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# ANNA & MARIE, A PERFORMATIVE INSTALLATION BUILT ON ERGODIC STORYTELLING—TWO PROJECT REPORTS

## INTRODUCTION

/LÜNEBURG/ In this chapter on the performative installation *Anna & Marie*, we offer perspectives and insights based on the process of creating this work by its composer Marko Ciciliani, and on the process of rehearsing and performing it by the violinists Susanne Scholz and myself. We hope that this dual angle will provide the reader with insights into the multilayered understandings and experiences that formed the foundation for conceptualizing, creating, rehearsing, and performing this work. As the phenomenologists Gallagher and Zahavi state, “*all reports given by subjects ... are in some sense ... about their own cognitive (mental, emotional, experiential) states*” (Gallagher and Zahavi 2012, p. 16). The two accounts will intersect and complement each other, serving as reflective reports and highlighting our different perspectives and experiences in creation and performance.

## THE ORIGINAL IDEA

/CICILIANI/ *Anna & Marie* is a concert installation involving two violinists on electric and baroque violin, generative electronics, two navigable virtual 3D worlds, augmented reality, and light design. It brings together three initial ideas: an exploration of the historical figures Anna Morandi and Marie Bihéron, principles of educative games, and ergodic storytelling. From where did these ideas emerge?

The first idea already arose several years ago when I learned about the Enlightenment anatomists Anna Morandi (1714–74) and Marie Bihéron (1719–86), who were pioneers in the field of ceroplastics, the art of making wax sculptures of human bodies and internal organs. At this time, anatomical wax models were in high demand due to the strong interest in autopsies, which had become a major field of medical research. In the absence of cooling systems, corpses for anatomical studies were hard to preserve, and wax models thus provided a cleaner, durable, and odor-free alternative. Although their primary purpose was for medical studies and research, ceroplastics gradually became an artistic practice in their own right, forming a fascinating intersection between art and natural science with its own epistemic objectives. I was very impressed that these women had managed to build a successful career in a field that at that time was dominated by men. For quite some time, I contemplated the idea of creating a piece that would in some way be based on their lives and work. The context that the artistic research project GAPPP offered me provided the second incentive. I was fascinated by the idea of developing an artwork akin to an educative game, where an interactive medium also provides accurate knowledge about a specific field of interest. Third, the concept of ergodic storytelling intrigued me for a number of reasons. Although ergodic storytelling predates the popularization of computer games (Aarseth 1997), it is often considered a form of narrative very characteristic of this medium (Ryan 2006, pp. 224–226; Keogh 2018, p. 47; Nitsche 2008, pp. 31–32, 49). Consequently, I decided to apply this narrative structure to design an open form in an audiovisual setting.

These three components—the historical background of Morandi and Bihéron, educative games, and ergodic storytelling—proved to be perfectly compatible. A story can easily be coupled with historically based information. Accordingly, the subject of the two anatomists, educative games, and ergodic storytelling came together quite naturally. For the narrative, I decided to apply counterfactual storytelling by describing an encounter between the two anatomists that never actually took place, while at the same time keeping the frame of the story historically accurate.

### EXPERIENCING ANNA & MARIE AS A PERFORMER

/LÜNEBURG/ *Anna & Marie* brings together two violinists from different genres, with different instruments and different practices—historical performance practice in the case of Susanne Scholz on the baroque violin, and contemporary music practice in my case on the electric violin. *Anna & Marie* is an installation that can turn into a performance and back into an installation, but it is also a ‘game,’ and a ‘story’ that unfolds ergodically. *Anna & Marie* is

complex. As performers we have many different agencies, which means that every second we take decisions on many levels, yet have to find the time to listen to what we are actually doing, both musically, artistically, visually, and in terms of chamber music.

The audience of *Anna & Marie*, on the other hand, are able to immerse themselves in the environment. They experience the sonic world of the electronics that couple with the sounds of the violins. They are given a story line and the historical context, narrated in English, one voice with an Italian, the other with a French accent. Visually, they encounter panels that display images of the anatomic wax models of the two female protagonists, anatomical busts that stand in two corners of the room, and two screens on which the game unfolds. They are subjected to moving lights, mirror balls, and a choreography of shadows. All the senses are stimulated, as even a delicate scent of beeswax surrounds them. There is no routine, not for the audience, nor for the performers.

My report adopts a phenomenological lens to look at the experiential, mental, and emotional states we went through when rehearsing and performing *Anna & Marie*.

### THE FORMAT

/CICILIANI/ It took me a while to find a suitable format for this project. My first attempt, which traces back to 2017, was to realize the composition as an audiovisual concert piece for a chamber music duo. I eventually abandoned the project when it became clear to me that the complexity of the storytelling could not be realized in such a reduced setting. Later the same year, I returned to the idea of this project when I reworked the concept into an exposé for a music theater. In the end, however, I realized that the combination of a ludified installation with integrated performances that occurred at various time intervals was the perfect format for this endeavor, and thus I created *Anna & Marie* for the Donaueschinger Musiktag 2019.

### ANNA & MARIE—A ‘GAME-BASED’ ARTWORK

/LÜNEBURG/ My partner on the violin, Susanne Scholz, appreciates the fact that her experience of *Anna & Marie* cannot be reduced to “a single perspective” (Scholz 2019).<sup>1</sup> She describes the format of *Anna & Marie* in various ways. To her children, she portrays it as a computer game that she navigates on her violin together with another violinist. To others, she explains it as an installation that exhibits certain features of a performance, but where electronic sounds are

<sup>1</sup> Orig.:  
 „Das zeigt  
 bereits,  
 dass ich  
 dazu keine  
 Einzelne  
 Sichtweise  
 habe, und das  
 ist gut so.“

2  
 „Meinen Kindern erkläre  
 ich, dass es ein  
 Computerspiel ist, das  
 ich mit Hilfe meiner  
 Geige und gemeinsam  
 mit der anderen  
 Geigerin navigiere.  
 Anderen Leuten sage  
 ich eher, dass es  
 eine Installation mit  
 Performancecharakter  
 ist, in der die  
 elektronische Musik im  
 Mittelpunkt steht und  
 wir lediglich einen Teil  
 dazu interpretieren.“  
 (Scholz 2019).

at the center and the violinists merely add a part of the whole (cf. Scholz 2019).<sup>2</sup>

If I wanted to categorize *Anna & Marie* in terms of its format, I would call it an artwork that is partly based on the principles of an explorative game. The choices offered to us performers and certain components of the piece make for this game-like character: the ergodic narrative, and the fact that we can choose which particular strand of the story we want to follow; our navigating of the landscape, which is very similar to finding our way through an explorative game environment; the first-person perspective we adopt, and the triggering and collecting of trophies in the form of anatomical wax models at certain locations in the landscape. These are all elements typical of games. However, to us performers, *Anna & Marie* needs to be a concert piece first and foremost. Hence, we hover between ‘gaming and exploring with relish’ and being aware of our artistic task, which is to handle all the levels of game mechanics and interactive technology and at the same time create an artistic experience—visually, narratively, and sonically—that can be followed and enjoyed by the audience. And having talked about what makes *Anna & Marie* resemble a ‘game,’ I would like to emphasize that I personally consider it primarily an intriguing, many-layered and rich artwork.

### THE NARRATIVE

/CICILIANI/ What particularly struck me early on about the two anatomists and wax artists Anna Morandi and Marie Bihéron was that they apparently never encountered one another, although they were contemporaries, worked in the same professional field, and in part even shared the same collectors. Thus I decided to let these two remarkable women have a fictitious encounter. I used ergodic storytelling as a means of presenting variations of what this meeting could have looked like. However, I wanted the fictitious story to be based on biographical and historical facts as much as possible, so that the fictitious part would still provide historical knowledge, mainly relating to their biographies.

I started to collect various reference texts about Morandi, Bihéron, and their historic circumstances in a growing MaxQDA session (MaxQDA is a program that is usually used to collect and analyze texts and data of different sorts for qualitative research). I used the software to code<sup>3</sup> many of the texts so I could more easily access specific information when in need of it.

Initially, I wanted to create a story in three counterfactual episodes, with each part based on a different fictitious encounter between

3  
 In the context of qualitative  
 research,  
 the process of coding means  
 that text sections are marked  
 according to themes  
 or keywords they address.

