dramatic text.

City Pieces (Window Piece), for singer, actor, ensemble, installation, light, video and audio represents the second component of Tsangaris's musical theater cycle, *Living Space*, and has emerged as the most frequently performed work of the trilogy.

Originally developed in 2014 for its 2016 premiere in Hong Kong, the piece has subsequently been adapted for performances in Aarhus and Cologne, with modifications tailored to each urban environment. While exhibiting a comparatively lower degree of site-specificity according to Barry Ray Morse's theoretical framework than other works analyzed in this chapter, *City Pieces (Window Piece)* demonstrates how site-inspired composition can serve as a catalyst for broader spatial exploration.

The Premiere Place

Fort Street in North Point, Hong Kong, was the premiere place that motivated Tsangaris to compose this piece. This central area is renowned for its ethnic and cultural diversity.

The art space Connecting Space, located on Fort Street until 2018, commissioned the work. While this venue likely first drew Tsangaris's attention to the area, his compositional focus expanded to encompass the surrounding urban environment, including an opposing coffee shop and the street's broader cultural landscape.

Five Stations

The performance was structured across five clearly demarcated stations indicated in the score. "Public Zero," the initial station, was situated on the street in front of the art space, where the audience gathered while awaiting entry and encountered an actor portraying a passerby equipped with a wireless microphone. "Public 1" and "Public 2" were positioned within the art space's main room, which housed a singer-performer, a violinist, a cellist, a pianist, and two machinists who operated a custom-built installation.

“Public 1,” hereafter referred to as Room 1, positioned the audience facing the singer-performer, the first machinist, and the violinist. “Public 2,” hereafter designated as Room 1b, was located behind Public 1 and maintained the same directional orientation. From this position, audience members could observe all performers except the second machinist, who operated behind them.



Figure 28. Google Street View (Jan 2024) of the premier area, “Public 1, 2, and 3” in the building left side; “Public Zero” on the left side of the street; “Public 4” in the building right side. (Screenshot by the author)

“Public 3,” hereafter referred to as Room 2, was situated in the art space’s side room, where a percussionist performed with a head-percussion set (percussion instruments placed around the musician’s head). In this configuration, audience members were positioned with their backs to the percussionist. “Public 4,” subsequently designated as Coffee Shop, occupied the upper level of a coffee establishment across the street. This location featured a guitarist and multiple headphone stations, allowing audience members to experience the audio content

while observing the street scene below. A street view of this neighborhood can be found in Figure 28.

The performance structure employed a continuous rotation system: audience members, guided by an usher, progressed sequentially from “Public Zero” to “Public 4.” As each group completed their experience at the final station, a new



Figure 29. Public 1.



Figure 31. Public 3.



Figure 30. Public 2.



Figure 32. Public Zero.



Figure 33: Coffee Shop.

Figure 29-33 all from the composer's website.
(Photographer: Barbara Lubich)

group was directed to the starting point, ensuring continuous occupation of all stations throughout the performance duration. The performance situation of each station can be seen in Figures 29-33.

Mediatized Perspective Change

Tsangaris's experimentation with audience-performer relationships typically maintains the audience in a receptive role, as exemplified in this work. The audience members were not required to actively contribute content or initiate events within the performance. Although occasionally observed by others, they remained largely unaware of this surveillance, establishing a relationship primarily characterized by shifting perspectives.

Three of the five stations—Room 1, Room 1b, and Room 2—presented similar performance content through varying vantage points. In Room 1, audiences initially encountered only the singer and machinist 1. The subsequent experience in Room 1b provided a more comprehensive view, revealing all musicians and a metallic projection surface. This expanded perspective allowed observation of the complete mechanical installation and intermittent projections that displayed performance details and urban-themed textual elements. This sequential revelation encouraged audiences to apply similar observational strategies to their urban environment, attending to details that emerge through multiple perspectives.

Upon entering Room 2, audiences encountered a significant shift in presentation format. The space employed a cinematic configuration, with seated viewers facing a screen and an unnoticed percussionist positioned behind them in darkness. The screen displayed recordings from Room 1's performance; however, just as audiences anticipated mere repetition, the sonic experience transformed. The percussionist provided synchronized accompaniment to the projected visuals, creating sounds that, while reminiscent of the original performance, were distinctly novel.

The final station, Coffee Shop, required audiences to be seated by windows and don headphones. This position facilitated a layered auditory experience combining live electric guitar, ambient street sounds, and the voice of the roaming actor. The textual elements previously projected onto the metallic surface in Room 1b reappeared as audio signals through the headphones.

This progression demonstrated deliberate dissociation of aural and visual information. Audiences progressed through multiple iterations of similar content: first experiencing an overview of the street, then observing an audiovisual sequence, followed by a repetition enhanced with additional visual information revealing urban-life themes. The third iteration maintained visual continuity while introducing new sonic elements, culminating in a remixed compilation of previous sequences through headphones. These repetitions reinforced audience memory while cultivating heightened awareness of urban observation.

As audiences developed increasing familiarity with the sequence, the material became internalized, prompting reflection on both their perception of the performance and their broader urban experience. The work suggested that while metropolitan environments contain numerous repetitive elements, individual experience remains dynamic and varied—analogous to one's shifting relationship with recurring urban phenomena, such as public transportation, which may alternately demand attention, urgency, or indifference.

While one critic characterized this piece as “deliberately content-empty” (Falentin, “Urban Healing?” 2019), suggesting that formal structure dominated the work's conception, this assessment warrants deeper examination. Although structural elements are indeed fundamental to the piece, the content was meticulously crafted to engage audience attention and suggest conceptual frameworks before revealing its complete structural architecture. The careful selection of sonic elements, choreographed movements, and physical materials demonstrates deliberate artistic intention. For instance, the subtle distinction between installation and percussion sounds enabled a gradual progression of media transformation,

rather than abrupt transitions. This measured approach to content development proved essential to the successful implementation of the work's mediatized perspective shifts.

The Core Stayed Unchanged

“Even though Manos Tsangaris responds to specific sites with his works, almost all of them can still be transferred to other places without a loss of substance” (Hiekel, “Permanent Quest: The Processional Theatre of Manos Tsangaris” 2012). After its premiere in Hong Kong in 2016, this work was played again in Aarhus in 2017 and Cologne in 2018.

The Aarhus performance was situated in Dokk1 (alternatively known as Dokken), a multifunctional cultural complex incorporating public library facilities and serving as a civic center. The Cologne iteration occurred on Bechergasse, a thoroughfare positioned between Cologne Cathedral and City Hall, characterized by significant tourist activity. Tsangaris’s selection of performance venues demonstrates consistent criteria: central urban locations that function as representative civic spaces, featuring architectural elements such as opposing display windows, ambient traffic sound, and substantial pedestrian activity—elements essential for the realization of notated events.

While the piece employs traditional notation augmented by innovative symbolic elements, the relationship between score and performance merits careful consideration. Although the notated elements must constitute part of the work’s essential “substance,” categorizing the score as the work’s primary determinant would conflict with Tsangaris’s self-identified role as both composer and director (as credited in Achtbrücke Festival and SPOR Festival documentation). The score prescribes ensemble performance parameters while deliberately preserving indeterminate elements, including precise performance positions, ambient soundscapes, architectural context, and audience behavior—variables that necessarily respond to site-specific conditions.

Documentation of the Cologne performance, along with Falentin’s critical review detailing his experiential observations, reveals significant site-specific adaptations. The spatial configuration underwent notable modifications: Room 2

was relocated to a basement setting, while the Coffee Shop segment was transposed to a kiosk environment. The urban context naturally provided different pedestrian interactions. Falentin's account also documents an instance of audience autonomy, noting how one spectator deviated from the prescribed progression by moving directly from station 1 to station 3, thereby subverting the intended sequential experience.

These localized adaptations enhanced audience engagement through regional specificity while maintaining the work's fundamental performative element—the manipulation of perspective. Falentin's critical response documents an evolution of perception: his initial fatigue upon the third iteration of the sequence transformed during his transit to the kiosk, where urban reality began to assume theatrical qualities.

“And while waiting in front of the kiosk, you're already to the point where you'd like to think every cab driver stowing suitcases in his car with a Polish accent is part of the performance...” (Falentin, “Urban Healing?” 2019)

This transformation of urban perception through participatory experience emerged as the work's invariant core. Despite the presence of unpredictable elements, the piece successfully achieved its primary objective: facilitating altered modes of urban observation among participants. This perceptual shift persisted as a constant feature across various performance iterations, transcending site-specific variations.

Cultural Site-Specificity

The work's thematic engagement with urban existence raises questions about the significance of individual urban cultures. Unlike pieces with more abstract settings, such as *Control* by Schubert, this work's explicit urban context invites consideration of the cultural specificities of each performance venue.

Tsangaris's portfolio demonstrates extensive experience with site-specific compositions. His personal website and his interview with Armin Köhler (Tsangaris in

Köhler, “Werke des Jahres 2004: Drei Räume Theater Suite” 2008) document numerous works that deeply integrate their performance spaces: *Drei Räume Theater Suite* at Fürstliche Hofbibliothek (Three-Room Theater Suite, Donaueschingen Music Festival 2004), *Diskrete Stücke* at the WDR headquarters, and *An die Vorwelt* (To the Previous World) at Cologne Philharmonic Hall (1996). These works exhibit sophisticated spatial integration through thematically resonant instrumentation, costumes, props, and choreographed movement patterns.

City Pieces (Window Piece), however, represents a departure from strict site-specificity, seeking instead to identify and exploit urban commonalities across multiple metropolitan environments. While audiences encounter the work within their familiar urban context, this trans-cultural approach facilitates philosophical reflection that transcends quotidian experience. Despite potentially limited familiarity with specific urban environments, Tsangaris successfully articulates fundamental aspects of metropolitan existence: the recognition of variation within repetition, appreciation of minute detail, and cultivation of spatial empathy among urban inhabitants.

The work’s international genesis—a German composer commissioned by a Swiss organization, performed by a Danish ensemble with English text—mirrors both Hong Kong’s international character and the broader homogenization of metropolitan centers. Through its deliberate adaptability to diverse urban settings, *City Pieces (Window Piece)* offers a transformative lens through which city dwellers can rediscover environments dulled by habituation, illuminating the extraordinary within the ordinary urban experience.

Tsangaris’s approach to urban adaptation in *City Pieces (Window Piece)* presented how site-specific composition could maintain flexibility while still engaging meaningfully with the place. This adaptable framework represented one strategy for navigating the relationship between composition and environment, yet other

composers have pursued more direct forms of site engagement, where the historical and social narratives embedded within specific urban locations become the primary compositional material.

This approach to place-based storytelling found distinctive expression in Kirsten Reese's *Berlin Rosenthaler Platz, audio walk with singing sirens*, which integrated the performative possibilities of music theater with the documentary potential of site-specific composition.

Kirsten Reese: *Berlin Rosenthaler Platz* (2018), Berlin

Kirsten Reese is a composer and sound artist. She worked as a flutist, author, and curator of contemporary music and sound art in her early years. With her abundant knowledge in both music and sound studies, as well as decades of practice in different places throughout the world, she has an extraordinary sensitivity to places. Her works often have extensive research behind them, combining historical facts, archive recordings with field recordings, and immersive soundscapes. One of her focuses is to create “compositions, installations, and audio walks for landscapes and urban outdoor spaces” (EMDoku Website, “Kirsten Reese”).

Since the 2000s, most of Kirsten Reese’s installations have been highly site-specific. For works like *Hallenfelder* (Hall fieldss), an audio-visual installation for a Wave Field Synthesis system and video projection (Donaueschinger Musiktage, 2006) and “*no voice audible but that of the sea on the far side*,” a four-channel sound installation (Aarhus harbor, SPOR festival, 2013), she worked on-site during the entire composition process, researching the acoustics of the room, the daily routine of its surroundings, as well as the historical roots of the area. In such works, we can see how technologies amplify the characteristics of a place. They not only show the artistic inspiration from the place but also expand its social impact. For example, “*no voice audible but that of the sea on the far side*” has drawn the audience’s attention to the relationship between humans and marine life through work on the sound-proof system for fish and the recording of fish activities.

In *Debatte*, a 24-channel sound installation (with Enrico Stolzenburg, Rathaus Donaueschingen, Donaueschingen Music Festival, 2013), she showed the performative potential of a place itself. She placed 24 loudspeakers around the round table in the meeting room of the Donaueschingen Town Hall. The audience can

perceive a narrative without any visual input through spatialized historical recordings, composed music, and the furnishings in the room.

Another important trend in Kirsten Reese's work is the extensive collection of audio walks she has designed. In both *Zoobrücke* (Zoo Bridge, pedestrian bridge over the Zoo in Karlsruhe, 2012) and *Hört auf diese Stadt!* (Listen to this city! with Enrico Stolzenburg and Dag Kemser, City Center, Magdeburg, 2013), she mixed historical samples, past interviews, newly composed music, and, in the latter piece, voice recordings of a fictional story. These projects established her distinctive style of audio walks: research-based, socio-politically connected, and highly participatory.

In 2018, during the BAM! Festival, a festival for contemporary music theater, *Berlin Rosenthaler Platz, audio walk with singing sirens* had its premiere. This piece combined an audio walk with promenade theater, making it an unconventional music theater piece. Its inclusion in the program suggested a strong performative element. Indeed, it inherited the strengths of Kirsten Reese's previous site-specific works, as the place and its history narrated the story throughout the entire work.

Performance Shaped by Historical Connection

On the afternoon of May 28th, 2018, people gathered at Brunnenstrasse 128. While it was unusual to see crowds assembling on the street for a performance, Kirsten Reese and David Wagner had deliberately chosen this urban area as their stage.

The area around Berlin Rosenthaler Platz extends from the Volkspark am Weinberg to the intersection of Brunnenstrasse and Linienstrasse, including the Rosenthaler Platz metro station. Located in downtown Berlin, it is a popular destination for meetings, shopping, dining, and transit. Since the 19th century, it has been a social hub; in the 1920s, it became the center of Jewish life, and it also played a significant role during the GDR era and the fall of the Berlin Wall. Reese collected historical sounds from the German Radio archives, aiming to merge

acoustic, social, and historical spaces. As she noted, “the chronology is the place” (Reese, “Lecture at VAMH”, 01:03:12, 2018; translated by the author).

Each audience member received an MP3 player and headphones, which they would use during the next 75 minutes while walking through the streets. This format was reflected in the piece’s subtitle: “audio walk with singing sirens.” The audio walk served as the primary activity, allowing participants to maintain their autonomy. While they received audio guidance through their headphones, they had to determine their own paths through the space.