Morandi and Bihéron in chronological order. The first episode was supposed to be centered on the question of Marie’s wax quality and around an exchange about their professional knowledge and experience. To depict the characters’ more personal sides, I planned to base the second part on a fictitious drug trip they took together using a combination of herbs that Marie was familiar with from her family, who were apothecaries. For the third part, I envisaged a scene that would relate to Anna’s husband Giovanni’s death. However, my final realization of *Anna & Marie* only used the first episode concerned with Anna’s and Marie’s exchange about Marie’s wax recipe. The complexity of the wax story already exploded and turned out to be one of my most challenging projects in both logistical and compositional terms.

The story is told in the form of a dialog between the two protagonists, which I recorded with nonprofessional speakers, the French native Nelly Bollon, who spoke the part of French protagonist Marie Bihéron, and the Italian Beatrice Baglioni, who lent her voice to Anna Morandi. I deliberately chose nonprofessional speakers, firstly to avoid an overly clean and possibly artificial manner of speaking, as sometimes displayed by professional actors. Secondly, while I kept the narration in English to make it easier to present the work in various countries, I nevertheless wanted to retain a trace of the anatomists’ origins. Thus I wanted Anna’s part to be spoken with a strong Italian accent, and Marie’s part with a French accent.

### HISTORICAL BACKDROP AND CHALLENGES TO OUR PERFORMANCE PRACTICES

/LÜNEBURG/ Both the historical situatedness and the semiotics of language and story challenged our individual performative approaches. We are violinists who come from two different musical genres and professional artistic practices. Two worlds collided: baroque playing technique came up against contemporary music sound modelling; the “doctrine of the affects,” a method of understanding and musically interpreting text used in historically informed performance practice, contrasted with the abstract electronic layering to which I added material and designed sound and timbre in my attempt to construe meaning in the way of contemporary music. Or—to give another example—a historic violin and bow from the second half of the eighteenth century were juxtaposed with an electronic five-string violin. Differences went as far as the understanding of tuning systems and the meaning of words: accidentals that evoke a certain musical *gestalt*, coloring of mood, and uneven distances on the fingerboard in Susanne’s baroque music practice are value-free, abstract material in the context of

contemporary music. By contrast, for me the layers of sounds and sonic textures of the generative electronics offered multiple starting points to respond to with my own playing with regard to shaping the form, color, and texture of the music. Words—whether those found in the story or our own words used as indications for our performance—prompted different responses in us. Furthermore, the characteristics of the technology needed to be taken into account. As our playing was tracked in order to navigate through virtual environments, we had to adjust our playing so that the electronics would respond in the ways we desired. For example, in historical performance practice bowing is *per se* uneven as a means of creating beauty and liveliness. However, this got in the way of the computer’s tracking system, which at certain points needed a steady tone to work correctly.

Phenomenologist and dancer Maxine Sheets-Johnston argues that a phenomenology of kinesthetic learning requires “a fleshing out of the developing awarenesses—felt, perceptual, cognitive—that constitute the knowledge, skills, and abilities of everyday life” (Sheets-Johnstone 2015, p. 31). We felt that we had to relearn our everyday professional practices and vocabulary, adjust to one another and develop the common “awarenesses—felt, perceptual, [and] cognitive” that we needed to navigate *Anna & Marie* in both a technical and figurative way.

/CICILIANI/ The concert part of the work and the installation version fulfill different roles in how they relate to the narrative. I use the entire setup quite differently in both versions, but conceive both as a continuity. The performance and the installation relate to one another in a complementary manner. The counterfactual ergodic story, for instance, is determined and created during the concert, where the performers take decisions about the narrative’s course of action. The installation manifests a trace of the preceding performance but—and this is where it differs from the performance—it also offers additional accurate background information on the lives and circumstances of Morandi and Bihéron. One of the last elements that I decided to include was thus the augmented reality (AR) element in the installation part. This feature provides fully accurate historical information. In order to experience this, visitors have to engage actively with the AR technology (see the subchapter “The Installation” for details).

Each artistic instantiation—concert and installation—offers a different experience and allows the audience to access other aspects of the story.

Fig. 1  
The wireless receiver with a single earpiece of a headphone attached.



4  
Orig.: „Das  
Zusammenspielen wird  
eine der wichtigsten  
und spannendsten  
Inspirationen.“

## INTERDEPENDENCY

/LÜNEBURG/ As performers, we explore this work together. If one of us chooses a certain narrative, the other one has to accept it and take on all the consequences regarding the emotions, form, pace of the story, and musical developments that go along with this decision. In this way and through our musical interaction, we are dependent on each other’s ‘game’ choices and artistic and performative actions. Although each of us may treat the game aspect of *Anna & Marie* individually and independently, the overall artwork is thus jointly shaped. Or, as Susanne Scholz remarked, “Playing together becomes one of the most important and fascinating inspirations” (Scholz 2019).<sup>4</sup> Musical traces of our performance later reappear in the sonic environment of the following instantiation of the installation.

## ACOUSTIC MEDIUM OF THE NARRATIVE

/CICILIANI/ One significant detail was that I never intended the spoken dialogs to be heard on speakers. I wanted them to be available as an optional layer but present the performance as a musical event without text overlay. In my opinion, using audible text would turn everything else into a side or background event and would have placed strong constraints on the other musical possibilities.

After considering several options for integrating the dialogs, I decided to use single headphone pieces to which compact wireless receivers are attached [Fig. 1]. Only the prerecorded conversations between Anna and Marie were transmitted through these units, which were scattered on the floor throughout the venue, ready to be picked up by the audience. It was not until I tried it for the first time that I realized that listening to the dialogs with these single earpiece units produced a voyeuristic quality, as if one were eavesdropping on somebody else's conversation. As this amplifies the intimacy of the fictitious encounter in the story, I found it suitable for the project.

The performances in Donaueschingen were designed for an audience of fifty people, yet I deliberately only provided twenty headphone units. In doing so, I wanted to make clear that listening to the story is not mandatory but an optional access point, only available to a fraction of the audience. I hoped this would encourage audience members to pass along the earpieces and anticipated this would create an interesting situation within the audience. The assumption was that having too few earpieces for the total number of audience members would encourage interaudience communication. Since there are so few headphones, you might want to share your headphone with your neighbor so that you both can explore the added layer, each for a while.

I always gave a brief introduction before the beginning of each performance in which I also explained that the number of audience members outnumbered the headphone pieces. People did indeed exchange headphones with each other in the following performances. Whether this happened because I encouraged them to do so in my brief introduction, or whether they would have done so anyway, we cannot know for sure.

## LISTENING IN

/LÜNEBURG/ The audience experiences a performance of *Anna & Marie* first and foremost as an audiovisual multimedia artwork without text, unless a person consciously decides to listen in. We performers experience the situation differently. For us, it is important and necessary to constantly track the dialog of our protagonists via headphones and on tablet screens that serve as our score. While the audience can afford to playfully follow or not follow the narrative, for us it is one of the backbones influencing our artistic decisions. Our way of following the dialog needs to be intentional and match the shaping of the musical atmosphere and overall artwork.

## THE VIDEO PROJECTIONS

/CICILIANI/ As mentioned before, the concert part is composed for two violinists, one playing an electric violin representing the protagonist Anna Morandi, the other a baroque violin representing Marie Bihéron. Each is linked to a video projection of a 3D environment set up nonsymmetrically on opposite sides of the performance space. Their instruments serve as interfaces, meaning that the musicians can move through their 3D environments by playing their violins, while seeing their respective environment from a first-person perspective.

One of the environments was rendered from the color photograph of a self-portrait of Anna Morandi, the other from a black and white photograph representing Marie Bihéron.<sup>5</sup> I converted the images into grayscale versions and transformed the intensity grade of the gray tones into the height information of the projected landscape. In a final step, I tilted the images into a horizontal position, through which they became an uneven, hilly and wide landscape, which the violinists traversed with their avatars. The musician representing Anna Morandi navigates the Bihéron landscape and the musician representing Marie Bihéron navigates the Morandi landscape. I wanted to symbolize the process of getting to know the other person by making the violinists each 'move across' and 'explore' the other protagonist, using her as a spatial terrain. To the audience, however, it is at first not evident that the musicians are walking on giant versions of each other's protagonist. However, the musicians' avatars have a certain feature which enables them to fly, and from that bird's-eye perspective, it eventually becomes clear what their landscape is made of.

The Bihéron landscape and the Morandi landscape face one another in each of the two projections, with the world of the one player forming the 'ground terrain' of the environment, and the world of the other protagonist the 'sky.' This means that the player representing Anna Morandi (who walks on the terrain made of Marie Bihéron) sees her own image as a sort of distant sky that hovers over her world [Fig. 2].