Audio Walk as a Way to Create Augmented Reality

The concept of the soundwalk was introduced by R. Murray Schafer in 1969 and subsequently refined by Hildegard Westerkamp. It refers to “any excursion whose main purpose is listening to the environment” (Westerkamp 1974, p.18). Despite its nomenclature, a soundwalk does not necessarily require physical movement between locations; it can involve active listening at a single site. The defining characteristic of a soundwalk lies in its capacity to “rediscover and reactivate our sense of hearing” (Ibid.), regardless of the number of participants or the presence of formal instructions.

The audio walk represents a synthesis of traditional audio tours and soundwalks, wherein participants receive guidance analogous to museum audio guides. These audio guides serve dual functions: providing practical navigation instructions while simultaneously directing attention to specific auditory elements. Beyond these utilitarian aspects, the audio track can be crafted as an artistic medium. Artists such as Janet Cardiff have pioneered the use of audio walks as a compositional methodology, creating intricate layers of environmental and pre-produced sounds.

Kirsten Reese’s implementation of the audio walk methodology bears striking similarities to augmented reality experiences. Although she did not explicitly employ augmented reality technology, her work effectively created an imaginary space superimposed upon physical reality.

Reese demonstrated exceptional sensitivity to the acoustic environment of Rosenthaler Platz, carefully curating and integrating elements from the existing soundscape while guiding her audience through a process of focused listening. Her artistic vision extended beyond mere environmental sounds, incorporating temporal dimensions that encompassed both cyclical contemporary sounds, such as metro operations, and historical echoes, including the now-absent sounds of a demolished dairy factory. Each carefully selected vantage point offered listeners an expansive auditory perspective of the space. To enhance this temporal bridging, Reese strategically positioned historical photographs at specific locations, providing visual context for the area's past incarnations (Figure 34).

“What kept me really fascinated here was this sound of the subway, which is very well-known. The students, for example, were very willing to do something with this sound. But what was totally fascinating was that you really hear many things apart when you listen to them over headphones. That’s real or not. That is a certain experience... simply plays together with this space.” (Reese, “Lecture at VAMH”, 01:06:27, 2018; translated by the author)

Reese’s innovative methodology enables participants to engage in a multifaceted examination of space, facilitating simultaneous observation of current conditions, exploration of historical narratives, and contemplation of future possibilities. Through her sophisticated implementation of augmented reality techniques, Reese succeeds in amplifying the intrinsic characteristics of specific geographical locations, thereby revealing complex narratives that might otherwise remain imperceptible to casual observation. The Rosenthaler Platz installation serves as a seminal example of Reese’s mastery in crafting immersive auditory experiences that transcend conventional temporal and spatial boundaries, establishing profound connections between the physical environment and its embedded historical memory. A map with the entire route of the audio walk can be found in Figure 35.



Figure 34. One of the historical pictures posted during the performance.
(Provided by the composer)

KIRSTEN REESE / DAVID WAGNER
BERLIN ROSENTHALER PLATZ
 EIN AUDIOWALK MIT SINGENDEN SIRENEN

Folgen Sie der Karte und den Anweisungen der Stimmen. Achten Sie auf Hinweise auf Gebäude, Schilder, Objekte und Aufkleber mit historischen Fotos. Verweilen Sie an den oben unterstrichenen Orten.
Der Audiowalk überlagert das gewohnte Hören im Alltag – bitte große Vorsicht im Straßenverkehr, insbesondere an Straßenkreuzungen.

● Tracks, Wege, Stationen. ● historische Fotos

- 1 Im Ocelot
- 2 Vor Ocelot – Gitter
- 3 Brunnenstr. bis Hofeingang Brunnenstr. 198
- 4 Hofe Brunnenstr. 198 und zurück
- 5 Brunnenstr. 198 bis Rosenthaler Platz, U-Bahn Aufzug – Ampelübergang
- 6 Ekke Kiosk – Rosenthaler Str. bis Linienstr. – Straßenüberquerung
- 7 Linienstr. bis Kl. Rosenthaler Str. und zurück zu Ekke Rosenthaler Str.
- 8 Rosenthaler Str. bis St. Oberholz / Kreuzung
- 9 Ampelübergang – 1. Mittelinsel – weiterer Ampelübergang
- 10 Ekke Weinbergweg Ost
- 11 Ekke Weinbergweg West
- 12 Weinbergweg bis Vertellerkasten gegenüber Zehdenicker Str.
- 13 Durch den Weinbergspark – Mutter-Kind-Statue – Denkmal
- 14 Hang Veteranenstr. – Kreuzung Veteranenstr./Brunnenstr.
- 15 Zum U-Bahn Eingang Brunnenstr.
- 16 U-Bahn Durchgang
- 17 Ekke Weinbergweg West – an der Ampel Brunnenstr. – Ampelüberquerung
- 18 Brunnenstr. zurück zum Ocelot

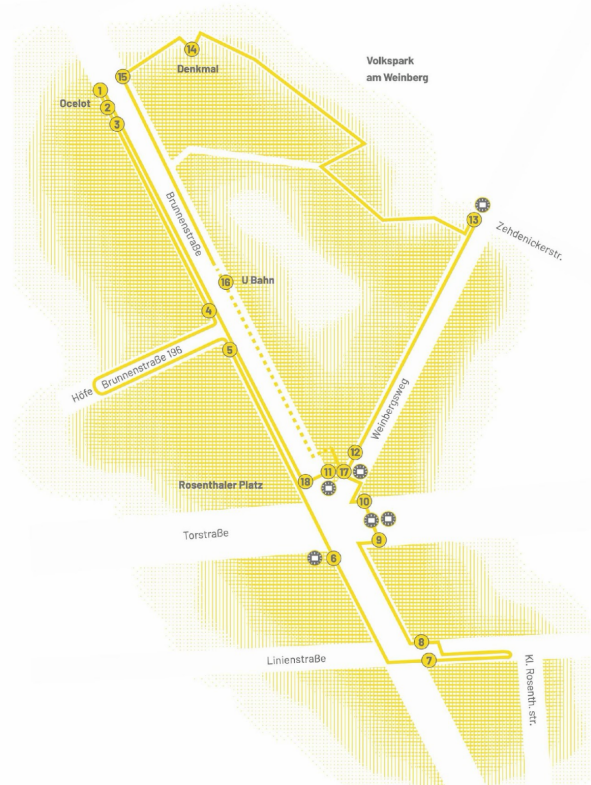


Figure 35. Map with the route of the audio walk. (Provided by the composer)

Intimacy and Distance in Binaural Mixing

Binaural mixing serves as an integral component of the work's dramaturgical structure, artistically shaping the audience's perception of space and social dynamics. The technique creates moments of intimate connection, with speaking voices positioned close to the listener's ears throughout most of the journey. This proximity, rather than creating discomfort, becomes an artistic tool through Reese's thoughtful choice to structure the narrative as a dialogue between two speakers instead of directly addressing the audience. Through this approach, she transforms what could have been an isolating experience into one that evokes the familiar sensation of walking alongside conversing companions.

Reese demonstrates particular artistic sensitivity in her use of spatial positioning to create moments of psychological distance. By occasionally moving the speakers away from the listener or introducing specific acoustic environments through reverberation, she crafts subtle transitions that guide the audience through different emotional and physical spaces, enriching their imagined experience of Rosenthaler Platz. These shifts in acoustic perspective function as gentle prompts, inviting listeners to engage more deeply with their changing surroundings.

The careful choreography of moving sounds further enhances the artistic composition. By allowing everyday sounds—cars, sirens, and fragments of conversation—to move through the virtual space in natural patterns, Reese creates a fluid interplay between the composed soundscape and the actual environment. This artistic choice helps establish a unified acoustic experience where the real and the virtual coexist and complement each other, deepening the audience's engagement with both the physical space and its reimagined counterpart.

Berlin Rosenthaler Platz exemplified how site-specific composition could draw upon the cultural and historical narratives embedded within urban environments. While this approach emphasized the social and performative dimensions of a place, other composers have pursued more fundamental relationships between music and environment, integrating both the acoustic properties and natural soundscapes that specific locations can offer to musical composition.

This holistic approach to environmental integration finds expression in works that treat natural spaces as complete sonic ecosystems. Technological advances have enabled composers to measure acoustic properties and record in previously inaccessible or harsh conditions, thereby expanding the range of environments available for musical exploration. *Quatuor pour la grotte Saint Marcel* represents a particularly compelling case study of this expanded environmental engagement.

Luna Valentin: *Quatuor pour la grotte Saint Marcel* (2020), Bidon

The practice of musicians leveraging unique acoustic environments to record music has a rich history. The reverberations of spaces like churches have been cherished by both classical musicians and popular artists seeking distinctive auditory qualities.

As mentioned in Chapter Three, Pauline Oliveros formed her band Deep Listening after performing in a 14-meter-deep underground cistern, where the space's extraordinary reverberation time shaped their sonic approach. With the onset of the 1980s, there was a rising interest in experimenting with unconventional acoustics to impart unique tonal colors and textures to music. Pioneering artists like Einstürzende Neubauten recorded *Stahlmusik* (Steel Music) in 1980 within a pillar of the Stadtautobahn Bridge in Berlin (Hall 2014, p.108), utilizing the bridge's acoustic characteristics to enhance their music. The following year, Yoshi Wada created "Lament for the Rise and Fall of the Elephantine Crocodile," recorded in a dried pool in upstate New York, harnessing the unique acoustic properties of that location (Torn Light Records, "Yoshi Wada, Lament for the Rise and Fall of the Elephantine Crocodile" 2025).

More recently, in 2018, composer and improviser Lucie Vítková recorded part of her album *Cave Acoustics* within caves in the Czech Republic (Vítková, Bandcamp page 2018).

By embracing this approach, *Quatuor pour la grotte Saint Marcel* (Quartet for the Saint Marcel Cave) breaks new ground, as the music becomes an integral part of the cave's sonic landscape. Through this innovative method, the piece creates a seamless fusion of art and environment, enriching the audience's experience and fostering a deeper appreciation of the cave's intrinsic acoustics.

Speleology And Music

Luna Valentin is a multi-talented artist who excels in various fields. She is not only a composer but also a dedicated researcher and accomplished contrabassist.

Her diverse educational background includes physics, musicology, and a contra-bass performance degree.

From an early age, Valentin developed a fascination with limestone caves and spelunking, beginning her exploration of these unique environments at age 10 (Valentin, interviewed by the author, 15th of July 2023). The unique acoustics of the caves left a profound impression on her, combining her love for music with her experiences as a spelunker. This fascination with cave acoustics led her to pursue further studies in the subject, including obtaining a license as a spelunking advisor.

After completing her studies in France, Valentin focused on Computer-Based Music Theory and Acoustics research at Stanford University's prestigious Center for Computer Research in Music and Acoustics (CCRMA). Before joining CCRMA, she had collaborated with Miriam Kolar on research into acoustic measurement methodologies in caves. Speleoacoustics, the study of sound propagation and acoustic properties in caves, became one of her most significant research topics. Together, they analyzed the acoustical environments of several caves, gaining deeper insights into the unique properties of these subterranean spaces (Stanford University, "Luna Valentin").

Throughout her research journey, Valentin had a visionary idea: to translate the awe-inspiring emotions and sensations she experienced within caves into the language of music. Combining her expertise in composition with her newfound knowledge of cave acoustics, she set out to create a musical piece that would convey the essence of her cave explorations.

Quatuor pour la grotte Saint Marcel was her first attempt at this vision. The piece, scored for flute, clarinet, viola, violoncello, and percussion, consists of three distinct movements that represent different aspects of the cave experience. Through her composition, Luna Valentin aimed to create a work specifically tailored to Saint Marcel Cave's unique environment. The natural acoustics of Saint Marcel cave guided her choice of musical material throughout the composition process.

During the recording, she made additional adjustments to better adapt the piece to the space.

Following this experiment, Luna Valentin further developed her ideas in *Chauvet Cave Beep Ploc Symphony* (2022), a data sonification project based on the audio language WebChuck that explores how extreme weather phenomena affect the ecological balance of Chauvet Cave (Vallon-Pont-d'Arc, France), and *D'autres Soleils* (Other Suns, 2023), a vocal composition focusing on the acoustics and history of the Le Corbusier Church (Firminy, France).

The Cave and the Acoustic Measurement



Figure 36. Saint Marcel Cave. (From the official tourist website)

Saint Marcel Cave (La Grotte de Saint Marcel) is located between Vallon Pont d'Arc and Saint Martin d'Ardèche, in the town of Bidon, France (Figure 36). It covers over 64km (The Ardèche Gorges) with a vertical drop of 325m and a natural entrance altitude of 95m. In the centre of the cave, the temperature is constantly at 13.8°C, with around 86% humidity (La Grotte de Saint Marcel tourist website). However, the humidity can be even higher in other parts of the cave (Valentin, interview). During 2020-2021, Luna Valentin and Miriam Kolar did fieldwork in

Saint Marcel Cave and l'Ours Cave (La Grotte de l'Ours, the cave of bears). Their human-centered comparison of speleoacoustical features was aimed at testing the sound at locations where humans could make sound and hear it.

The acoustic characterization of Saint Marcel Cave employed impulsive signals generated by wooden clappers, selected for their portability despite their spectral limitations. Initial experiments involved comparative analysis of clapped signals at fixed positions, measuring RT20 (reverberation time) values and revealing significant deficiencies in low-frequency energy content, which is crucial for spatial acoustic assessment.

Subsequent investigations utilized a comprehensive measurement protocol incorporating both subwoofer and miniature loudspeaker excitation signals spanning 20Hz-20kHz, enabling spectral analysis and validation of the initial findings. The methodology was cross-referenced with measurements in l'Ours Cave, where wooden clappers demonstrated different low-frequency characteristics. Early Decay Time (EDT) metrics were employed to quantify the energy distribution between direct and reverberant sound fields, providing insights into the cave's acoustic properties (Valentin 2022, p.4).

“...early reverberation, as quantified by the EDT metric, is dominated by mid-frequencies, whereas over time, higher frequencies disappear, and lower frequencies are prolonged according to the larger dimensions of the cave. Without attention to the time-dependencies of reverberation metrics, this particular behavior could be overlooked, with psychoacoustical implications.” (Ibid.)

The spatial characteristics of the sound field were evaluated using a binaural measurement setup comprising synchronized Zoom H3VR first-order Ambisonic microphones positioned at each ear position of a human listener, enabling analysis of interaural reverberation parameters.

Composition and Rehearsal in the Cave

Among several options, including l'Ours Cave and others, Luna Valentin selected Saint Marcel Cave not only for its acoustic properties but also for its superior accessibility.