Ten so-called wax lakes are distributed throughout each of the environments. They are little ponds, yellow in color, that have been placed in trenches and small valleys. The musicians' task is to navigate to those wax lakes, enter them and thus trigger a particular event. The character then begins to fly and looks down at her former position, thus drawing attention to three events. First, it becomes evident that the environments are in fact renderings of images of the protagonists. Second, the triggered wax lake will gradually be drained and becomes smaller until it disappears. Third, as soon as it disappears, a 3D object emerges in its place that from now on hovers

<sup>5</sup> To my knowledge, no images of Marie Bihéron have survived. I decided to use an etching of Marie-Louise Lachapelle (1769-1821) as a fictitious image of Bihéron. Lachapelle was roughly a contemporary of Bihéron, and her clothing in the image is typical of upper-class French women.



above the position where the lake used to be. This striking visual event goes hand in hand with a specific musical harmonic texture characterized by rhythmicized timbral modulations. Gradually, the timbre of this texture is transformed. Like the visual event, the sonic texture is never the same twice. However, it makes for a recognizable element. An entire lake sequence lasts anything between 20–40 seconds, during which the violinists stop playing and the dialogs on the ear units are interrupted.

### NAVIGATING ANNA & MARIE

/LÜNEBURG/ At first glance, navigating the environment of *Anna & Marie* is easy. Our instruments, the violins, are connected to a computer system that detects our input. The computer reads the volume of our playing, the pitch, and the stability of the tone color. It then transcodes this information into movement on the screen. For instance: usually, whenever we play the violin, we or rather our characters walk across the landscape. If we play more loudly, we walk faster, if we play softly, we will crawl very slowly, always just straight ahead. As soon as we reach the edge of our landscape, we wander into the off and out of the game environment. So occasionally we need to change direction. To turn right or left, we first have to adopt a specific playing mode: we keep playing, but have to produce a long, stable note that cannot change pitch for at least two consecutive seconds. We get two cues that indicate whether we have been

Fig. 2  
View of the character representing Marie Bihéron. The landscape she explores is a 3D rendering of Anna Morandi. At the same time, the sky shows the 3D landscape that has been rendered by her own image, on which the player representing Anna Morandi navigates.

6  
Orig.: „Es bedarf einer gewissen Zeit, bis man im Navigieren die Ruhe findet, aber es macht Spaß, und wenn man es dann in den Griff bekommt, wird es inspirierend. Und letztlich ist es so, wie mit vielen Dingen: Wenn man die Freiheit lenkt, dann kann man sie manchmal noch besser spüren.“

successful: a visual cue—we stop moving although we keep playing—and an audio cue, consisting of a melodic scale in the live electronics, which either ascends or descends towards our chosen pitch. Once we have stopped moving and the melodic electronic scale has arrived at the same pitch we are playing, we know we can navigate to the right or to the left. However, the long note we have to produce before we can change direction has to be extremely stable, because any change in timbre results in a change in the overtone spectrum, which the computer then detects and may interpret as a new, different pitch. This means that the long single note is interrupted, which consequently resets the tracking. Thus, navigating the environment and the complex tracking system quickly turns into a fragile kinesthetic experience.

Playing what the computer recognizes as a stable tone proved to be problematic. The interface reacts sensitively to the slightest scratch or minute interruption (such as a bow change), sometimes even to changes in the overtone spectrum, which the human ear experiences only as slight variations in timbre or sound color. This is not so much of an issue with the electric violin, because its tone is very pure and lacking in overtones, but it caused many problems with the acoustic violin. Susanne’s eighteenth-century baroque violin has a rich overtone spectrum that is quite prominent and somewhat erratic in its composition. Thus it was easy for the system to miss the original pitch at the base of the spectrum and instead pick up a higher tone of the spectrum that for some reason appeared to be more prominent for the computer’s tracking system than the actual base pitch. Another problem Susanne struggled with is that a long stable tone is considered lifeless in historical performance practice. Being ‘forced’ to produce a ‘dull and lifeless’—albeit stable—tone went against her musical training. Accordingly, for her navigating within the tracking system turned into a stressful kinesthetic and unsatisfying aesthetic experience that went entirely against her *raison d’être* as musician. However, once she had conquered the handling of the system she found inspiration, fun, and freedom in it. In her words: “The navigation takes a while to ease into. Still, it is fun. Also, once you can halfway handle it, you will gain inspiration from it. And in the end it is like many things: if you steer the freedom, then sometimes you can feel that freedom even better” (Scholz 2019).<sup>6</sup>

/CICILIANI/ In the virtual environment that is based on Marie Bihéron, on which the Anna Morandi performer navigates, all lakes are replaced by 3D models of embryos and fetuses in various stages of their development. This is because Marie Bihéron specialized in making wax models of pregnant women that also included models of fetuses and embryos. In the environment that Marie Bihéron explores, the lakes are replaced by a variety of organs: a heart, a brain, an eye, the vocal tract, a liver, a lung, a spleen, a stomach, a

penis, and a kidney. This refers more generally to the multitude of organs that they both designed and emphasizes a specialty of Anna Morandi. She was known for her detailed models of eyes and also made models of the male reproductive organ, which was unusual at that time—hence the inclusion of an eyeball and a penis. As the piece progresses, the players replace more and more lakes with 3D models. The environments thus keep changing and become more varied.

The 3D models are illuminated by rotating virtual light sources that cause the models to cast shadows on the terrain. However, instead of being depicted as darker areas on the surface, these ‘shadows’ uncover an otherwise hidden texture that covers the entire environment. This texture consists of scanned images of anatomy books from the 18th century. Since the shadows are constantly moving, only fleeting impressions of this texture can be grasped, just enough to recognize it. The entire process of replacing the lakes with 3D objects and—through their shadows—making the texture of anatomy books visible symbolizes the process of Anna and Marie getting to know each other. The 3D objects show the anatomical entities they specialized in, while the texture of anatomy books reveals the knowledge they have gained that enables them to carry out their profession [Fig. 3].

### SPATIAL ARRANGEMENT AND LIGHT DESIGN

/CICILIANI/ In Donaueschingen, *Anna & Marie* took place in the Alte Hofbibliothek, which used to serve as the library for the noble house of Fürstenberg. The building was constructed between 1732 and 1735, the same time period that Anna Morandi and Marie Bihéron were active as artists and anatomists. When I was invited to create a performance installation for the festival Donaueschinger Musiktage, I was allowed to choose from a selection of venues. I was immediately intrigued by the Alte Hofbibliothek. The age of the building, its size, and especially its character as a former library, a place where knowledge was collected and maintained, matched my subject perfectly. I liked the fact that the main bookshelves were preserved and left empty. For me, the blank shelves symbolized a wealth of space for acquiring new knowledge and experience. The space where *Anna & Marie* took place had a width of seven meters, a length of twenty meters and a height of three meters, a rather long and narrow rectangle and therefore not an easy shape to arrange for a performance installation. With a relatively low ceiling, its character was more that of a residential room than a concert venue, which created a sense of privacy. Although *Anna & Marie* is not explicitly designed as a site-specific work, I nevertheless had the Alte Hofbibliothek in mind while developing it.

Fig. 3  
The texture of scanned anatomy books  
from the eighteenth century becomes visible where shadows  
of 3D objects are cast.



See footnote 5,  
p. 97

I opted for a nonsymmetrical setup, with one screen placed slightly diagonally in a corner and the other screen positioned flat against the windowed long side of the wall. Throughout the space I distributed nine A2-sized panels with illuminated backgrounds depicting photographs of various works by Anna Morandi and the portrait that served as a replacement for Marie Bihéron.<sup>7</sup> The illuminated panels served as marker images for the augmented reality applications that the audience members could explore (see subchapter “The Installation” for details). I also developed a generative light design. Each variation of the narrative was visually characterized by its individual set of colors. For the light design, I used two groups of three LED bars positioned on the floor, each consisting of twelve individually controllable lamps. In each group, the LED bars pointed at a contemporary anatomical doll. Today, such models are used for education in anatomy. They contain removable organs and can be considered contemporary's version of Morandi and Bihéron's wax models. I arranged the light design in such a way that moving shadows of the anatomical dolls were cast on the white walls behind them—similarly to the shadows created in the virtual environments by the rotating light sources.

Projection screens often have the effect of windows into a reality entirely separate from the actual performance space, and they tend to absorb the audience's attention (for a detailed discussion of this topic, see the chapter “Virtual 3D Environments as Composition and Performance Spaces”). To reduce this perceptual divide, I

deliberately chose to have the light design and projections overlap. I employed four small spot lamps, of which two pointed at a mirror cylinder that was hanging next to the screen associated with the Anna Morandi performer, while the other two pointed at a small golden disco ball hanging next to the screen associated with the Marie Bihéron performer. During the lake sequences and the so-called junction points—moments where the musicians decide how the story will proceed—these spots are turned on, and mirror cylinder and disco ball start to rotate slowly. The resulting reflections were dispersed throughout the entire space and scattered conspicuously across the projection screens. The light design also includes six wash lamps that in Donaueschingen pointed at the ceiling. They are turned on when a junction point appears in the 3D environment to create the impression of the space growing in size by accentuating its upper boundary. Finally, I used a moving spotlight that is turned on at those junction points. It casts a narrow beam of light across the space and moves at a slow speed, thus also crossing the projection screens and the area where the audience is. All the light is computer controlled and mainly designed as generative lighting, so it never is identical.

My intention in distributing the various components—the projection screens, the nine panels, the two anatomical dolls, and the light design—throughout the space was to avoid having areas in the space that drew more attention than others. I therefore decided to use bean bags for the audience to sit or lie on rather than chairs aligned in a single direction. A last subtle component that contributed to the general atmosphere of the space was the odor. Since beeswax is the main subject of the story and the main material with which the anatomists worked, I placed two little pots with melted beeswax on hotplates in the space. The scent of the beeswax thus spread throughout the entire space, albeit subtly.

### PERSPECTIVAL INCOMPLETENESS AND GESTALT OF THE WHOLE

/LÜNEBURG/ From a phenomenological perspective, audience members could choose their personal variation of ‘perspectival incompleteness’ by centering their attention on visuals, the sonic environment, the story, the light, the performers or just their neighbors. By focusing on different details and adding or excluding aspects of the whole, they actively shape and vary their personal version or *gestalt* of the event. They could for instance decide whether they wanted to experience *Anna & Marie* with or without the narrative, actively navigate through the landscape, add to the music, and trigger lakes, or watch other people do it, play with augmented reality features to uncover historical details, or engage with the encompassing

experience and let the music, visuals and the scent of melting beeswax wash over them.

### INTENTIONALITY

/LÜNEBURG/ As performers, we negotiate the musical, sonic, visual, and narrative world of *Anna & Marie* intentionally, focusing on the concert situation, the audience, and the unfolding artistic process. Moreover, our artistic notions and decision-making are informed by their temporal character. We judge instantaneously what kind of short- and long-term consequence our choice will have with regard to the form of the piece, its emotional and sonic character, its visual appearance, and our chamber music practice. While playing, listening, navigating, and ‘gaming,’ we are aware of what has already taken place and anticipate what will come next: which lake to trigger, which narrative to choose, which musical accents to set. Our attention—whether based on our immediate perception, memory, or imagination—is directed to the situation and the artistic process, and ‘intentionality’ is “reflected in the very structure of consciousness, and involves notions or mental acts and mental content” (Gallagher and Zahavi 2012, p. 13).

### THE CONCERT PART

/CICILIANI/ The Donaueschingen premiere was performed by Barbara Lüneburg and Susanne Scholz, who were the musicians I had in mind when I composed the piece. The baroque violin Susanne used was in fact approximately from the time of Morandi and Bihéron. The combination of electric and baroque violin is particularly interesting for me because of the instruments’ different historical connotations and timbral differences. In different ways, both instruments are less flexible than a modern acoustic violin with regard to their timbral and dynamic range. I like the contrast of their timbres, with the electric violin being duller than the modern acoustic one, and the baroque being somewhat harsher and more nasal. I also welcome the fact that they refer to different historical periods.

/LÜNEBURG/ Marko transferred the idea of the two personalities to the musical realm by letting Susanne play on a baroque violin and me on an electric violin. The idea was to distinguish Anna and Marie from each other sonically through the different sound qualities of our violins. In my opinion, the baroque violin could even be understood as hinting at the world in which the historical figures Anna and Marie lived, while the electric violin points to the two women as emancipated academic thinkers who were ahead of their times.

/CICILIANI/ I do not work with a traditional score in *Anna & Marie*. Instead, the musicians read from tablets on which a custom-designed app is running. Using this app, I can display playing instructions in real time [Fig. 4]. The app was programmed and developed by Andreas Pirchner.

The playing instructions consist of the following information:

1. A verbal description of playing techniques to be used by each of the players, often combined with a description of the general atmosphere and the chamber-music relationship between the musicians.
2. Information on the pitch scale used in the current section.
3. A selection of specific pitches from the scale that are meant to be used by each player.
4. Individual dynamic instructions.
5. The text that is currently spoken in the narrative, which is updated continuously as the dialogs progress.

The verbal description of playing techniques and chamber music instructions to be used in the different scenes is the most important information in terms of shaping the music and overall atmosphere. These descriptions and instructions were developed and formulated in a collaborative approach between Barbara Lüneburg, Susanne Scholz, and myself during the rehearsal process. The other instructions were all provided by myself beforehand.

As mentioned above, the violinists' playing affects the movement of the characters through the virtual 3D environment. When developing the navigation, I implemented audio cues for the performers. I invested a lot of effort in making the cues musically meaningful and at the same time functional, in the sense that they provide the violinists with information about the navigation mode they are currently in. As mentioned above, two distinct navigation modes need to be differentiated. In the standard mode, the violinists' playing causes their virtual character to move forward and the amplitude determines the speed of their movement. If they want to change direction, they have to switch to so-called orientation mode. They do this by holding a pitch steadily for two seconds. While holding the note they hear the abovementioned audio cue, which consists of a linear melody in the scale mode of the current section that approaches the note either from below in an ascending line, or from above in a descending line. After two seconds the melody ends up in unison with the held note and the pitch is sustained in an electronic freeze, showing that the player has entered orientation mode. At this point, the virtual character stops moving forward. From here on, the violinists can turn left by playing a lower note than the one with which they entered orientation mode, or can turn right by playing a higher one. They

Fig. 4  
Screenshot of one of the tablets that served the musicians as a score, showing the opening scene. The pitches on the left are for the electric violin, those on the right for the baroque violin.

switch back to navigation mode to move forward by either holding a note again for more than two seconds, or by not playing at all for the same amount of time. As soon as orientation mode is exited, the note freeze stops.

### ROLE OF MUSICIANS—REHEARSAL PROCESS

/CICILIANI/ Ergodic storytelling is a style of plotting narratives that is strongly associated with game play, and more specifically with computer games. In ergodic storytelling, the performers decide how the story will unfold. In order to offer a corresponding space of possibility, I needed to provide the musicians with a certain degree of autonomy in deciding how to organize and perform their part. A written-out score was thus not an option. In using the tablets, which are able to provide changing sets of instructions, I sought to strike a balance between offering scope for autonomous musical decisions and interactions and at the same time giving a clear sense of orientation about the piece's musical direction and character.

I deliberately avoid the label 'improvisation' for this situation, although Barbara and Susanne usually referred to it as such. I do not find the term fully appropriate as in my understanding, improvisation should allow musicians to change musical direction spontaneously and without any predetermined restrictions, which is something that

<sup>8</sup> I am aware that the term improvisation can be applied in different contexts and for the description of different degrees of flexibility. My personal understanding of improvisation was shaped by my experience as co-curator of the weekly improvisation series Kraakgeluiden in Amsterdam between 2001 and 2006, where improvisation was practiced without any preconceived constraints. When I use the term improvisation, this is usually the form of musical practice to which I refer.

<sup>9</sup> Orig.: „Niemand hat ein identes Sprachverständnis und schon gar nicht verknüpft mit etwas so Subjektivem wie Musikmachen.“

would be very problematic in this particular piece.<sup>8</sup> Furthermore, my main point of orientation for offering the musicians a certain degree of autonomy and a space of possibility was mainly inspired by game designs. In games, players typically are able to act spontaneously within certain boundaries. It would be odd, however, to refer to playing a game as ‘improvising,’ despite the agency granted to the players.

As I mentioned before, the verbal description of playing instructions that was displayed on the tablets resulted from our collaboration during the rehearsal process. During the rehearsals, we meticulously went from section to section and searched for musically plausible solutions and the best description for them.

## WORDS

/LÜNEBURG/ It was a challenge to find the right wording for these comments. We needed a common language that both Susanne and I would understand and be comfortable with. As the specialists we have become over the years—in historical performance and in contemporary music practice respectively—we not only express music and emotions differently, but also use different wordings to describe our artistic intentions and approach to music. This was reinforced by our individual artistic personalities. Words mean something else to us, or, as Susanne stated: “Nobody has an identical understanding of language, and especially not if it is linked to something as subjective as musical practice” (Scholz 2019).<sup>9</sup>

How we treat our instrument, form a tone, improvise and transcode information into musical and performative meaning is deeply shaped by our musical practices. A certain word in the dialogs of *Anna & Marie* might evoke an affect and a musical gesture in Susanne that comes from the vocabulary of baroque music and makes sense to her, but maybe not to me. Another word might evoke a sonic reaction in me that derives from the vocabulary of contemporary art music or sound design, which in turn does not make any sense to her. What has congruity for one of us might not make any sense to the other—neither musically, nor emotionally, nor as a general instruction for playing. This took us very much by surprise.