This cave, inhabited since the Mousterian period (Lower Paleolithic), preserves traces of our Paleolithic ancestors, including rock paintings. Its magnificent landscape has made it a tourist destination since 1838 (Saint Marcel Cave tourist website). In 2015, its stable temperature and humidity conditions were utilized to establish a wine-maturing cellar. Infrastructure, including transportation, electricity, and other necessary facilities, was developed to accommodate regular tourist visits and wine-tasting events.

Based on acoustic features analyzed during fieldwork, Valentin chose instrumentation primarily in the mid-high range, with the violoncello as the lowest instrument, reaching approximately 65.4 Hz at standard tuning. Despite the cave's vast dimensions, unlike venues such as the Elbe Tunnel, verbal communication remained possible throughout the space. Musicians had ample room to position themselves while maintaining visual contact, facilitating ensemble coordination. Though Valentin avoided rapid phrases requiring precise synchronization due to the substantial reverberation, coordination between voices remained manageable.

The three movements—*Aqualuz*, *Water Drop Beat*, and *Ballade et Majesté Minérale* (Ballad and Mineral Majesty)⁷—were inspired by the primary forces that shape cave formation: flowing water, dripping water, and minerals. While not explicitly notated in the score, water sounds permeate the recording (Valentin, interview).

In the first movement of this composition (Figure 37), listeners encounter a captivating interplay between contrasting musical elements performed by the flute, clarinet, viola, and violoncello. The movement unfolds through two distinct characters, creating a compelling musical dialogue.

⁷ In the initial version, the order of the three movements was: *Ballade et Majesté Minérale*, *Water Drop Beat*, and *Aqualuz*. Here I take the recorded version as the final version to analyze.

The initial character features drone-like chords, with each note performed by a different instrument. This technique imbues the music with a sustained, meditative quality, drawing listeners into a contemplative atmosphere. In contrast, a series of short, arpeggio-like eighth notes emerges, executed with lively viola and cello pizzicato. This vibrant and agile texture provides a sharp contrast to the preceding drones, injecting rhythmic vitality and energy.

As the movement progresses, an elegant melodic line emerges, alternating sequentially among the four instruments. While one instrument presents the melody, the others maintain the drone-like chords, creating a harmonious and supportive accompaniment. This alternating melodic presentation adds fluidity and unity to the composition, bringing together the individual voices into a cohesive whole.

In the subsequent movement, *Water Drop Beat*, the musical landscape shifts dramatically. The tempo intensifies to 180 beats per eighth note, swift yet controlled. The flute and clarinet are replaced by marimba and tambourine, introducing percussive elements that create a minimalist soundscape.

All four instruments actively participate in this movement, producing short, staccato notes in a vivid and percussive manner. The rhythmic intricacies and playful exchanges between instruments build momentum, evoking the imagery of water droplets falling in a mesmerizing pattern.

In the concluding movement, *Ballade et Majesté Minérale*, the composition returns to the instrumentation of the first movement, with flute, clarinet, viola, and violoncello taking center stage. The movement maintains the character established toward the end of the first movement, as the four instruments shape a cantabile melody. During melodic pauses, the instruments reprise the drone-like chords, now serving as a textured backdrop to the main melodic material.

Luna Valentin composed the piece away from the cave, relying on her memory of the cave environment while writing the score in traditional notation. The rehearsals took place in a conventional practice room at the conservatory rather than in the

cave itself. Although extensive acoustic data from the cave was available, the musicians did not have an opportunity to test their instruments in the actual space before the performance. Nevertheless, they anticipated potential adjustments would be necessary once in the cave environment and deliberately maintained flexibility in their interpretation to accommodate these changes (Valentin, interview).

33

Fl.

Clar. Sib

Alt.

Vlc.

38

Fl.

Clar. Sib

Alt.

Vlc.

42

Fl.

Clar. Sib

Alt.

Vlc.

ppp

pp

ppp

pp

ppp

pp

ppp

pp

Figure 37. Score excerpt from the 1st movement. (Provided by the composer)

Upon arriving in the cave, the musicians required approximately two hours to acclimate to the altered timbres of their instruments in the unique acoustic envi-

ronment. They soon discovered that performing complete pieces without interruption proved challenging due to two significant environmental factors. First, the elevated CO₂ levels necessitated frequent breaks every one to two minutes for the wind instrument performers. Second, the extreme humidity levels exceeding 90% affected the string instruments' tuning stability, requiring regular adjustments throughout the performance.

These physically demanding conditions prompted modifications to certain musical passages, adapting them to allow for uninterrupted phrase execution despite the environmental constraints. As Valentin herself noted, "I really composed them for the cave while being aware of the qualities and also the faults" (Valentin, "Presentation", 01:44, 2021; translated by the author).

Liveness and Speleoacoustic

The significance of this composition lies in its innovative exploration of site-specific live concert performances within the unique acoustical environment of a cave. Although initially conceived as a live performance piece, the practical challenges of sustaining continuous performances in extreme climatic conditions led to an evolution in its presentation format. The work was ultimately realized as a video presentation, providing comprehensive information for further artistic creation.

Valentin approached the recording process with meticulous attention to technical detail. Her methodology involved strategic microphone placement through a mixing desk configuration, capturing both individual instrumental voices and the cave's inherent soundscape. The post-production phases—recording, editing, and mixing—became crucial elements in crafting the final artistic vision of the composition.

While the transition from live performance to video format may diminish the immediate experiential quality for audiences, this experimental process has provided valuable insights into the possibilities and limitations of creating site-specific performances within environmentally challenging spaces such as caves. The

comprehensive acoustic analysis and systematic implementation of this composition have generated significant methodological insights for future projects in similar environments.

In response to the challenge of preserving performative immediacy, Valentin has developed two distinct trajectories for future work. The first involves technological innovation through virtual reality modeling and acoustic data sonification, aiming to accurately translate spatial acoustic properties into digital media. The second pathway focuses on refining site-specific live performances, as exemplified by her ongoing project at the Le Corbusier Church, where she has implemented a more site-integrated compositional process with extensive on-location rehearsals.

The *Quatuor pour la grotte Saint Marcel* demonstrated how composers could engage with extraordinary natural environments. However, the principles of environmental musical engagement can also be applied to more mundane, everyday spaces using accessible methods and modest resources, while simultaneously fostering community interaction and social engagement.

This accessible approach to site-specificity finds expression in works such as *Sound Ride*, where logistical simplicity, economic feasibility, and social connection serve as primary compositional considerations.

Dong Zhou: *Sound Ride* (2023), from Hannover to Lehrte

Research into environmental sound and soundscape theory has been a central focus for me since 2014, beginning with field recording work in multimedia theater productions. Notable projects during this period included two multimedia theater works: *2o15* (2015) and Yi Qin's *City Maze* (2015), which necessitated extensive field recording sessions throughout the Shanghai metro system, spanning multiple lines over two-week periods.

This initial exploration of environmental sound revealed limitations in the traditional approach of presenting recorded sounds within conventional performance spaces. A shift in methodology emerged, focusing on the creation of site-specific experiences that would enable audiences to engage with sounds in their original contexts. This theoretical framework was first implemented in 2019 through the site-specific sound installation *Installation for MUWA* at the Museum of Perception in Graz, housed in a former public bath. The project was developed through collaboration with Algorithms that Matter (ALMAT), an artistic research project at the Institute of Electronic Music and Acoustics, University of Music and Performing Arts Graz. Led by Holger Rutz, David Pirrò, and Daniele Pozzi. ALMAT investigates the increasing influence of algorithms and their translation into aesthetic positions in sound. Under their guidance, the installation incorporated a miniature bath construction, inviting audience interaction with water elements while amplifying and resonating these sounds within the space's unique acoustic properties.

The research expanded to investigate the transformation of quotidian spaces into performance and exhibition venues. This exploration culminated in a 2021 site-specific sound installation situated within public restroom facilities, which has been examined in Chapter Five as a case study in the application of piezo loudspeakers in site-specific works.

In 2023, the Fuchsbau Festival extended an invitation to create a performance piece for a bus journey between Hannover and Lehrte, the festival's location. This commission presented an opportunity to further develop the investigation of site-specific sonic interventions in transportation environments.

Sound Ride, performed on May 20th, 2023, emerged from this commission, addressing the unique cultural context of a region where contemporary arts have historically maintained a limited presence. This context was aptly illustrated by journalist Thomas Kurz's pre-festival inquiry: "Can those who otherwise dance to *Layla* and Helene Fischer in the Schützenzelt (beer tents) get excited about readings by the lake, psychedelic electro music, and landscape-related sound installations?" (Kurz, "Lehrte: Fuchsbau-Festival als künstlerische Landpartie" 2023; translated by the author) The performance was conceptualized as a preparatory experience for festival attendees, designed to heighten auditory awareness, foster receptiveness to experimental artistic forms, and facilitate initial social interactions among festival participants.

Transition through Exploration

The performance was conducted in four distinct phases, which are marked in Figure 38, each designed to facilitate a progressive transition from quotidian perception to heightened acoustic awareness.

The initial phase (A-B) was initiated with a structured invitation for participants to engage with Hannover's urban soundscape through observation from the windows. This methodological approach enabled participants to discern distinct acoustic strata within the metropolitan sonic environment, identifying inherent musical qualities within the urban acoustic fabric.

The second phase (B-C) introduced a mobile phone-based soundboard application as an interactive element. This technological interface enabled participants to integrate pre-composed musical phrases with the ambient urban and vehicular acoustics. These musical interventions were designed to respond to and enhance the harmonic elements identified within the urban soundscape. The communal

nature of this interactive element facilitated initial social discourse among participants.

Phase three (C-D) incorporated the Soma Ether device, an instrument designed for the detection and amplification of electromagnetic field emissions. Participants were encouraged to explore the sonic properties of electromagnetic fields within the vehicle environment. The resulting radiofrequency emissions are integrated with the external soundscape, generating a complex acoustic composition. The collaborative exploration of these devices fostered increased social interaction and acoustic discourse among participants.

The final phase (D-E) coincided with the approach to the Lehrte festival venue. A methodological shift was implemented through the announcement of an imminent field recording playback, encouraging comparative acoustic analysis between recorded and live soundscapes. This expectation was deliberately subverted through the introduction of a children's song, creating an unexpected cognitive dissonance that elicited collective amusement. The subsequent revelation of the vocalist's identity established a temporal connection to forthcoming festival programming.

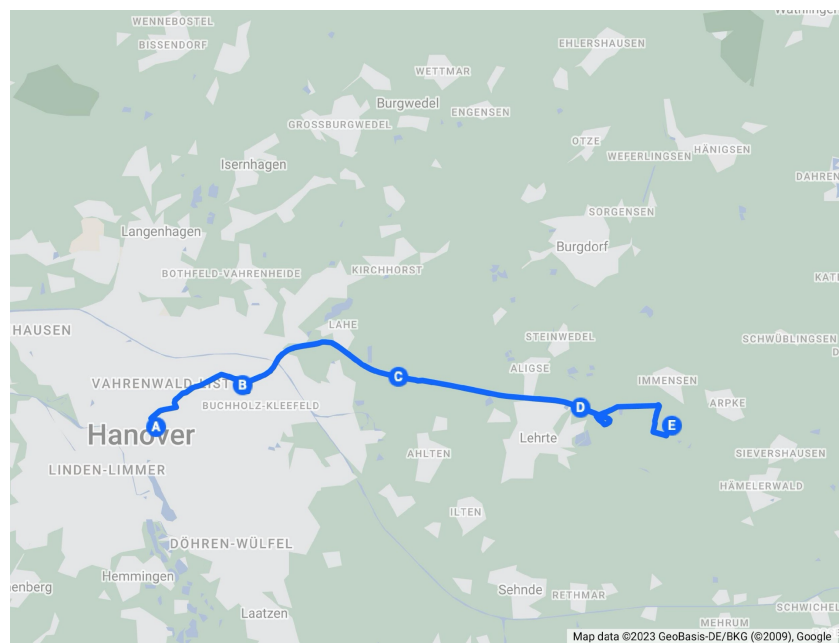


Figure 38. Map with the bus route. (Created by the author)

The journey's conclusion marked a transformation in participants' acoustic perception and social engagement, preparing them for subsequent festival experiences through enhanced auditory awareness and increased receptivity to experimental artistic forms.

A Bus Conductor and a Steward

The performance methodology centers on reconceptualizing the role of performer-facilitator through the historical paradigm of a bus conductor, examining their traditional function in fostering community engagement and passenger assistance during transit. This approach repositions the facilitator from a centralized performance role to that of an enabler, empowering audience members to become active participants in the performative experience.

The selection of the bus conductor archetype as a methodological framework stems from an analysis of their historical social interactions and behavioral patterns. Given that this occupation ceased to exist in Germany during the 1970s, the performance required a contemporary reinterpretation. This adaptation incorporated elements from modern transportation service roles, particularly that of the airline steward, creating a hybrid performance model that bridges historical and contemporary service paradigms.

The performance script drew structural inspiration from standardized aviation safety protocols and public address announcements, establishing a framework that balanced familiarity with artistic intervention. To enhance the theatrical dimension and maintain consistency across performances, the facilitator's instructions were pre-recorded and integrated into the performance structure. This audio implementation created a controlled delivery mechanism while preserving the spontaneity of live interaction.

The choreographic elements of the performance incorporated repetitive spatial movements derived from traditional conductor practices, such as the cyclical progression through the vehicle for ticket verification. This systematic approach established a rhythmic structure within the performance space.

A significant methodological innovation emerged from the integration of airline steward protocols, specifically the synchronization of physical gestures with pre-recorded audio instructions. This synthesis created a multisensory performance element that enhanced audience engagement through the simultaneous presentation of visual and auditory stimuli.

The performance design thus represents a synthesis of historical and contemporary service roles, creating an interactive framework that facilitates audience engagement while maintaining structural coherence. This methodology enables the creation of a temporary community within the transit space, fostering both individual and collective participation in the performative experience.

Artistic Strategy in Small-Scale Production

The artistic strategy for this site-specific performance explores the constraints of small-scale production parameters, emphasizing resourcefulness, spontaneity, and the repurposing of quotidian technological devices to create an immersive participatory experience.

The production framework presented significant logistical constraints, including temporal and budgetary limitations, one performance for approximately thirty participants without rehearsal or repetition, and restricted access to the performance venue and its broadcast infrastructure. These parameters precluded traditional theatrical production elements such as sustained rehearsal periods or conventional staging apparatus. Furthermore, the paucity of documented precedents for similar small-scale productions limited the availability of methodological references.

The strategic response prioritized the integration of ubiquitous technological devices commonly found in contemporary daily life. This approach offered practical advantages in terms of portability and implementation while simultaneously leveraging audience familiarity with these devices to establish psychological comfort and facilitate engagement. The utilization of familiar technological interfaces created an accessible entry point for audience participation.

While acoustic fidelity was necessarily subordinated to logistical constraints, the performance strategy prioritized social interaction and collective engagement. Drawing theoretical frameworks from community art practices, the production deliberately minimized theatrical artifice in favor of game elements. This gamification approach facilitated active audience participation and interpersonal interaction, fostering an environment of collaborative exploration.

Participants engaged with this collaborative framework through activities like manipulating a mobile phone application to play pre-composed sounds, record ambient audio, and construct simple compositional patterns from these materials; operating Soma Ether devices to detect and listen to the electromagnetic field activity in their immediate environment (Figure 39); and practicing focused attention to the acoustic characteristics of their surrounding space. These engagements created multiple layers of sonic interaction, allowing participants to simultaneously contribute to, document, and perceive the evolving soundscape collectively.



Figure 39. Performance situation of *Sound Ride*. (Provided by Fuchsbau Festival)

The artistic strategy thus represents a calculated response to small-scale production constraints, reconceptualizing these limitations as opportunities for innovation in audience engagement. Through the strategic deployment of everyday technology and emphasis on social interaction, the performance transcended its logistical constraints to create a distinctive contribution to site-specific multimedia art practice. This adaptive strategy demonstrates the potential for resource-conscious approaches to generate meaningful artistic experiences within limited production parameters.

Conclusion

The case studies are listed in Table 1 with four specifiers. The selection of these four specifiers reflects their status as foundational determinants that fundamentally shape the conceptual framework of any site-specific work. Each specifier encompasses multiple methodological approaches that composers could choose

from when developing their site-specific ideas. These dimensions represent the core decision-making areas where artistic choices directly impact both the creative process and the resulting work's relationship to its environment.

Title	Composer	Spatial Scale	Temporal Coordination	Site Engagement Strategy	Social Engagement Depth
<i>Control</i>	Alexander Schubert	Multi-room, large-scale distributed	Digital synchronization across disconnected spaces	Architecture-specific, layout-responsive	High; scripted interaction between the audience and the performers and among audience members
<i>Symphony in St. Pauli Elbe Tunnel</i>	Georg Hajdu	Single specific location, tunnel environment	Digital synchronization in challenging acoustic space	Architecture-specific, layout-responsive, acoustic properties central	Moderate; 144 selected musicians from various background worked together
<i>City Pieces (Window Piece)</i>	Manos Tsangaris	Urban area scale, flexible spatial framework	Multimedia ensemble coordination	Urban-responsive, adaptable framework	Moderate; connected a few spots on one street, adaptable to different urban contexts
<i>Berlin Rosenthaler Platz</i>	Kirsten Reese	Specific urban location, walking-based	Sequential temporal structure	Social-historical-focus, listening activation	High; connected many spots in an area, visible and accessible for public
<i>Quatuor pour la grotte Saint Marcel</i>	Luna Valentin	Natural cave environment	Traditional ensemble coordination	Environmental immersion, acoustic properties central	Low; produced with a closed group
<i>Sound Ride</i>	Dong Zhou	Everyday spaces, community-accessible	Sequential temporal structure	Community-centered, listening activation	High; logistically simple, blended into a mundane routine

Table 1: An overview of all six case studies.

Site-specific multimedia performance can happen anywhere and on any size of scale. Each of these compositions employs distinct strategies to navigate the challenges presented by unconventional performance spaces. From subterranean tunnels to bustling urban streets, the artists showcased here ingeniously utilize their chosen sites' unique acoustic and visual attributes, drawing inspiration from the cultural and social contexts surrounding them. The intrinsic limitations posed by these spaces emerge as catalysts for creativity rather than constraints. In the process of realizing their works, these artists transform compromises into opportunities, embracing the distinctive aspects of their performance locations.

The convergence of their creative visions with the intrinsic features of the site results in interpretations that are inherently linked to the spaces themselves.

These works collectively reinforce the notion that predefined norms do not confine site-specific multimedia performances. The innovative strategies demonstrated in all these works illuminate the potential of merging art with space, evoking deep connections and enriching the appreciation of both the artistic expression and the physical surroundings.

When they “treat the world as a macrocosmic musical composition” (Schafer 1994, p.5), these composers have demonstrated that artistic intervention can transcend barriers and illuminate new dimensions of expression, affirming that art is boundless and has its roots in our surroundings.

Chapter 6: Influences on Other Art Forms

The previous chapters have examined detailed case studies of site-specific multimedia performances. These investigations have revealed how the integration of site, technology, and artistic expression creates unique performative experiences that transcend traditional venue-based presentations. Building upon these foundational studies, this chapter explores how site-specific multimedia performance practices have influenced and transformed other artistic disciplines.

The expanding influence of site-specific methodologies across diverse artistic domains represents a significant shift in contemporary creative practice. This chapter examines how artists working in classical music composition, contemporary dance, telematic performance, and experimental film have adapted and reinterpreted site-specific approaches within their respective fields. Through analysis of selected works and projects, including Hara Alonso's *City Composing* project, Fernanda Ortiz's *Radical Dance Series*, the *Corona Improv Session* at Ars Electronica, and Ulrike Ottinger's *Under Snow*, this chapter illuminates the transformative impact of site-specific thinking on artistic creation and presentation.

These examples demonstrate how site-specific multimedia performance practices have contributed to the development of new artistic methodologies, challenging traditional boundaries between disciplines and expanding the possibilities for audience engagement. By examining these influences across different art forms, we can better understand how site-specific approaches have become catalysts for innovation in contemporary artistic practice.

Contemporary Classical Music

Research into the origins of music-based site-specific multimedia performance reveals its connections to the operatic concept of Gesamtkunstwerk. Contemporary classical music compositions have increasingly demonstrated the principles of site-specific multimedia performance in a reciprocal manner. The Donaueschingen Music Festival has played a pivotal role in this development, incorporating musical pieces and sound installations in unconventional spaces since the early 2000s. The festival's support of site-specific projects from 2013 onward has significantly influenced composers' consideration of spatial contexts.

The 2023 Darmstadt International Summer Course for New Music (Darmstadt Ferienkurse) acknowledged the growing relevance of site-specific music composition in contemporary practice. During the "Local Music"⁸ workshop, composers and musicians converged at LEW1, a regional center for creative media technology projects. The collaborative efforts resulted in site-specific performance methodologies, with participants utilizing the studio and garden environments to create spontaneous compositions in response to the physical space. The workshop regulated technical specifications for electronic instruments at an early stage, indicating a growing recognition within the classical music community of the importance of adapting to spatial constraints.

While the Darmstadt workshop exemplified institutional engagement with site-specific composition, examination of earlier initiatives reveals a more comprehensive approach to community-based spatial composition that warrants detailed consideration. The *City Composing* project. Launched by Hara Alonso in 2014, nearly a decade before site-specific composition gained widespread recognition, this long-running project continues to redefine music composition through community engagement. The initiative has distributed notebooks throughout cafes,

⁸ The exact time and location can be found on the Internationales Musikinstitut Darmstadt 2023 program, p.146.

universities, galleries, and other public spaces, fostering diverse forms of notation and composition (Figure 40-42). Through workshops in schools, cultural centers, and museums, the project has enabled individuals from varied backgrounds to express themselves through music. Professional musicians then arrange and perform these collected scores and sound recordings in concert settings.

As Alonso articulates on the project's website (Alonso, "The City Composing"), the essence of *City Composing* is to "generate local engagement." By amplifying the voices of urban inhabitants—including children, elderly individuals, migrants, and various underrepresented communities—the project transforms composition into a vehicle for social inclusivity. The collaboration between professional musicians and community members facilitates knowledge exchange and self-expression, reflecting the principles of site-specific multimedia performance. Through this sustained engagement with diverse communities, *City Composing* demonstrates how site-specific composition can transcend traditional musical boundaries to become an instrument of social transformation and cultural dialogue.

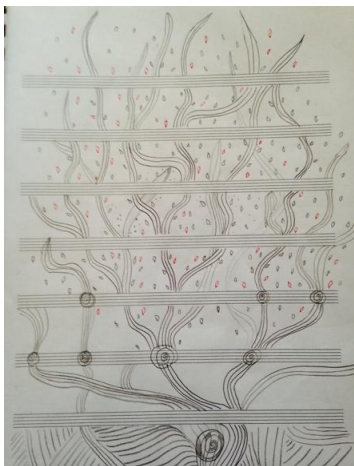


Figure 40. Excerpt from their notebooks. (From the City Composing website)



Figure 41. Excerpt from their notebooks. (From the City Composing website)

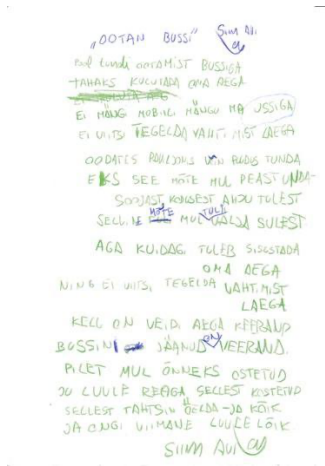


Figure 42. Excerpt from their notebooks. (From the City Composing website)

Contemporary Dance



Figure 43. Augmented Reality Experience of *Radical Dance Series*.
(From the artist's website)

Since the era of Pina Bausch and Sankai Juku, choreographers have recognized the crucial relationship between environment and the human body. The pioneering site interventions and location-specific work of choreographers like Trisha Brown and William Forsythe marked a significant development in dance history.

In recent years, site-specific multimedia performance has emerged as a driving force behind transformative choreographic experiences. Choreographers have adopted urban spaces as their stages, integrating multimedia elements such as audio walks and augmented reality into their performances. Two recent examples from Hamburg illustrate this innovation in contemporary dance: *Radical Dance Series* by Fernanda Ortiz (2022) and *Polipolis* by Regina Rossi (2023).

The *Radical Dance Series* unfolds along three distinct routes, each with its own thematic focus (Ortiz, “Radical Dance Series” 2022). Beginning in the former working district of Barmbek (Hamburg, Germany), dancers embark on a journey to disrupt everyday constraints and unexamined routines of urban life. Audiences can either follow the dancers or join them at various points, moving together through the urban space. Through interrupting the mundane and offering glimpses of alternative ways of living, the dancers prompt viewers to reconsider their relationship with the urban environment.

The *Radical Dance Series* distinguishes itself through its technological integration. After experiencing the live performance, audiences can further explore the dancers’ created world through augmented reality technology (Figure 43). By using their smartphones, spectators can generate virtual avatars of the dancers on their screens. These digital performers integrate seamlessly with the environment captured by the phone’s camera, enabling viewers to continue exploring the intersection of movement and urban space.

The influence of site-specific multimedia performance is evident in how *Radical Dance Series* employs urban spaces as its canvas. It blurs the lines between performance and real life, inviting passersby to engage with and reflect on their surroundings. This immersive approach is enhanced by multimedia elements, such as augmented reality technology, which extends the performance’s impact beyond its live execution.

In contrast, *Polipolis* presents a different approach to site-specific multimedia performance in contemporary dance. The work envisions a utopian cityscape within Hamburg by combining street performance, street art, and audio walks. “In this imaginative urban setting, priorities shift from consumerism to community, where climbing parks replace shopping malls, children curate museum exhibitions, and rooftop gardens flourish” (Ullmann, “Vogelwild durchs Hamburg einer besseren Zukunft: Kritisch gesehen: ‘polipolis—audiowalk’ vom k3-zentrum für choreografie” 2023; translated by the author).

The audio walk serves as the connecting thread of the piece, integrating all its components. Participants, equipped with headphones, embark on a guided journey through this utopian city, following a narrated story that reveals both historical and contemporary urban narratives. Throughout the journey, dance performances featuring whimsical characters emerge, dissolving the boundaries between storytelling and choreography.

The urban landscape becomes both stage and medium, with multimedia elements integral to the storytelling process. This fusion transforms the city into a space for artistic exploration, communal engagement, and urban reimagining.

While the *Radical Dance Series* challenges urban norms and employs technology to redefine urban experiences, *Polipolis* constructs an alternative urban reality where dance and multimedia converge to present a utopian narrative. These works demonstrate the creative possibilities that emerge when contemporary dance embraces multimedia within site-specific contexts. They illustrate how contemporary dance can engage with the dynamic nature of urban environments, encouraging audiences to reimagine their surroundings through movement and multimedia storytelling.

Telematic Performance

During the global lockdown that left many feeling isolated and disconnected, online performances proliferated significantly. Telematic performance, which had played an important role in the history of site-specific multimedia performance while remaining largely outside public awareness, suddenly became the predominant artistic form. This performance practice has historically regarded the internet as a distinct spatial environment, developing numerous performance strategies based on its unique characteristics, including network latency, bandwidth limitations, and digital artifacts. The *Corona Improv Sessions* (online, 2020-2022), initiated by Tina Frank, Alex Murray-Leslie, and Thies Mynther and

joined by a group of artists⁹, emerged as one of the notable practices during this period, presenting a series of intercultural, performative, audio-visual telematic jam sessions that provided a creative lifeline and contributed significantly to telematic performance.

The *Corona Improv Sessions* commenced on March 20th, 2020, responding to the unprecedented circumstances of the COVID-19 pandemic. Every Sunday, co-located students and artists gathered virtually to transcend their physical constraints. What began as a creative outlet during a period of cultural and political retrenchment evolved into a powerful catalyst for developing enduring artistic connections and personal bonds.

These sessions distinctively embraced the inherent limitations of their medium. The group transformed the internet and platforms like Zoom into performance spaces, incorporating latency, glitches, and algorithmic imperfections as integral components of their artistic expression rather than viewing them as obstacles.

This embrace of imperfection represented a deliberate artistic strategy rather than merely a coping mechanism. The participants recognized these technical characteristics as creative opportunities, transforming their performances into demonstrations of human creative resilience and adaptability.

As the *Corona Improv Sessions* evolved, they began to influence broader telematic performance practices. The group's exploration of co-located performativity and their development of emergent, aleatory musical and visual forms established new paradigms in this emerging artistic medium.

⁹ Full list of the artists: Tina Frank, Alexandra Murray-Leslie, Thies Mynther, Melissa E. Logan, Panja Göbel, Krööt Juurak, Anat Ben David, Cat Hope, Atau Tanaka, Catharine Cary, Tina Havelock Stevens, Mikalsen and Marhaug, Nina Haarsaker, Diana Lindbjerg, Dong Zhou, Håvard Gismerøy Ekker, Sina Marie Haave, Junda Auguste Andriuskeviciute, Evelina Bartuseviciute, Salma Mastour, Dunia Isabel Vazquez Juarez, Nadia Buer Haugen, Agnes Dalgård, Dinu Bodiciu, Øyvind Brandtsegg, Mari Bastashevski, Einar Grinde, Unnur Andrea Einarsdottir, and Ada Hoel (Ars Electronica, "Corona Improv Sessions").