In our comments, we tried to find terms that would prompt a performative action in the concert, and that we could transpose into musical language and meaning. We failed repeatedly. Before we could even start to make music together, we first had to work out what was going wrong and why we did not understand one another. When we finally realized that we were each communicating in our very own way, and that these ways of communicating were not necessarily

compatible because of our different backgrounds, we were able to start looking for something else that we had in common and that would help to make the process meaningful for both of us. Figuring this out was one of the artistically most challenging aspects of the rehearsal process for *Anna & Marie*.

## DEVELOPING THE VIOLIN PARTS

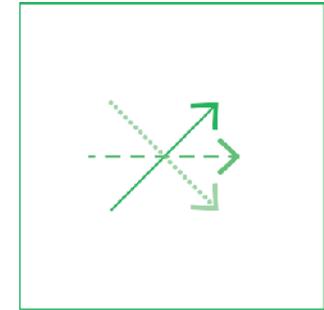
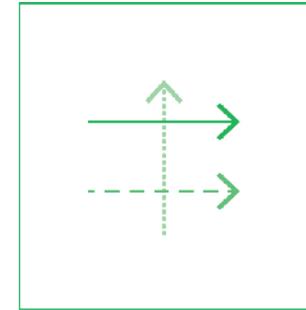
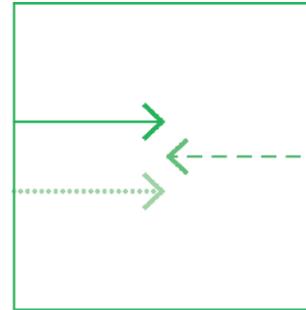
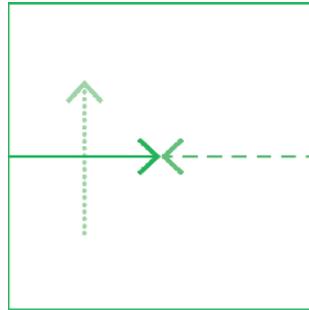
/CICILIANI/ For the violin parts, we needed to explore and negotiate the players’ agency within the given space of possibility defined by the musical and narrative material and the constraints communicated through the tablets. We started this complex process by breaking it up into individual steps and following a different point of orientation in each iteration.

Firstly, we concentrated on the electronic texture, which was already composed. Although the electronics are generative, they are consistent enough to provide an aesthetic direction and a musical context with which to work. Hence, we started by listening to these textures, analyzing the musical elements contained in them and discussing how the violin parts could relate to them. Secondly, the development of the story served as a further point of orientation. Although we never sought to achieve a literal translation of the events in the narrative, we did take the dramatic development and the protagonists’ psychological state into account for our musical decision making. I suggested a third angle for the development of the instrumental parts, namely to follow the spoken dialogs where the rhythm of speech might serve as an incentive for the instrumental part. However, this proved to be ineffective and did not help us to create meaningful musical interpretations.

I provided yet another point of orientation by displaying symbols on the tablets, indicating what sort of chamber-music relationship should characterize a particular section. Here, I used colored arrows in order to differentiate the roles of three musical partners, the two violinists and myself as the operator of live electronics. The relation of the arrows to each other indicates whether the three musicians should, for example, adopt contrary or complementary musical roles in relation to one another [Fig. 5]. In the rehearsal process, however, the symbols turned out to be too abstract and were not helpful.

In a more traditional situation, my role as composer would have been to take the role of decision-maker by choosing the sounds and playing techniques that are meaningful in a particular context. However, I invited these two players to participate in my project not only for the sake of the instrument they play—baroque and

Fig. 5  
The symbols indicating a chamber-music situation between the three players. The way the arrows are positioned describes whether the musicians should relate to each other in complementary fashion (parallel lines), in contrary contesting ways (arrows pointing at each other), or whether the parts should evolve without reference to the playing of the other musicians (arrows pointing in different directions).



electronic violin—but also because of the two rich and specific music-cultural backgrounds they contributed to the work. I was hoping for a situation to emerge in which both could bring in their personal style to the piece—similarly to the French and Italian accents of the amateur speakers who recorded the dialogs of the narrative.

### ADDING OUR VOICE

/LÜNEBURG/ The performative version of this piece depends to a significant extent on the improvisation of the two violinists. Baroque musicians are well versed in improvising and the same applies to contemporary music performers, but each of us improvises in a completely different way, adopting a style that fits our own special practice. Thus we had to find a way of improvising that does justice to both our worlds and still fits the piece. Then again, *Anna & Marie* already provides an abundance of material. There is the electronic sonic world, the visual experience, the historical component, the narrative, and the generative electronics. As Susanne remarked: “The work as a whole already has a *gestalt* before we even start doing anything, and this produces a certain focus, putting what else we can do into perspective” (Scholz 2019).<sup>10</sup> Indeed, the installation version of *Anna & Marie* can exist very well without us. The concert version, however, cannot. We are the ones who initiate the performance and keep it running. Without our playing, the development comes to a

<sup>10</sup> Orig.: „Das Ganze hat schon eine Gesamtgestalt, noch bevor wir überhaupt anfangen, irgendetwas zu tun, und das ergibt eine gewisse Art von Gewichtung und relativiert, was wir dann noch tun können“.

standstill. There are no more movements on the main screens, lakes do not vanish, organs do not appear, anatomy books are not revealed. There is no narrative, much less a decision about which strand of the story to follow. The generative music does not come into being unless our input triggers it, nor do the lights flicker. The environment we bring to life is extremely rich and multifaceted, and once we start it, finding our place in it certainly is a challenge. Our goal therefore has to be to find ways to connect these multiple worlds meaningfully, to be embedded in the sonic and visual environment, and add our own voice from there. Musically speaking, it was important not to understand ourselves as soloists supported and carried by the sonic surroundings, but to become an integral part of the whole.

/CICILIANI/ During the first set of rehearsals, we looked section by section for suitable musical material to be played by the two violinists. However, I became increasingly pessimistic that this approach would lead to a musically meaningful result. The way that both of the violinists, who each came from such different professional backgrounds, related to a given musical situation was just too different. The results often sounded like a compromise and the music felt stiff and contrived. After the second rehearsal it occurred to me that there was only one section in which I had the feeling that it ‘worked’ and the music suddenly started to flow. I realized that here we were not focusing as much on selecting and describing specific musical material, instead concentrating on how the two musicians related to each other. This encouraged me to start the rehearsal process all over

again and focus on how Barbara and Susanne could play together in a meaningful way. This was a crucial change of emphasis that immediately produced more convincing results. The chamber-music relationship between the two players turned out to be the most important criterion in finding a musically compelling situation. Once this had been established, we were also able to take decisions on the use of specific musical material, but the musical relationship between the players remained the backbone of each section. Chamber music is central to both their musical practices, regardless of the context in which they perform, and here it formed the common denominator.