The influence of site-specific multimedia performance manifested in how participants designed and implemented content specifically for the virtual environment. They recognized the digital realm as a unique canvas that enabled the integration of audio, visuals, and technology to create distinctive artistic expressions.

This artistic journey culminated in hybrid performances at the Ars Electronica Festival, where ensemble members performed simultaneously from multiple locations—part of the group performed at the physical venue in Linz, Austria, while others participated remotely from their respective cities (Ars Electronica, “Corona Improv Sessions”). This configuration demanded consideration of both physical and virtual spatial dynamics, resulting in a more sophisticated technical and artistic setup. The performance utilized a modular content toolbox specifically developed to navigate between physical and virtual spaces, enabling seamless integration of in-person and remote participants while maintaining the artistic principles developed during their online sessions.

The *Corona Improv Sessions* demonstrated how artistic practice could transform constraints into creative inspiration by treating online spaces as distinct performance sites with their own unique characteristics and possibilities. These artists approached the internet not as a neutral platform but as a specific environment with its own spatial qualities, limitations, and affordances. Through their embrace of digital imperfections and exploration of virtual architectures, these artists transformed a period of isolation into a creative movement that continues to influence telematic artistry globally.

Film

Site-specific multimedia performance has influenced filmmaking by transforming it from a meticulous script-driven endeavor into a dynamic art form where locations take center stage. Historically, filmmakers selected shooting locations based primarily on practical considerations, but recent years have witnessed a paradigm shift. Contemporary filmmakers increasingly choose settings for their

artistic merit, allowing locations to become central elements that shape the narrative, with scripts adapting to the unique characteristics of each place. This transformation is exemplified by Ulrike Ottinger's 2010 film *Under Snow*, which captured the essence of a snow-dominated Japanese region.

This film marked the beginning of Ottinger's continued exploration across China, Mongolia, Siberia, and other regions. Her work coincided with the emergence of site-specific composition and growing awareness of climate change. Within both the film industry and academic institutions, attention has increasingly focused on place-based narratives, recognizing that environmental changes necessitate human adaptation. Locations have increasingly assumed protagonist roles in contemporary cinema.

As Ottinger stated in an interview, "The materiality of snow is the merciless, even tyrannical ruler that determines all areas of life. But in my films the places and their histories are also protagonists, whether this is Berlin, Europe, Siberia, or Mongolia" (Bürkle 2023, p.33).

In 2022, a group of emerging filmmakers at the Chair of Visual Arts, Institute of Architecture, TU Berlin, launched a project in crafting films rooted in specific places, turning it into a method of artistic research¹⁰. This project demonstrated the transformative power of place through cinematic techniques and artistic interventions. The initiative encouraged students to engage with unfamiliar spatial situations and non-connotative places, fostering a deep understanding of the symbiotic relationship between material, space, and social dynamics.

The participants formed 32 groups, each selecting a specific location to create a film exploring its geography, acoustics, history, and social context. The chosen sites spanned globally, with on-site research addressing themes such as human-

¹⁰ It is documented under the Art and Research website under "Eigensinnige Orten project" and part of the research outcomes were published in the book "Eigensinnige Orten".

environment relationships, emotional trauma, and the aesthetic qualities of agricultural work.

Through this immersive experience, students developed the capacity to utilize film as an artistic medium, generating knowledge that transcended individual projects and enriched the broader creative community. This development in filmmaking strengthened the connection between artists and their environments while establishing more sustainable production processes.

Conclusion

This chapter demonstrates how site-specific multimedia performance has significantly influenced diverse artistic disciplines, not only expanding practitioners' technical methodologies but also fundamentally transforming their conceptualization and interaction with space, technology, and community engagement.

The widespread accessibility of advanced technologies, including virtual reality systems, portable audio devices, and streaming platforms, has democratized artistic tools, enabling practitioners to construct immersive experiences that transcend conventional disciplinary boundaries.

Furthermore, site-specific multimedia performance has catalyzed a paradigmatic shift in the conception of performance venues. This transformation has prompted both artists and audiences to recognize and embrace the inherent characteristics of non-traditional spaces, fostering deeper integration between artistic expression and environmental context. Such reconceptualization has generated new dimensions of creative possibility, enabling practitioners to derive inspiration from spatial contexts while challenging established disciplinary conventions.

Most significantly, this movement has elevated the role of artistic intervention in contemporary practice. It has emphasized the critical importance of the triadic relationship between artists, their work, and their socio-environmental contexts. This heightened awareness of community and environmental engagement has

become a fundamental driver of artistic practice, imbuing creative work with enhanced social relevance and purpose.

Concluding Remarks: Expanding Artistic Approaches

This dissertation has traced the emergence and development of site-specific multimedia performance as a distinct artistic form that bonds music, space, technology, and audience ever tightly. Through historical analysis and examination of contemporary works by six Europe-based composers, this research demonstrates that site-specific multimedia performance represents not merely an evolutionary step in multimedia art but a paradigmatic shift that challenges traditional artistic boundaries and establishes new creative possibilities.

The historical investigation reveals that site-specific multimedia performance emerged from three pivotal historical transformations: the convergence of artistic disciplines, the evolution of performer-audience dynamics, and changing modes of environmental engagement. Beginning with Wagner's Gesamtkunstwerk concept, which maintained hierarchical structures while aspiring toward synthesis, the trajectory moved through futurism's energetic disruption, Fluxus's process-oriented practices, sound installations' spatial innovations, and contemporary theater's participatory approaches. Each movement contributed essential elements that would later coalesce into site-specific multimedia performance.

This progression proves that site-specific multimedia performance did not emerge in isolation but represents the culmination of over a century of artistic experimentation. The research establishes that while technology need not be essential to site-specific practice, as evidenced by Monk's early works, technological advancement has fundamentally altered environmental perception and expanded creative possibilities. The examined composer-theorists served as pioneering figures who introduced alternative frameworks for environmental perception, establishing foundational elements that continue to influence contemporary practice.

A central finding of this research is that technology in site-specific multimedia performance functions not merely as a facilitating tool but as an active creative catalyst that shapes artistic direction. The analysis of works by Tsangaris, Schubert, Hajdu, Reese, Valentin, and Zhou demonstrates how technical capabilities and limitations inspire new artistic approaches, while logistical constraints generate unexpected creative solutions. This represents a fundamental departure from traditional approaches where technology serves as a tool to overcome the difficulties caused by the difference between the artists' concept and the material.

The research reveals that contemporary site-specific multimedia performance uniquely positions technology as an integral component of the creative process itself. Through innovations such as telematic technology, portable playback devices, and VR systems, artists have not only expanded creative boundaries but have created new ways of how space, sound, and narrative interact. This technological integration has made site-specificity an efficient approach in performance, creating experiences that are inherently linked to their spatial contexts.

The examination of diverse performance environments—from subterranean tunnels to urban streets—demonstrates that site-specific multimedia performance has covered different types of performance spaces on different scales. Each analyzed work showcases distinct strategies for navigating unconventional spaces, transforming limitations into possibilities. The research establishes how these artists actively engage with the spaces' unique acoustic, visual, and cultural attributes to create interpretations that are inseparable from their locations.

This spatial engagement represents a paradigmatic shift from traditional performance concepts where venues serve as neutral containers. Instead, site-specific multimedia performance treats space as an active collaborator in the creative process, generating new dimensions of artistic possibility and challenging established disciplinary conventions.

Outlook

It is increasingly frequent to see site-specific multimedia performance works on festival programs, which makes them influential in diverse disciplines of art. Most significantly, this movement has elevated the role of artistic intervention in contemporary practice, emphasizing the critical importance of the triadic relationship between artists, their work, and their socio-environmental contexts.

The vitality and ongoing development of site-specific multimedia performance are evidenced by the continuous emergence of new works throughout the research period. For example, the Denmark group Between Music has developed underwater concert installations since 2003, and they have applied their installations to a few natural spaces for performances in recent years; the Düsseldorf-based Trio Wellenbad dedicates itself to electronic music concerts in pools, designing movable underwater systems for each venue, while the Rathenow Tage für Neue Musik 2024 commissioned a piece involving percussions and lights specifically composed for an abandoned military test site. These developments confirm that site-specific multimedia performance continues to evolve and find new expressions across diverse spatial contexts.

The rise of site-specific multimedia performance represents a new level of appreciation and response to our environment that builds upon foundational concepts established by earlier practitioners. More than sixty years have passed since John Cage recognized how listening and innovation mutually reinforce each other, yet his insight has gained renewed relevance in contemporary practice. Technologies have enabled us to listen differently and even interact with what we listen to, fundamentally transforming how we link observation and composition.

Furthermore, the research indicates that as technology continues to advance and become more accessible, site-specific multimedia performance will likely expand its influence across artistic disciplines while maintaining its core commitment to

place-based, community-engaged creative practice. The form's ability to transform constraints into creative opportunities suggests its continued relevance in an era of increasing environmental and social challenges.

Site-specific multimedia performance thus emerges not merely as an artistic trend but as a meaningful response to contemporary needs for connection, engagement, and environmental awareness. By establishing new relationships between art, technology, space, and community, this form offers both aesthetic innovation and social relevance, positioning itself as a vital component of contemporary artistic practice and cultural discourse.

Bibliography

All websites were last accessed on January 29, 2025, unless otherwise noted.

Appia, Adolphe. *La mise en scène du drame Wagnérien*. 1895. Reprint, Paris: Hachette Livre BNF, 2021.

Appia, Adolphe. *Die Musik und die Inszenierung*. 1899. Reprint, Norderstedt: hansebooks, 2016.

Arnold, Denis. *Giovanni Gabrieli and the Music of the Venetian High Renaissance*. Oxford: Oxford University Press, 1979.

Auslander, Philip. "Philip Auslander Talks to Performance Paradigm." *Performance Paradigm* 1 (2005): 93-101.

Auslander, Philip. *Liveness—Performance in a Mediatized Culture*. 3rd Edition. London: Routledge, 2023. First published in 1999 by Routledge.

Bailey, Thomas B.W. *MicroBionic: Radical Electronic Music and Sound Art in the 21st Century*. 2nd edition. Belsona Books Ltd, 2012. First published in 2009 by Belsona Books.

Ballengee, Olga. "John Cage, Fluxus and the Musicality of Nam June Paik." *Roczniki Humanistyczne* 68, no. 12 (2020): 155-164.

"BAM! Festival." Festival program. Berlin, Germany, 2018.
https://bam-berlin.org/wp-content/uploads/BAM!_Infoheft.pdf

Banes, Sally. "The Art of Meredith Monk." *Performing Arts Journal* 3, no. 1 (Spring-Summer 1978): 3-18.

Blauert, Jens. *Spatial Hearing: The Psychophysics of Human Sound Localization*. Massachusetts: MIT Press, 1983.

Bongers, Bert. "An Interview with Sensorband." *Computer Music Journal* 22, no. 1 (Spring 1998): 13-24.

Budden, Julian. *The Operas of Verdi*. New York: Oxford University Press, 1978.

Bürkle, Stefanie, Alex Gross, and Katrin Wegemann, eds., with Ulrike Ottinger, Knut Ebeling, Lars Henrik Ostenfeld, Carla Hinrichs, et al. *Eigensinnige Orten*. Dortmund: Verlag Kettler, 2023.

Cage, John. *Silence: Lectures and Writings*. New England: University Press of New England, 1973. First published in 1961 by Wesleyan University Press.

Carey, Rachel. *Music in Unconventional Spaces: The Changing Music Scene of Great Depression America, 1929-1938*. Master's thesis, James Madison University, 2018.

Cascone, Kim. "The Aesthetics of Failure: 'Post-Digital' Tendencies in Contemporary Computer Music." *Computer Music Journal* 24, no. 4 (2000): 12-18.

Chambers, Colin (Ed.). *The Continuum Companion to Twentieth Century Theatre*. California: Oro Editions, 2006.

Chondros, Thomas G., Kypros Milidonis, George Vitzilaios, and John Vaitsis. "Deus-Ex-Machina Reconstruction in the Athens Theater of Dionysus." *Mechanism and Machine Theory* (2013): 172-191.

Cobussen, Marcel, Vincent Meelberg, and Barry Truax. *The Routledge Companion to Sounding Art*. London: Routledge, 2016.

Cox, Christoph, and Daniel Warner. *Audio Culture: Readings in Modern Music*. New York/London: Continuum, 2004.

Crawford, Chris. *Chris Crawford on Interactive Storytelling*. 2nd edition. Indianapolis: New Riders, 2012. First published in 2004 by New Riders.

Darmstadt Summer Course. "Program 2023." <https://internationales-musikinstitut.de/content/uploads/imd-readerdarmstaedterferienkurse2023.pdf>

Davis, Douglas. *Art and the Future*. New York: Praeger Publishers, 1975.

De la Motte-Haber, Helga (Ed.). *Sonambiente Berlin 2006 Klang Kunst Sound Art*. Heidelberg: Kehrer Verlag, 2006.

Dinkla, Sönke. *Klanginstallation*. Karlsruhe: Zentrum für Kunst und Medien, 2007.

Drees, Stefan. *Körper, Medien, Musik: Körperdiskurse in der Musik nach 1950*. Hofheim: Wolke Verlag, 2011.

Duckworth, William. *Talking Music: Conversation with John Cage, Philip Glass, Laurie Anderson, and Five Generations of American Experimental Composers*. New York: Da Capo Press, 1995.

Duckworth, William. *Virtual Music: How the Web Got Wired for Sound*. London: Routledge, 2007.

Eckersall, Peter, Helena Grehan, and Edward Scheer. *New Media Dramaturgy*. London: Palgrave Macmillan, 2017.

Emmerson, Simon. *Living Electronic Music*. London: Routledge, 2007.

Eno, Brian. "The Studio as Compositional Tool." *Down Beat*, July-August 1983 (1983): 7-8.

Falentin, Andreas. "Urban Healing?" *Die Deutsche Bühne*, 2019. <https://www.die-deutsche-buehne.de/kritiken/urban-healing>

Föllmer, Golo. "Töne für die Straße." *Klangkunst*, edited by Akademie der Künste. Munich (1996): 216-218.

Garner, Stanton. *Kinesthetic Spectatorship in the Theatre: Phenomenology, Cognition, Movement*. London: Palgrave Macmillan, 2018.

Giannachi, Gabriella. *Virtual Theatres: An Introduction*. London: Routledge, 2004.

Gottfried, Rama, and Georg Hajdu. "Drawsocket: A Browser Based System for Networked Score Display." *Proceedings of the International Conference on Technologies for Music Notation and Representation*. Malborne (2019): 15-25.

Greckel, Wil. "Visualization in the Performance of Classical Music: A New Challenge." *Visions of Research in Music Education* 16 (2021): Article 35.

Griffiths, Paul. *Cage. Oxford Studies of Composers* 18. Oxford: Oxford University Press, 1981.

Hajdu, Georg, and Rama Gottfried. "Networked Music Performance in the St. Pauli Elbe Tunnel." *Proceedings of the International Conference on Technologies for Music Notation and Representation*. Malborne (2019): 55-60.

Hajdu, Georg. "Disposable Music." *Computer Music Journal* 40, no. 1 (2016): 25-34.

Hajdu, Georg, and Rama Gottfried. "The Symphony in the St. Pauli Elbe Tunnel." *Contemporary Music Review* (2025), March, 1–23.
doi:10.1080/07494467.2025.2452720.

Hall, Mirko M. *Musical Revolutions in German Music: Musicking Against the Grain, 1800-1980*. London: Palgrave Macmillan, 2014.

Haraway, Donna. "A Cyborg Manifesto." *Socialist Review*, vol. 15,80 (1985): 65-107.

Harth, Jonathan. "Kontingenzmaschinen: Über die domestizierte Kontingenz des Mitspielens." *Neue Zeitschrift für Musik* 1/2020 (2020): 28.

Herr, Christopher R., and Gary W. Siebein. "Theatres and Concert Halls: An Investigation of Parallel Developments in Music, Performance Spaces, and the Orchestra." *Proceedings of the 86th ACSA Annual Meeting and Technology Conference*, (1998): 146-152. Washington: Association of Collegiate Schools of Architecture.

Hiekel, Jörn Peter. "Permanent Quest: The Processional Theatre of Manos Tsangaris." In *Composed Theatre: Aesthetics, Practices, Processes*, edited by Matthias Rebstock and David Roesner, 281-91. Bristol: Intellect, 2012.

Hosokawa, Shuhei. "The Walkman Effect." *Popular Music* 4 (1984): 165-180.

Iddon, Martin. "The Haus That Karlheinz Built: Composition, Authority, and Control at the 1968 Darmstadt Ferienkurse." *Musical Quarterly* 87, no. 1 (2004): 87-118.

International Organization for Standardization. *"ISO 12913-1:2014 Acoustics—Soundscape."* Geneva: ISO, 2014.

Jowitt, Deborah. *The Dance in Mind: Profiles and Reviews 1976-83*. Boston: David R. Godine, 1985.

Kaprow, Allan. *"How to Make a Happening."* (1968). Brooklyn: Primary Information. 2009.

Katz, Mark. *Capturing Sound: How Technology Has Changed Music*. California: University of California Press, 2010.

Kaye, Nick. *Site-specific Art: Performance, Place and Documentation*. London: Routledge, 2000.

Kirby, Michael. *Futurist Performance*. Massachusetts: PAJ Publications MIT Press, 1986.

Klich, Rosemary, and Edward Scheer. *Multimedia Performance*. London: Palgrave Macmillan, 2012.

Kurz, Thomas. "Lehrte: Fuchsbau-Festival als künstlerische Landpartie." *Hannoversche Allgemeine*, May 17, 2023.
<https://www.haz.de/lokales/umland/lehrte/lehrte-fuchsbau-festival-als-kuenstlerische-landpartie-DJRQIZE2INGIDOZAJ3D4O45MQ4.html>

Kwon, Miwon. *One Place After Another: Site-Specific Art and Locational Identity*. Massachusetts: MIT Press, 2002.

LaBelle, Brandon. *Background Noise: Perspectives on Sound Art*. New York/London: Continuum, 2006.

Lehmann, Hans-Thies. *Postdramatic Theatre*. London: Routledge, 2006 (German OI 1999).

Marinetti, Filippo Tommaso, Emilio Settimelli, Bruno Corra, and Suzanne Cowan. "The Synthetic Futurist Theatre: A Manifesto." (1915) *The Drama Review* 15, no. 1 (1970): 142-146.

Marranca, Bonnie (Ed.). *The Theatre of Images*. Baltimore: Johns Hopkins University Press, 1996.

- Masura, Nadja. *Digital Theatre: The Making and Meaning of Live Mediated Performance, US & UK 1990-2020*. London: Palgrave Macmillan, 2020.
- McLuhan, Marshall. *Understanding Media: The Extensions of Man*. London: Routledge, 2001. First published in 1964 by McGraw-Hill.
- Meyer-Odewald, Jens. "Unterirdisch gut: Alter Elbtunnel eröffnet mit Musik." *Hamburger Abendblatt*, February 11, 2019.
<https://www.abendblatt.de/hamburg/article216418401/Unterirdisch-Alter-Elbtunnel-eroeffnet-wieder-mit-Musik.html>
- Miyake, Akiko. *Substantials*. Fukuoka: CCA Kita-Kyushu, 2003.
- Morse, Barry Ray. *Site-Specific Music Composition and the Soniferous Garden*. PhD diss., University of Illinois at Urbana-Champaign, 2016.
- Muchnic, Suzanne. "Nam June Paik, 74; Free-Spirited Video Artist Broke Radical New Ground." *Los Angeles Times*, January 31, 2006.
<https://www.latimes.com/archives/la-xpm-2006-jan-31-me-paik31-story.html>
- Murph, Megan Elizabeth. *Max Neuhaus, R. Murray Schafer, and the Challenges of Noise*. PhD diss., University of Kentucky, 2018.
- Neuhaus, Max. *Sound Works, Volume I: Inscription*. Berlin: Cantz, 1994.
- Nyman, Michael. *Cage and Beyond (Music in the Twentieth Century)*. 2nd edition. Cambridge: Cambridge University Press, 2011. First published in 1974 by Cambridge University Press.
- Oliveros, Pauline. *Deep Listening: A Composer's Sound Practice*. Nebraska: iUniverse, 2005.
- Oliveros, Pauline. *Quantum Listening: From Practice to Theory (To Practice Practice)*, 1999. Ignota Books, 2022.
- Paparrigopoulos, Kostas. "The Sounds of the Environment in Xenakis' Electroacoustic Music." *Proceedings of the International Symposium Xenakis: La musique électroacoustique*, edited by Makis Solomos. Paris (2012): 201-210.
- Packer, Randall. *From Wagner to Virtual Reality*. New York: W. W. Norton, 2001.

Parker-Starbuck, Jennifer. *Cyborg Theatre*. London: Palgrave Macmillan, 2011.

Pratella, Balilla. *Manifesto of Futurist Musicians*. 1910. Berlin: Ricochett, 2015.

Rebstock, Matthias, and David Roesner. *Composed Theatre: Aesthetics, Practices, Processes*. Bristol: Intellect Ltd, 2012.

Salter, Chris. *Entangled: Technology and the Transformation of Performance*. Massachusetts: MIT Press, 2010.

Schafer, R. Murray. *The Music of the Environment*. Vienna: Universal Edition, 1973.

Schafer, R. Murray. *The Soundscape: Our Sonic Environment and the Tuning of the World*. Rochester: Destiny Books, 1994. First edition in 1977.

Schubert, Alexander. "Binary Composition." *Tempo* 74, no. 293 (July 2020): 14-18. <https://doi.org/10.1017/S0040298220000236>.

Schubert, Alexander. *Switching Worlds*. Hofheim: Wolke Verlag, 2020.

Solomos, Makis. "Xenakis' First Composition in Musique Concrète: Diamorphoses." *Proceedings of the International Symposium Xenakis*. London: Goldsmiths, University of London, 2011.

SPOR Festival. "2017 Programme." Arhus. 2017.
https://issuu.com/sporfestival/docs/spor_2017_program-web.02

Sprouse-Zoeller, Kimberly. *Giovanni Gabrieli: The Musical Times, His Life, Work, and His 'In Ecclesiis'*. Texas: Independent study, 2007.

Steinberg, Leo. *Other Criteria: Confrontations with Twentieth-Century Art*. Michigan: University of Michigan Press, 1972.

Sterken, Sven. *Music as an Art of Space: Interactions between Music and Architecture in the Work of Iannis Xenakis*. PhD diss., Ghent University, 2004.

"Tag des offenen Denkmals." Festival program. Hamburg, Germany, September 12-14, 2008.

Tibbetts, John C. *Performing Music History: Musicians Speak First-Hand about Music History and Performance*. London: Palgrave Macmillan, 2018.

Truax, Barry. "Acoustic Space, Community, and Virtual Soundscapes." *Organised Sound* 13, no. 2 (2008): 103-109.

Truax, Barry. "Acoustic Sustainability in Urban Design: Lessons from the World Soundscape Project." (2019). *Cities and Health, Volume 5* (2021, published online in 2019): 122-126.
<https://doi.org/10.1080/23748834.2019.1585133>

Truax, Barry. "Interview with Barry Truax." *Computer Music Journal* 18, no. 3 (1994): 17-24.

Truax, Barry. "Soundscape, Acoustic Communication and Environmental Sound Composition." *Contemporary Music Review* 15 (1996): 49-65.

Tsangaris, Manos. "Was heißt situatives Komponieren?" *Artist Website*, July 29, 2005.
<http://www.tsangaris.de/texte%20-%20poesie.htm>.

Ullmann, Katrin. "Vogelwild durchs Hamburg einer besseren Zukunft: Kritisch gesehen: 'polipolis—audiowalk' vom k3-zentrum für choreografie." *TAZ*, September 22, 2023.
<https://taz.de/!5958448/>

Valentin, Luna. "Speleoacoustics in Southern Ardèche for Auralizations and Music Experimentation." *Proceedings of the 19th Sound and Music Computing Conference*. Saint-Étienne (2022): 70-77.

van der Hoeven, Arno, and Erik Hitters. "The Social and Cultural Values of Live Music: Sustaining Urban Live Music Ecologies." *Cities Journal Volume 90* (2019): 263-271.

van Eck, Cathy. *Between Air and Electricity: Microphones and Loudspeakers as Musical Instruments*. London: Bloomsbury Publishing, 2017.

Varopoulou, Eleni. *Musikalisierung der Theaterzeichen*. Lecture presented at the First International Summer Academy, Frankfurt am Main, August 1998. Unpublished manuscript.

Wagner, Richard. *Richard Wagner's Prose Works, Vol. 4: Art and Politics*. 1912. Whitefish, Montana: Kessinger Publishing, 2008. First published in 1912 by Kegan Paul Trench Trubner & Co.

Wagner, Richard. *Wagner on Music and Drama*. Edited by Albert Goldman. New York: Da Capo Press, 1964.

Wainwright, Lisa. "Happening—Art Event." *Encyclopedia Britannica*, 2008. <https://www.britannica.com/art/Happening>

Walshe, Jennifer. "The New Discipline." *Borealis Festival*, 2016. <https://www.borealisfestival.no/2016/the-new-discipline-a-compositional-manifesto-by-jennifer-walshe-2/>

Weber, William. "Did People Listen in the 18th Century?" *Early Music* 25, no. 4 (1997): 678-691.

Weibel, Peter. "The Post-Medial Condition." *Artecontexto* (2006): 5-15.

Westerkamp, Hildegard. "Fantasy for Horn (I)." *Program note on artist website*, 1978. <https://www.hildegardwesterkamp.ca/sound/comp/4/fantasie-1/>

Westerkamp, Hildegard. "Soundwalking." *Sound Heritage* 3, no. 4 (1974).

Widewalls Editorial. "The Happening and Its Influence on Contemporary Art." *Widewalls*, 2016. <https://www.widewalls.ch/happening-happenings-performance-art/>

Williams, Alastair. *Music in Germany since 1968*. Cambridge: Cambridge University Press, 2013.

Wolfman, Ursula Rehn. "Corelli and JS Bach: The Musical and Architectural Baroque Style." *Interlude*, December 2013. <https://interlude.hk/corelli-and-js-bach-the-musical-and-architectural-baroque-style/>

Yan Jun. "How to be Changed by the World—The Chinese Sound Practice in Reality." *Program of 2013 West Bund Biennale*. (2013-2014, Shanghai). <https://www.yanjun.org/wp-content/uploads/2014/08/yanjun-howtobechangedbytheworld.pdf>

Yan Jun. "On Peter Handke's Offending the Audience." *Subjam* (2015). <https://subjam.org/blog/74>

Yan Jun. "Stereo Worlds as Everyday Art." *Artist Website* (2008). <https://yanjun.org/archives/910>

Video/Audio Recordings

Cardiff, Janet. "Alter Bahnhof Video Walk." YouTube video. 2012. <https://youtu.be/sOkQE7m31Pw>

"City Pieces (Window Piece) Cologne Version." YouTube video. 2020. <https://youtu.be/sNzZWWWhEkZI>

"Documentation of Symphony in St.Pauli Elbtunnel 1-1." YouTube video. 2020. <https://youtu.be/DMBavo1IDnE>

"Documentation of Symphony in St.Pauli Elbtunnel 1-2." YouTube video. 2020. https://youtu.be/9dx7VRAeX_A

"Documentation of Symphony in St.Pauli Elbtunnel 2." YouTube video. 2020. <https://youtu.be/HBRwOobE59g>

Hamburg Port Authority. "News from Hamburg Port Authority." YouTube video. 2019. <https://youtu.be/BXlaSBo0KXs>

Oliveros, Pauline. Interview by RA Exchange. "RA Exchange 293." Resident Advisor. 2016. <https://ra.co/exchange/293>

"Rehearsal of Symphony in St.Pauli Elbtunnel." YouTube video. 2019. <https://youtu.be/mkhEYE2Pxrg>

Reese, Kirsten. "Lecture at VAMH." on 21. Nov. 2018 at 8. Salon, Hamburg. Vimeo video. 2018. <https://vimeo.com/showcase/1774022/video/302291508>

Schubert, Alexander. "Control Full Documentation."
YouTube video. 2020. <https://youtu.be/04gmizhApKs>

Schubert, Alexander. "Control Lecture at HfMT."
YouTube video. 2019. <https://youtu.be/u4cyMk4qB88>

Schubert, Alexander. "Video Streaming of Control."
YouTube video. 2018. <http://control.alexanderschubert.net/stream.html>

Truax, Barry. "Interview at Wrocław University."
YouTube video. 2014. <https://youtu.be/JFuRgnqyajA>