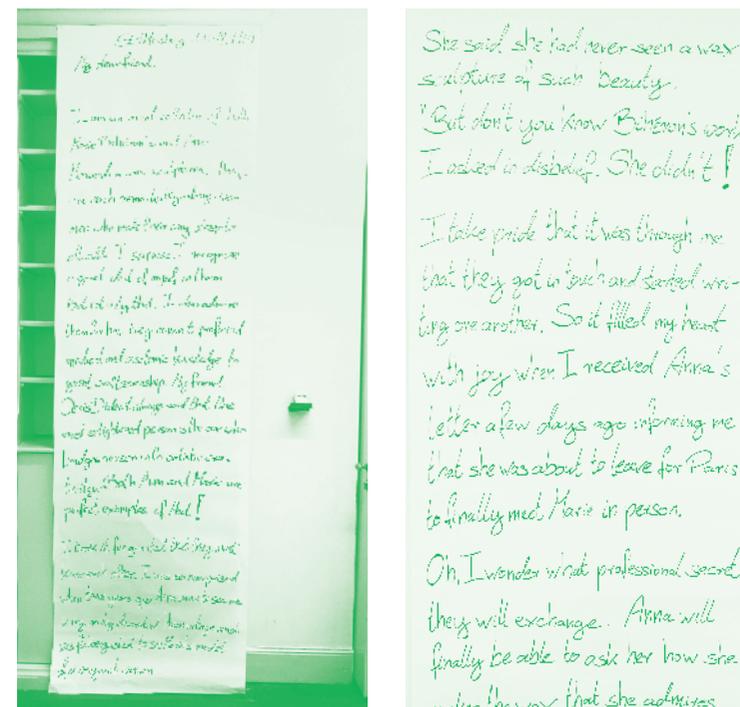
### ERGODIC STORYTELLING

/CICILIANI/ How has ergodic storytelling been implemented in the performances of *Anna & Marie* and what form does the variable narrative take? As mentioned above, according to historical sources Anna Morandi and Marie Bihéron never met. However, Catherine the Great among others showed an interest in both artists' work, which she also collected. In my counterfactual story, it is thus Catherine the Great—or rather Catherine II, she only became Empress of Russia in 1760, while my story takes place in 1754—who establishes the contact between the two. As I tell it, Anna Morandi goes to visit Catherine II in Saint Petersburg in 1751. In Catherine's art collection in the Hermitage, she sees a work by Marie Bihéron and is deeply impressed by it. While still in Saint Petersburg, Anna writes a first letter to Marie and soon they become avid pen pals. Three years later, Anna eventually decides to visit Marie in Paris to meet her in person for the first time.

This part of the story precedes the narrative that unfolds during the performance. It is presented as a fictitious letter by Catherine II, which serves as an introduction to and information about the background story. In Donaueschingen, this letter was written on two huge sheets of paper. They flanked the entrance through which the audience entered the performance space [Fig. 6].

The actual story that is told during the performances of *Anna & Marie* takes place in Paris during Anna's visit. The narrative revolves around the choice of compounds for the wax they use to create their anatomical models. Since Anna deeply admires the quality of the wax used in Marie's works, she asks her about its ingredients. The entire story is thus based on the exchange of professional advice and secrets. When Anna asks Marie to share a professional secret that is of special value to her, she puts her in a dilemma. In the narrative, Anna's question leads to the first so-called junction point in the story, from where the narrative can develop in three different ways:

Fig. 6  
Image of the paper strips  
showing Catherine II's fictitious letter presenting  
the background story of how Anna and Marie get in touch  
with one another.



1. Marie entrusts her secret to Anna but explicitly demands that she not share it with anybody else: she uses beeswax from a particular region in France where the bees primarily harvest pollen from sage. This creates the special wax quality she looks for in her practice.
2. Marie does not want to share her secret with Anna but feels embarrassed to admit this. Accordingly, she lies and invents a fictitious wax recipe, pretending that she adds pumpkin oil to her wax melange to give it its particular quality.
3. Marie refuses to share her secret. She openly tells Anna that she does not feel at ease revealing it, despite her friendly feelings for her.

Each of these different story lines leads to additional junction points. To give an example, in the first narrative strand, in which Marie reveals her secret to Anna, the next junction point revolves around the question of how Anna treats the secret entrusted to her. Does she only use it in her own work, as she promised Marie? Or does she use it to negotiate a deal with her greatest competitor back home in Bologna, Ercole Lelli? Lelli is an inferior artist to Anna, but holds powerful positions that he uses to prevent Anna's admittance to the Accademia delle Scienze, for example. In this version of the story, Anna offers to reveal Marie's secret to Lelli if he agrees to promote her in return. Altogether, the story can lead to forty-six versions with eight different endings. The endings differ from each other quite drastically. Some narratives end in intimate friendships,

11  
One special quality of bone-conduction headphones is that they do not cover the ears. They were used so that the musicians could still hear the sound in the space unrestrictedly while following the dialogs.

while several others lead to dramatic fallouts between the two protagonists.

As mentioned above, the story is told through dialogs between Anna and Marie, which the audience can opt to listen to via earpieces. The performers, on the other hand, wear bone-conduction headphones through which they follow the dialogs continuously.<sup>11</sup> Although the dialogs as a whole were prerecorded, each single phrase still has to be triggered by the musicians. Barbara Lüneburg triggers Anna's part, whereas Susanne Scholz triggers Marie's sentences. If the musicians stopped playing, the dialogs would not continue. The progress of the story is directly dependent upon the playing of the violinists.

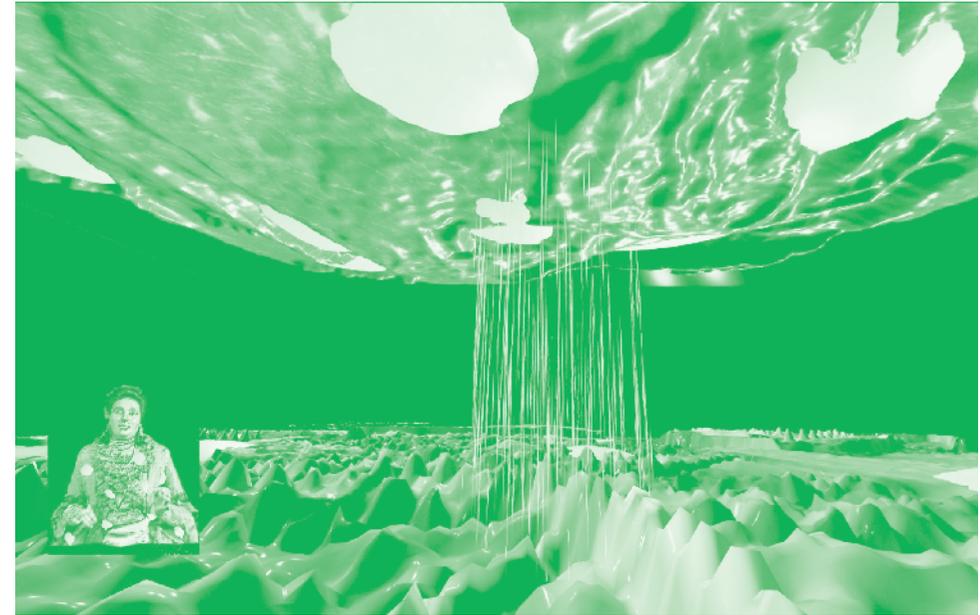
### LISTENING IN

/LÜNEBURG/ The audience experiences a performance of *Anna & Marie* first and foremost as an audiovisual multimedia artwork without text, unless a person consciously decides to listen in. We performers experience the situation differently. For us it is important and necessary to constantly track the dialog of our protagonists via headphones and on our tablets. Hence, whereas the audience can afford to engage with the narrative playfully, heed the invitation and peek in for a bit, reject the offer and refuse to listen in, or stick to it for the entire time, our way of following the dialog needs to be intentional and refer to the shaping of the musical atmosphere and overall artwork.

We can follow the dialog in printed form and keep track of the actual content of the passages on the screens (cf. the chapter “The Real-Time Score of *Anna & Marie*: Ergodic and Emergent Qualities” by Pirchner). The segments of every scene are numbered consecutively, and at each point we know where we are within the overall conversation. Whenever a new text segment is triggered, we receive an indication such as [15/30], meaning that the fifteenth segment of the conversation is running in a narrative strand that consists of thirty text segments in total. This is significant, since in musical terms it makes a difference whether we are still at the beginning, already in the middle or right before the end of a section. We know we either have plenty of time to musically develop a scene's emotional setting, or we might want to round off the section and not introduce yet another musical idea.

Besides the written dialog that appears on our tablets, we listen to the conversation via our headphones. This is important, since we have to trigger the sentences of the person we represent. It also enables us to regulate the flow of the conversation: for instance, we might want to create pauses by triggering the next sentence with a delay,

Fig. 7  
The garland-like object that occurs at junction points in the 3D environment of the player who has to decide how the story will progress.



or emphasize meaning through the way we musically introduce a certain phrase. Listening to the dialogs also means that we have to take decisions concerning the way we deal with the content of the narration. The text is very concrete. Coming from historical performance practice, Susanne likes to musically underline the meaning of individual words, whereas I prefer to emotionally color a passage or set the atmosphere of the scene as a whole. Interpreting the meaning of the text too literally felt confining to me in my attempt to create music that stands in relation to the narrative but still has its own validity.