Valentin, Luna. "Presentation."
YouTube video. 2020. <https://youtu.be/DgVB1HZFYPE>

Valentin, Luna. "Recording."
YouTube video. 2020. <https://youtu.be/GXZv0yOwg1o>

Websites

((audio)) Aesthetic Strategies. <https://llaudioll.de/>

Acht Brücken. "Archives." <https://www.achtbruecken.de/en/archives>

Agosto Foundation. "Mediateka Archive."
<https://agosto-foundation.org/mediateka/archive>

Alonso, Hara. "The City Composing." <https://www.thecitycomposing.com>

Ars Electronica. "Corona Improv Sessions."
<https://ars.electronica.art/keplersgardens/de/corona-improv-sessions/>

Art and Research. "Eigensinnige Orten project."
<https://www.artandresearch.org/projects/eigensinnige-orte/>

Between Music. "Artist Website." <https://www.betweenmusic.dk>

Cage, John. "Artist Website." <http://johncage.org>

Center for Deep Listening. "Homepage." <https://www.deeplistening.rpi.edu>

Collins, Nicolas. "Artist Website." <https://www.nicolascollins.com/>

Connecting Spaces. "City Pieces." <https://www.connectingspaces.ch/city-pieces/>

Corona Improv Sessions. "The Corona Improv Sessions."
<https://theatreofmaking.net>

Crypton Future Media. "Miku EXPO."
<https://mikuexpo.com>

David Bermant Foundation. "Participation TV."
<https://davidbermantfoundation.org/project/participation-tv/>

EM Doku. "Kirsten Reese Biography."
<https://www.emdoku.de/en/artist/kirsten-reese>

Ferrari, Luc. "Artist Website." <http://lucferrari.com>

Festival d'Avignon. "2023 Program by Place."
<https://festival-avignon.com/en/edition-2023/programme/by-place>

F. Wiesel—Hanke Wilsmann & Jost von Harleßem GbR. "Flintridge."
<http://flinkwiesel.de/flintridge/>

Hajdu, Georg. "Artist Website." <http://georghajdu.de>

HfMT Hamburg. "Symphony in St. Pauli Elbtunnel."
<https://www.hfmt-hamburg.de/innovative-hochschule/zm4/symphonie-im-st-pauli-elbtunnel/>

ISEA Symposium Archives. "Interacting With Human Characters: An Engaging and Rewarding Interactive Storytelling Experience. ISEA96: Seventh International Symposium on Electronic Art."
<https://www.isea-symposium-archives.org/presentation/interacting-with-human-characters-an-engaging-and-rewarding-interactive-storytelling-experience/>.

Kubisch, Christina. "Electrical Walks." <https://christinakubisch.de/electrical-walks>

Künstlerhaus Sootbörn. "Re-member."

<https://kuenstlerhaus-sootboern.de/re-member/>

La Grotte Saint-Marcel (tourist website). "Getting Here."

<https://en.grotte-ardeche.com/getting-here.html> (link expired)

López, Francisco. "Artist Website." <http://franciscoLópez.net>

Monk, Meredith. "Artist Website." <http://meredithmonk.org>

Muhr, Diego. "Corporate Unconscious." <https://diegomuhr.com/sound>

Museum of Contemporary Art Oslo. "Museum of Contemporary Art."

<https://www.nasjonalmuseet.no/en/>

National Museum of Norway. "The Museum of Contemporary Art."

<https://www.nasjonalmuseet.no/en/visit/locations/the-museum-of-contemporary-art/>

Oliveros, Pauline. "Artist Website." <http://paulineoliveros.us>

Performing Arts Festival Berlin. "2023 Program."

<https://2023.performingarts-festival.de/de/programm.html>

QuintetNet Wiki. "St. Pauli Elbtunnel Project." [https://quintetnet.hfmt-](https://quintetnet.hfmt-hamburg.de/wiki/projects/stpaulielbtunnel/St_Pauli_Elbtunnel.html)

[hamburg.de/wiki/projects/stpaulielbtunnel/St_Pauli_Elbtunnel.html](https://quintetnet.hfmt-hamburg.de/wiki/projects/stpaulielbtunnel/St_Pauli_Elbtunnel.html)

The Ardèche Gorges. "La Grotte Saint-Marcel."

<https://en.gorges-ardeche-pontdarc.fr/equipement/saint-marcel-dardeche-cave-bidon/>

Radical Dance Series. "Homepage." <https://radicaldanceseries.de>

Reese, Kirsten. "Artist Website." <http://kirstenreese.de>

Rathenow Tage für Neue Musik. "Instagram Profile."

<https://www.instagram.com/rathenowertagefuerneuemusik/>

SCENATET. "Living Spaces." <https://www.scenatet.dk/portfolio/living-spaces/>

(link expired)

Shaw, Jeffrey. "Artist Website."

<https://www.jeffreyshawcompendium.com/>

Schubert, Alexander. "Artist Website." <http://alexanderschubert.net>

Silent.move GmbH. "silent.move Homepage." <https://www.silentmove.berlin>

Stage 2.0. "Vernetzte Musikperformance."

<https://stage2.hfmt-hamburg.de/portfolio-item/vernetzte-musikperformance/>

Stanford CCRMA. "Luna Valentin." <https://ccrma.stanford.edu/~luna/220c/>

teamLab. "Artist Website." <https://www.teamlab.art/>

Torn Light Records. "Yoshi Wada, Lament for the Rise and Fall of the Elephantine Crocodile"

<https://www.tornlightrecords.com/shop/yoshi-wada-lament-for-the-rise-and-fall-of-the-elephantine-crocodile/>

Trio Wellenbad. "Artist Website." <https://wellenbad.eu>

Tsangaris, Manos. "Artist Website." <http://tsangaris.de>

Tsangaris, Manos. "City Pieces Photos."

<http://www.tsangaris.de/fotos%20city%20pieces.htm>

Tsangaris, Manos. "Interview with Armin Köhler."

<https://www.swr.de/swr2/musik-klassik/donaueschinger-musiktage/archiv/article-swr-2898.html>

Typisch Hamburch. "Ein Blick in die Elbrohre." <https://typisch-hamburch.de/ein-blick-in-die-elbroehre/>

Ultima Oslo Contemporary Music Festival. "Alexander Schubert: Control."

<https://www.ultima.no/en/events/alexander-schubert-control-220918>

Valentin, Luna. "D'autres Soleils." <https://ccrma.stanford.edu/~luna/220c/>

Valentin, Luna. "Artist Website." <https://lunavalentin.wixsite.com/website>

Vítková, Lucie. "Cave Acoustics."

<https://mappa.bandcamp.com/album/cave-acoustics>

Wise Music Classical. "Manos Tsangaris".

<https://www.wisemusicclassical.com/composer/6309/Manos-Tsangaris/>

Westerkamp, Hildegard. "Soundwalk Workshop."

<https://www.hildegardwesterkamp.ca/main/workshops/>

Xenakis, Iannis. "Artist Website." <http://iannis-xenakis.org>

Yan Jun. "Artist Website." <http://yanjun.org>

Yokohama International Performing Arts Meeting. "Program."

<https://ypam.jp/program/index.en.html>

ZKM. "Research Production Collection Archives."

<https://zkm.de/de/forschung-produktion/sammlung-archive/archive>

Zhou, Dong. "Artist Website." <https://dongzhou.live>

Scores

Collins, Nicolas. *Roomtone Variations*. 2013-2014. Published on the artist's website. <https://www.nicolascollins.com/texts/RoomtoneScore2017.pdf>

Curran, Alvin. *Notes from Underground 2*. Private Collection.

Liao, Tzu-Ning. *Chakra*. 2019. Private Collection.

Lu, Minzuo. *Lónglóng - (Düster)*. 2019. Private Collection.

Tsangaris, Manos. *City Pieces (Window Piece)*. 2016. Private Collection.

Tzeng, Shing-Kwei. *Der Frühling des goldenen Schweines*. 2019. Private Collection.

Valentin, Luna. *Quatuor pour la grotte Saint Marcel*. 2020. Private Collection.

Vickery, Lindsay. *Decompression*. 2019. Private Collection.

Young, La Monte. *1960*. 1960. Collection of MoMA.
<https://www.moma.org/collection/works/127628>

Zhou, Dong. *Kinderszene*. 2019. Private Collection.

Index

A

- Ablinger, Peter, 58
- Acoustic design, 29, 52-53
- Acoustic ecology, 49-53
- Active listening, 44, 51-54, 134
- Alonso, Hara, 157-159
 - *City Composing*, 157-159

ALMAT, 148

- Anti-radio, 71
 - Soma Ether, 66, 71, 150, 153
- Appia, Adolphe, 19-20, 39
- Ars Electronica Festival, 164
- Atmosphères* (Ligeti), 117
- Aufbrechen Amerika* (Nel, Storch, Kloke), 11
- Auslander, Philip, 15

B

- BAM! Festival (2018), 133
- Bausch, Pina, 160
- Bayreuth Festival House (1876), 19
- Bethge, Katrin, 99
- Between Music, 170
- Bluetooth loudspeaker, 66
- Boombox, 65
- Botzios, Panagiotis, 88
- Brecht, George, 27
- Brown, Trisha, 160

C

- Cage, John, 11, 44-45, 49, 170
 - 4'33", 37, 44
 - *Kitchen Music*, 45
 - *Child of Tree*, 45
 - *Roaratorio*, 45
- Cardiff, Janet, 73-75
 - *Alter Bahnhof Video Walk*, 73-75
- Cheung, James, 104

City Maze (Yi Qin), 148
Corona Improv Sessions (Frank, Murray-Leslie, Mynther et al.), 162-164
Corporate Unconscious (Studio Noclip), 74-75
Crawford, Chris, 33-34

- *Gossip* (Crawford), 33-34

Crypton Future Media, INC., 17-18

- *Miku EXPO* (Crypton Future Media INC.), 17-18

Curran, Alvin, 77, 114-116

- *Crystal Psalms*, 77
- *Notes from Underground 2*, 114-116

D

Darmstadt International Summer Course for New Music (2023), 158
Demand, Sascha, 99
Depero, Fortunato, 21-22
Dinkla, Sönke, 28
Donaueschingen Music Festival, 130, 132, 158
Drawsocket, 107-108

E

Eavesdrop (Shaw), 17
Einstürzende Neubauten, 139

- *Stahlmusik*, 139

Electric Walk (Kubisch), 71
Eno, Brian, 48, 56

F

Ferrari, Luc, 29, 40, 54-55
Festival d'Avignon, 4
Field recorder, 70
Field recording, 29, 45-46, 50-58, 132, 148-150
Flintridge oder: Der Mensch erscheint im Holodeck (F.Wiesel), 75-76
Forsythe, William, 160
Freitag, Rosa, 34

- *Mixed Emotions*, 34

Fuchsbau Festival, 149

G

Giannachi, Gabriella, 16
Goebbels, Heiner, 31

Gottfried, Rama, 108-110
GPS-Trans series (Choloniewski), 78

H

Happening, 23-27
Hajdu, Georg, 37, 98-120

- *Symphony in St. Pauli Elbe Tunnel*, 98-117

Handke, Peter, 31-32

- *Offending the Audience*, 31-32

Hershman, Lynn, 27-28, 33

- *Lorna* (Hershman), 33

Hjorth, Magnus Olsen, 85

I

iPad (in performance), 74-75, 107-109

K

Kagel, Mauricio, 11, 32

- *Kantrimusik*, 32
- *Mare Nostrum*, 32

Kaprow, Allan, 24-25
Kaye, Nick, 41-42, 47
Klich, Rosemary, 15
Kolar, Miriam, 140-141
Kruchenykh, Aleksei, 22

L

Lachenmann, Helmut, 11
Lehmann, Hans-Thies, 11, 18, 27-31, 121
Liao, Tzu-Ning, 116-118

- *Chakra* (Liao), 116-118

Lissitzky, El, 21-23
Local Music (workshop), 158
London, Charles, 14
López, Francisco, 51-53

- *La Selva* (López), 51

Lucier, Alvin, 40

M

Maciunas, George, 27
Malevich, Kazimir, 22
Marinetti, Filippo Tommaso, 20-24
Masura, Nadja, 62-63
Matyushin, Mikhail, 22
MaxScore, 109-110
Mo Li Hua (folk melody), 111
Monk, Meredith, 41-42

- *Blueprint*, 42
- *Juice*, 41-42

Monteil, Philippe, 8
Moorman, Charlotte, 26
MP3 player, 72
MP4 player, 72-73

N

Nekrosius, Eimuntas, 31
Neuhaus, Max, 28, 47-49

- *Public Support*, 49
- *Radio Net*, 49
- *Times Square*, 28

Niblock, Phill, 11

O

Ode to Joy (Beethoven), 111
Oliveros, Pauline, 46-49, 139

- Deep Listening, 46-49

Orpheus Kristall (Stahnke), 98
Osaka Expo, 10
Otomo Yoshihide, 58

P

Paik, Nam June, 25-27, 31

- *TV Cello*, 26
- *TV Buddha*, 26
- *Participation TV*, 26
- Paik-Abe Video Synthesizer, 26
- *Piano Piece*, 26
- *Schallplatten-Schaschlik*, 26

Panhuysen, Paul, 11

- *Long Strings (Panhuysen et al.)*, 11

Parker-Starbuck, Jennifer, 14-15
Performing Arts Festival Berlin, 4
Piezo loudspeaker, 67-68
Pokémon Go, 34
Polipolis (Rossi), 161-162
Prampolini, Enrico, 21-22
Pratella, Francesco Balilla, 21
Proportional notation, 102-103, 109, 117-118
Prosumer, 39

Q

Quintet.net, 98

R

Radical Dance Series (Ortiz), 77, 160-162
Rathenow Tage für Neue Musik, 170
Reese, Kirsten, 132-138

- *Berlin Rosenthaler Platz*, 132-138
- *Debatte*, 132
- *Hallenfelder*, 132
- *Hört auf diese Stadt!*, 133
- *no voice audible but that of the sea on the far side*, 132
- *Zoobrücke*, 133

Rokeby, David, 34

- *Very Nervous System*, 34

Roomtone Variations (Collins), 106, 108
Russolo, Luigi, 21

S

Sankai Juku, 160
Schafer, R. Murray, 27, 29, 40, 47-54, 134, 156
Scheer, Edward, 15
Schroeder, Lucie, 72

- *Re-Member* (Schroeder), 72

Schubert, Alexander, 84-97

- *Control* (Schubert), 84-97

Serate Futuriste, 20

Silent disco headphones, 69-70
silent.move, 69-70
Sound installation, 28, 48-49, 55, 67, 132, 148
Soundscape composition, 29-30, 50-54, 58-59, 70
Soundwalk, 50, 70, 134
Speleoacoustics, 80, 140
SPOR Festival, 128, 132
Studio Arata Isozaki, 10
STAMP Festival (2021), 67
Stockhausen, Karlheinz, 10, 43-44