/CICILIANI/ Once a unit of the story comes to a junction point, one of the two performers has to decide how the story will continue. Junction points are represented audiovisually in the following way: a harmonic change occurs in the musical texture while the activity of other sonic events is reduced. Visually, a garland-like, scintillating three-dimensional object appears in front of the player, who then has to decide on the subsequent development of the narrative [Fig. 7]. The performer chooses the story's progress by passing this object either on its left side, on its right side, or by walking straight through it. Each direction causes the narrative to unfold in a different way. Choosing the left path always has a pacifying or consolidating effect in the storyline, while choosing the right path provokes conflict or confrontation. If a third option is available, which is not the case at all junction points, taking the middle path leads to a more neutral effect on the development of the story. Walking to the left or

right of the junction point requires the performers to change from standard to navigation mode, which results in a prominent change in the music.

### EVENT-DRIVEN FORM

/CICILIANI/ The entanglement of the performer's actions with the musical, visual, and narrative development of the story provides them with a direct form of agency. There are four ways in which their playing is linked with specific events that have direct consequences for the form and structure of the performance.

1. The phrases of the dialogs are directly triggered by the playing of the violinists.
2. When navigating through the environment, a change in direction entails various audio cues.
3. When the character of a violinist in the 3D environment enters a wax lake, a musical sequence is triggered, the avatar begins to fly, and the terrain is shown from a bird's eye perspective.
4. When a junction point is reached, the musicians choose the way the story continues by navigating past or through the garland-like object.

The flexible arrangement of the instrumental parts forms a precondition for the open musical form and enables decision-making. I therefore refer to this formal design as “event-driven form.”

The musicians not only control the progress of the story, they choose how to visually navigate through the environment, which activates integrated audio cues whenever they change direction; they insert interruptions to the musical flow when triggering a lake sequence; and they choose the overall musical development and atmosphere by selecting a particular storyline. Both musically and visually, these events offer structural points of orientation. Although each lake sequence sounds and looks different and so does each junction point, they nevertheless can be recognized easily as variations of the same sort of event.

### THE PERFORMER AS CINEMATOGRAPHER

/LÜNEBURG/ Another role we performers take on is that of a cinematographer. We navigate the environment from a first-person perspective, meaning that whatever we see, the audience will too. Their visual experience of our 3D environments depends on our actions. Whether crawling or running across the landscape, struggling with a hill, turning around slowly or spinning madly, circumventing

objects, jumping into a lake, falling off the island, or flying across our world, we take the audience along with us, providing the lens through which we all observe whatever comes to pass. However, if we stop moving while looking towards the black horizon, the image we offer spectators lacks interest and information. Accordingly, part of our task is to consciously alter our perspectives and shape the visual experience: for instance, we need to carefully consider which direction to take next so that the visitors can enjoy the arrangement of the embryos across the landscape; take in the detail of a hovering organ; or gain an overview of what the whole environment looks like when we fly across it. In *Anna & Marie*, the role of the musicians is expanded: we are narrators, cinematographers, explorers, and musical improvisers all at the same time.

### THE INSTALLATION AND THE AUGMENTED REALITY EXPERIENCE

/CICILIANI/ The sound of the installation version of *Anna & Marie* consists of granular textures that are created generatively. Hence there are never any identical repetitions, but also no larger developments. Each instantiation of the installation comes with one of eight possible sonic textures, each of which is associated with one of the eight possible endings to the story. In other words, the musicians' choice of how to navigate through the ergodic narrative not only shapes the musical result of the performance, but also determines the sound material of the following version of the installation. Each concert version leads seamlessly to the texture that keeps playing during the installation part, all until the next performance starts. I consider the installation the vestige of the most recent concert, through which some of the performance can be retraced. How do these remnants manifest?

Most concretely, the complete dialog generated during the most recent performance keeps playing in a loop on the earpieces, so the audience can listen back to it. During the concert, most audience members will not have followed the narrative from beginning to end. This is due both to the density of sonic, performative, and visual events and to the fact that there are fewer earpieces than audience members. The installation therefore offers an opportunity to hear the storyline without interruptions and within a calmer situation. Additionally, the 3D environments on the two projection screens that originally were associated with the two violinists are now available for the audience to explore. While the violinists moved through the 3D environment by virtue of their playing, in the installation version, audience members can do the same with the help of gamepads, similarly to a computer game. As they do so, fragments of recordings of the violin parts from the most recent performance become audible.

The augmented reality feature forms another prominent part of the installation that can be experienced via special tablets made available to the visitors. By pointing these tablets at one of the nine panels (these are described in the subchapter “Spatial Arrangement and Light Design”), 3D objects of organs or embryos become visible that seem to grow out of the image of the panel. In addition, sounds arise from the tablets and can be manipulated by turning and tilting the tablets. As often several audience members use the augmented reality feature at the same time, it was necessary to design the sounds to complement one another. At the same time, these sounds extend the granulated sound texture emanating from the main sound system.

Furthermore, if the tablet is pointed at the panel for more than ten seconds, a text appears behind the virtual 3D object, revealing factual information about the lives of Morandi or Bihéron. The information refers to the personal circumstances of the two women, their profession, and the cultural background of their time. Since the text appears behind the augmented reality object, the latter often hinders the reading of the text. The users will only see the entire text if they keep changing the angle and direction of the tablet to peek behind the object. I included this obstruction deliberately, on the one hand because I want the audience members to engage more actively with the augmented reality experience, and on the other hand to make it easier for them to discover that the tablet’s position also affects the sound that is played back. Without the obstruction, the tablet users would have no reason to change the position of the tablet, and hence it would be very unlikely that they would discover the interactive sound functionality.

To summarize, my intention was for the audience to encounter the installation as an environment that they can experience in multiple ways: through navigating the 3D environment; by experiencing the augmented reality feature; or by listening to the dialogs between Anna and Marie on the earpieces. I wanted the audience to be aware of the interactive options available, but considered it equally legitimate if they just lay down on one of the bean bags and enjoyed the sonic environment and overall atmosphere.

### THE HARMONIC SYSTEM

/CICILIANI/ Throughout the entire project, I employ a particular tuning system that is used by the violinists and is also applied to all sound synthesis. It is based on the harmonic ratios  $3/2$ —a perfect fifth—and  $7/4$ —a diminished minor seventh. The system builds on the open strings of the violins, which are tuned in pure intonation. When the fifth, an interval of 702 Cents (C), is divided by 3, an enlarged whole tone of 234C results. This interval is almost equal to the  $8/7$

ratio (231C). The complementary interval of  $8/7$  is  $7/4$ , which is the equivalent of 969C and therefore 31C smaller than an equally tempered minor seventh. While minor sevenths are traditionally treated as dissonances, the  $7/4$  ratio sounds very consonant due to its simple numeric ratio. It is an interval I am particularly fond of, and therefore I liked the fact that the enlarged whole tone I derived from the division of the perfect fifth almost exactly matched the  $8/7$  ratio. I divided this enlarged whole tone once more and based the tuning system on a chromatic scale, in which each half tone measures 117C.

One particular characteristic of this tuning is that it is not equivalent to an octave. 10 half tones result in 1170C—30C short of an octave, whereas 11 half tones overshoot the octave to 1287C. On the other hand, the scale is fifth-equivalent, since 3 whole tones or 6 half tones add up to a perfect fifth of 702C. This has an important practical aspect for the violinists, since they can keep the same finger positions across all strings. Besides using this whole-tone scale and chromatic scale, I derived additional modal scales based on repetitively ordered successions of half (HT) and whole tones (WT):

1. WT-HT-WT-HT...
2. HT-WT-HT-WT... (a transposition of 1.)
3. WT-HT-HT-WT-HT-TH...
4. HT-HT-WT-HT-HT-WT... (a transposition of 3.)

I then assigned specially selected scales to the different sections of the composition. These scales were used consistently by the violinists and in the electronics, thus giving each section its own particular coloration.

### A SIMPLE SOLUTION FOR A COMPLEX SYSTEM

/LÜNEBURG/ To Susanne, the tonal system was of special interest, since in her professional practice she deals with alternative tuning systems on an almost daily basis. “In early music there are hundreds of different tuning systems, so I found this one really interesting. Each tuning system has its own *gestalt*. This is very important! Every accidental provokes something in me in terms of intonation. My half-tone steps in principle are never evenly fanned out, they are irregular. And when I see an accidental—a sharp or a flat—that triggers something in me. ... However, I suddenly realized that in this system, we are dealing with equal distances between the tone steps” (Scholz 2019).<sup>12</sup> This experience went against all her habits of reading and playing notes, and at first she struggled with it. In the end she found a simple but ingenious mechanical solution for this complex tuning system by developing frets for her instrument [Fig. 8]. “Usually fretted instruments are driven crazy by tuning systems with unequal

12  
 Orig.: „In der Alten Musik gibt es ja hundert verschiedene Stimmungsarten, deswegen fand ich das super interessant. Jede Tonart hat eine andere Gestalt für mich. Das ist ganz wichtig! Ein Vorzeichen macht mit mir was und zwar auch in Bezug auf Intonation. Meine Halbtöne sind prinzipiell nicht gleichmäßig aufgefächert, sondern sind ungleichmäßig. Und wenn ich ein Vorzeichen sehe – ein ‚Kreuz‘ oder ‚B‘ – dann triggert das etwas in mir. ... Aber irgendwann fiel mir auf, dass dieses Tonssystem ja genau gleiche Abstände hat.“

Fig. 8  
Susanne Scholz's baroque violin, endowed with frets.