- *Musik für ein Haus*, 43-44

T

teamLab, 18
Text notation, 45
The Art of Noise, 21
The Walkman Effect, 10
Truax, Barry, 44, 49-54
Tudor, David, 31
Trio Wellenbad, 170
Tsangaris, Manos, 121-131

- *Botenstoffe. Orestie*, 121
- *An die Vorwelt*, 130
- *Bathsheba. Eat the History!*, 121
- *City Pieces (Window Piece)*, 121-131
- *Diskrete Stücke*, 130
- *Drei Räume Theater Suite*, 130
- *Living Space*, 122

Tzeng, Shing-Kwei, 111-112

- *Der Frühling des goldenen Schweins*, 111-112

U

Ultima Festival, 84
Under Snow (Ottinger), 165
Unsilent Night (Kline), 65

V

Valentin, Luna, 139-147

- *Chauvet Cave Beep Ploc Symphony*, 141
- *D'autres Soleils*, 141

- *Quatuor pour la grotte Saint Marcel*, 139-147

Verdi, Giuseppe, 35

Vickery, Lindsay, 119-120

- *Dekompression* (Vickery), 119-120

Victory Over the Sun, 22-23

Vítková, Lucie, 139

- *Cave Acoustics*, 139

Virtual Reality (VR) headsets, 75-76

Virtual soundscape, 52-53

Vitrac, Roger, 31

- *Les Mystères de l'amour*, 31

W

Wada, Yoshi, 139

- *Lament for the Rise and Fall of the Elephantine Crocodile*, 139

Wagner, David, 132-138

Wagner, Richard, 19-20

Walshe, Jennifer, 14-15, 36

Water Heaven, 10

WebChuck, 141

Weibel, Peter, 5

Westerkamp, Hildegard, 29-30, 47-51, 70, 134

- *Fantasy for Horn I & II*, 29-30

Wi-Fi (in performance), 78-29, 107

Wienert, Hannes, 99

Wilson, Robert, 27, 30

Wu Wei, 99

World Soundscape Project, 27, 29, 49

X

Xenakis, Iannis, 10, 54-55

- *Bohor*, 54
- *Diamorphoses*, 54-55
- Phillips Pavilion, 10

Y

Yan Jun, 32, 56-68

Yokohama International Performing Arts Meeting, 4

Z

Zhou, Dong, 148-153

- *"Here Could Be a Camera"*, 67-68
- *Installation for MUWA*, 148
- *Sound Ride*, 148-153
- *Kinderszenen*, 112-114

Appendix

- Excerpt of interview transcript with Luna Valentin
- Excerpt of interview transcript with James Cheung
- Excerpt of interview transcript with Panagiotis Botzios

Excerpt of interview transcript with Luna Valentin

This interview was conducted on the 15th of July 2023 online (Zoom meeting).

Zhou: Do you have some inspiration?

Valentin: Yeah, so I'm a spelunker, so I've been visiting caves since I was 10, very regularly, at least once a month. Sometimes it is like a week of spelunking camp, sometimes it's every two weekends. So, I had a lot of caving experiences, and it's always a very spiritual experience for me. It was very hot, and I was basically thinking about the coolness of caves and those very nice experiences. The piece is in three parts, and the three parts describe different experiences of being in a cave and how it feels like being in a cave.

It was very spontaneous, the writing of this piece. I wouldn't say that I had a lot of reflection before about what I wanted to say, but I wanted it to relate to the space. It was more like a musical idea that I put on the paper, and then I'm going to see how it's working. And it became a whole project about playing the piece in a cave and recording it. But in the beginning, it was just a musical idea. And then I wouldn't say that there was much reflection about space. It came a little bit later when we actually were working on recording it. So the music was, of course, written to be played in the cave, but there are a lot of different acoustics in one cave and in different caves.

Z: So, you wrote the piece first, then tried it in different caves.

V: Yeah, I wrote the piece, and then I visited several caves and several places, and to several places. And then, with two of the musicians, we went to one cave where I had selected three different locations. Then, we chose one location where we recorded the piece.

Z: Do you remember why you chose it?

V: Yeah, so the place where we recorded it is first very convenient to go. Because in caves, it can be tricky to go with a lot of equipment.

So this is the Saint-Marcel cave. It is a network where there are, I think now, 80 kilometers of galleries. This very specific place in this web of galleries was chosen because very near there is a part that is managed for tourists. So there is a tourist entrance that allows us to go in the cave with equipment, and there's not too much work, and you don't have to use ropes to move the equipment and stuff like that. You also have access to power. There are plugs where you can power the recording equipment.

And we had a lot of choices because there's 1.5 kilometers, I think, that are accessible for tourists. So we had the choice even in those 1.5 kilometers. And this specific place that we have chosen is because the reverb sounded great.

It was like we were singing everywhere, and we decided that that was the best place. I think it was super empirical, but it worked.

Z: Did you change anything during the rehearsal?

V: Yeah. So, when I wrote the piece, it was thought of as a continuum. So, I had those three different musical ideas. One was more about how the water evolves in the limestone and how it creates shapes and how water flows and stuff like that. One is more about rock and the sound of walking in a cave and also the drops and these kinds of percussive elements that you can find in caves. That's the second movement. Another one was basically the idea of, as a spelunker, you have a headlamp, and basically, you're going to spot one portion of the cave and light it. And the spots move, and you see very different things and very different landscapes. And for me, it was a continuum; something like water creates the cave, and droplets also create skeletons.

And then spelunkers see actually what is creating caves. But we couldn't play it as a continuum when we went in the cave because it was too physical for the instrumentists. There is a pretty high level of CO₂. So, for the clarinet and flute,

it was hard to play from the beginning to the end. It's almost 15 minutes, so they couldn't do it. Basically, we were recording one or two minutes of music, depending on how it would hit the music score, and then we'd stop the recording and take a break. That was not possible as a continuum.

A few times, the musicians just made mistakes playing the music score, and sometimes I liked it. So I was like, okay, you play this, and I want this too, so let's change the score. I feel like random, and mistakes are sometimes meant to be, so we changed the score a few times because of that.

Z: Can you tell me a bit more about why the blast instrument can't be played longer than two minutes?

V: Yeah, so there is this high level of CO₂.

First, they were out of breath very easily. So that was the first thing. And also, there is 90 to 99% of humidity. So the cello and the viola were also out of tune, very, very, very often. So we had to stop the recording, tune the instrument, and give time to the flutist and the clarinetist to take their breath back. And then we were able to restart. It took us three days to record 15 minutes of music because there were several takes, and we had to take big breaks in between each take to get back to something. Sometimes, like on the recording, you can hear that the instruments are out of tune or there is a part, and then suddenly the tune is not so good. So I hear that a lot, also because I'm aware of all the technical details. I think that's not something everyone will hear, but still hear. And that was something that I wasn't expecting, but that's just how it is.

Z: There was no conductor?

No. Most of the time, the instrumentalists were positioned in a circle so they would be able to see each other. So most of the time, there was no one conducting, but sometimes one take was particularly difficult, so there was one person who was accompanying us and who would give one or two signs sometimes just for musicians to get together. Especially when there are long

silences to know where to start, he was deciding when. I was behind the microphones and getting the levels all right, so I wasn't able to do it. But we had rehearsed together with this man who was giving some signs for him to know how long the silences and things like that are.

Z: So, the acoustic didn't make it more difficult for the musicians to hear each other?

V: No. Because the reverb that we had chosen was fairly easy to work with.

However, the difference between the rehearsals when we were at the university before leaving and then playing in the cave was really big. Actually, the first morning that we went to the cave, they played, we recorded it, and it wasn't great. After lunchtime, we took a break, and they played for two hours, each one of them just by themselves, getting used to the acoustics. And then they started to rehearse for one hour altogether, and then we were able to record the concert. But before that, it wasn't meant to be a challenge, and that wasn't really a challenge because of the reverberation, but it took them time to get the feeling of being in a cave.

I think that's something that you do when you go to a church; you're going to experiment with the acoustics before playing, and we didn't take this time first, and we had to take it after to be able to record.

Z: Was there an audience? I feel like that would be really difficult.

V: No, there was no audience. There were a few people who were here to help move the equipment and stuff like that. Sometimes, they were around, and they would sit or sleep and listen to it, but there wasn't really any official audience.

Z: I also think if the musicians need to have a break every two minutes, then it would be really difficult to have a live performance.

V: Sure. That's the idea.

Excerpt of interview transcript with James Cheung

James Tzu-Him Cheung worked as a violist and composer in the *Symphony in St. Pauli Elbe Tunnel* project. He composed the piece *Dodekaederstern* and adapted Prof. Tzeng's notation to MaxScore. After the project, he kept working for HfMT as a research assistant for a few years.

The interview was conducted on the 21st of March 2023 online (Zoom meeting).

Zhou: As a violist, did you practice before the rehearsal? Did you know the piece in its entirety before the rehearsal?

Cheung: At that time in Kraftwerk Bille, we had one or two rehearsals. I didn't practice before the rehearsals because there was no way to practice alone. They had an online platform at that time, remember? An online platform where you could log in and see how the score works, and you could click to see your own part. And then you could see every piece, and you could play it, and it would scroll.

The notes are really simple, but there are some really long breaks, and then all of a sudden, there's a super long note. There's not much one can practice with pieces like that. There are no complicated parts, and anyway, all the composers should have thought that these things can't be too complicated, the piece can't be too fast, because it's not possible to do it too fast for this concert. That's why the notes are usually long, that's the way to compose, the composers knew that from the beginning. Unless there are some super high and super low notes, then the woodwind and brass players must practice. But I don't really need to practice them as I play a string instrument.

Z: Did you get anything out of the rehearsals? I meant the ones in Kraftwerk Bille.

C: I think that rehearsal is not really about rehearsing the piece; it's mostly about rehearsing the whole process. And it's about whom to go to when there's a problem or how to let the people at the console know if there's a problem with a certain part. And how to play with other people, and how to read the score. And you knew how it feels like to have 144 people to do this thing together. That was the main thing I got out of it. It's not really about playing each note on your own strings. That's not the point.

Z: Do you think there's a difference between Kraftwerk and Elbe Tunnel?

C: They are very different. In Kraftwerk Bille we stood in a circle, and everyone could see everyone, and we could also hear each other. The venue also has a big echo, so you can also know what everyone is doing. In the Elbe Tunnel, it was also a big circle, but not everyone could see everyone. We spread more apart, and then even in two tubes. So you will not be able to see the opposite side. In the Elbe Tunnel, you can hear clearly only the two or three people next to you, and if someone is further away, you can still hear them a bit, but it's not clear. If they are in the other tube, it would be completely inaudible. So there is a difference. I can also tell you that as a composer, my piece sounded totally different in these two places.

Z: Did the team get any long-term benefits from the project?

Of course. For example, in our school, those iPads actually use the draw socket a lot, and it's used in a lot of concerts. Of course, the draw socket itself has also been changed; it is always in progress. It can be used as a control monitor, so the musician doesn't necessarily read the score; they can look at an iPad and have some text and cues on it. In another case, there was a piece written in the Bolen-Pierce Scale (microtonal scale), so it was not a piece that could be sung directly from the score. So, the musicians had an iPad and plugged in a

headphone at the same time, and they could hear the pitch half a second before it came, and then they could sing along with it. In that way, you don't have to listen to a click track, and you can synchronize with everyone just by looking at the score. It's also helpful for synchronizing with video. But it's not a replacement for the conductor, who can interpret the phrasing of a piece. The real-time cueing information is mainly to give everyone an aid, not to replace the conductor. The overall musicality is much better with a conductor.

The draw socket was also used in our "People are the Knife, I am the Meat" (performative installation by Dong Zhou and James Cheung, 2021 in Hamburg). But it's not on a local server; it's on the HfMT Live server.

Z: Lastly, I'd like to ask you about modifying Prof. Tzeng's score: what do you think you've changed mostly? Then is the function in MaxScore of transforming notations from Finale to MaxScore. Did you find it easy to do?

C: No, it wasn't easy. Actually, it was just about transforming from Finale to MaxScore. He composed the piece as a normal orchestra piece, and maybe while composing, he didn't know that the musicians would be looking at an iPad and everyone was far away from each other. So, I had to modify some musical content because this was not for a normal concert hall performance. His piece is actually a mix of Jasmine Flower and Beethoven, but it was very well received. Some audience members found it was the best and most touching piece.

Excerpt of interview transcript with Panagiotis Botzios

Panagiotis Botzios is a composer and guitarist. He worked in *Control* as a performer in 2018. He played guitar in the Symphony in *St. Pauli Elbe Tunnel* project.

The Interview was conducted on the 24th of July 2021 in Hamburg.

Zhou: How come that you joined this project?

Botzios: I knew Alex from the lessons he gave in Lübeck, and he asked us (the composition class in Musikhochschule Lübeck) whether we wanted to be the guest performers with Decoder Ensemble and perform a piece in Oslo. I was interested in this idea, so just like a few of my classmates, I was in.

Z: How was the rehearsal? What was the hardest part?

B: The rehearsal was in Kraftwerk Bille, the same rehearsal place for the Elbe Tunnel project, but it was in a different part of the building. It was separated into a few rooms, but not as many as the performing place. We learned the concept, the process, and detailed things like movement. There was a choreographer, and we were supposed to do some group movements. But we were not professional dancers, so things like slow motions were very difficult. I guess for dancers they don't need too much practice for this kind of idea.

Z: How much difference was it from the rehearsal place to the Museum? How much was it because of the site?

B: They were very different. In Kraftwerk Bille, it's bright, and we were closer. The museum was much bigger and didn't have any natural light. We set up lights there, but you still don't feel the time like you're in a normal building, and you don't see the other performers. During the rehearsals, we played our roles and

test audiences in turn, but in the real performance, we played the loop many times in a row with unknown audiences. It was much more exhausting.

Z: What was your role in this piece? What did you do in this timing overview? How was the room you located?

B: I was in the room Sleepers together with two other performers. We don't really have a role, like, we don't have a name or something. We were wearing the same black shirts and trousers, and faces covered by the VR headset. We didn't talk either; the audience were listening to their headphones. We moved very little or slowly when no one came, and when it came to someone, we had the scene of offering pills. At the end of every loop, we need to move to another room together with most of the performers. The audience's reactions were very different, and it was interesting to observe. Very few people actually took the pill. If I was the audience, I wouldn't do it either.