13  
Orig.: „Das bringt Bundinstrumente normalerweise zur Raserei, weil sie Tonsysteme mit ungleichen Tonschritten nie gut abbilden können. Jetzt haben wir hier aber lauter gleiche Abstände. Das ist ja perfekt für Bünde. Also habe ich mir Bünde auf die Geige montiert. Und ehrlich gesagt, das war eine unglaubliche Erleichterung, denn allein diese Töne zu lesen und auf der Geige richtig abzubilden, und gleichzeitig alle anderen Entscheidungsebenen zu bedienen, das hat mich zu Anfang sehr gestresst. Und so habe ich das einfach auführungspraktisch gelöst.“

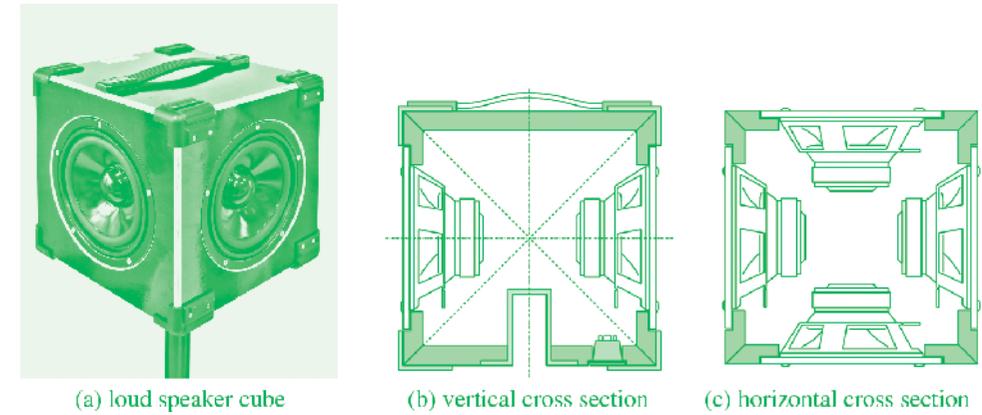
tone steps, because they can never represent them adequately. But here, we have all these equal distances between the notes. That is perfect for frets. So I mounted frets on my violin. And honestly, this was such a relief, since reading all these [microtonal] notes and playing them perfectly on my violin, and at the same time dealing with all the other levels of decision making, well, at the beginning this stressed me out. So, I found a simple solution based on performance practice” (Scholz 2019).<sup>13</sup>

## THE SYNTHESIS

/CICILIANI/ The generative sound synthesis for the most part is based on a variation of wavetable synthesis. The main part of the synthesis predominantly generates sustained sounds. The wavetable synthesis uses small snippets of sound taken from a selection of recordings, which are:

1. Voice samples from the dialogs.
2. Samples from the violin sounds.
3. Environmental recordings.
4. Baroque music from Bologna by Giuseppe Torelli (1658–1709) and Paris by Jean-Philippe Rameau (1683–1764).

The snippet that is used for the wavetable synthesis constantly shifts through the selected recording. This can lead to sounds that are

Fig. 9  
Design of a loudspeaker cube: prototype, and vertical and horizontal cross-section plots.

synthetic in character with slow timbral fluctuations, or to strongly modulated, possibly even distorted and noisy sounds. If the shift value lines up with the size of the snippet used by the wavetable synthesis, the original unaltered recording emerges. Altogether, this synthesis method makes it possible to move gradually between purely synthetic sounds and unaltered concrete sounds via harsh digital distortions. A second component of the sound synthesis consists of two different pattern generators, for which percussive sounds based on the same wavetable synthesis method are used.

## AUDIO SETUP

/CICILIANI/ In *Anna & Marie* I use a total of seven loudspeakers. Three of these are cube speakers, while the other four are standard speakers. There is an independently driven subwoofer for the lowest frequency range. The regular speakers flank the projection screens on the left and right. They are used to amplify the violins among other things.

The cube speakers are custom built and were designed and developed by Franz Zotter at the Institute of Electronic Music and Acoustics (IEM) of the University of Music and Performing Arts Graz. On the horizontal plane, they come with an independently driven membrane on each of their four sides [Fig. 9]. Hence, the seven speakers combined—four standard speakers and three cube

speakers with four channels each—offer a total of sixteen audio channels.

I use the cube speakers to differentiate direct and diffused signals. Firstly, I put all percussive synthetic sounds on the four standard speakers and those membranes of the cube speakers that are directed towards the center of the space. In total, seven loudspeaker membranes are thus pointing and projecting towards the center of the room where the audience is seated. Secondly, all sustained synthetic sounds are randomly distributed across three membranes of the cube speakers that are not facing towards the center. Since these nine membranes are directed at the sides or the wall behind the cube speakers, various reflections occur before the sound encounters the listeners' ears. This creates spatial depth and sonic transparency: the sustained synthetic sounds are projected indirectly, while the percussive sounds and the violins are transmitted directly to the audience.

When moving through the space, the indirect reflections deliver constantly changing spatial impressions and amplitude relations between the different sound layers. Within an installation setup in which the audience moves freely through the space, I find it important that the change of position also affects the perception of sound. Although those changes are subtle, in my opinion the indirect sound projection qualitatively adds to the explorative character of the setup. When exploring the space, the audience is rewarded with ever-new visual and auditive impressions of the overall situation.

## SUMMARY

/CICILIANI/ The performance part consists of different components that are all directly related to the development of the story: two violin parts, sixteen generative synthesis audio channels, a narrative told as dialogs on headphone earpieces, two projected 3D environments responding to the actions of the violinists, and a light design with moving light effects. Some audience members described the experience of the performance part as rich, multifaceted, overabundant, or even as sensory overload. The installation is calmer and more contemplative in comparison. While the performances might feel somewhat overwhelming, the installation invites the audience to experience the setting in a more explorative fashion.

I do not expect the audience members to experience each individual facet of the work in either setting. In fact, I imagine that every person will collect fragments of what is taking place. My hope is, however, that these fragments together will form a consistent unity despite the

partly disparate elements. As a result, each person will inevitably experience *Anna & Marie* differently. This is true for every work of art, of course, but in this case this aspect is inherent in the basic conception of the entire project. It is therefore my intention that every person piece together their own mosaic of impressions. Although there is a linear story that underlies the project, I do not expect the work as a whole to be experienced in a linear way, but in splinters, fragments, and fleeting or disrupted impressions.

## TRAVERSING THE WORLD OF ANNA & MARIE

/LÜNEBURG/ In his book *Writing in the Dark*, philosopher Max van Manen tries to phenomenologically grasp the experience of traversing worlds when engaging in creative work, in his case writing or reading texts. He states: “A peculiar change takes place in the person who starts to write ... the self retreats or steps back as it were, without completely stepping out of its social, historical, biographic being” (van Manen 2016, p. 3). I found this sentence inspirational when thinking about our lived experience of entering the world of *Anna & Marie*, and thinking about how this experience related to our biographical and social being. How did the compositional, visual, and narrative material, the agencies offered, and the environment we ‘lived in’ appear to us? How was the structure of our experience and our engagement with the artwork informed by our prior professional—historically informed or contemporary music—practice? And how did we relate these experiences to our audience?

16  
Orig.: „Man lenkt  
etwas mit der  
Freiheit, und  
man bezieht sich  
gleichzeitig auf  
jemand anderes, aber  
nicht auf eine Person,  
die tatsächlich da  
ist, sondern auf eine  
automatisch generierte  
elektronische Musik,  
von der man nicht  
einmal vorhersehen  
kann, wo sie dich  
hinführt. Und  
gleichzeitig gibt  
es optisch noch  
wahnsinnig viele  
Eindrücke. Also  
es sind wirklich  
alle Sinne voll  
ausgereizt....  
Unglaubliche  
Hirngymnastik.“

15  
„Und  
Freiräume:  
Ich habe in  
meinem Leben  
noch nie so  
viele auf so  
vielen Ebenen  
gehabt! ...  
Differenzierte  
Freiheit.“  
(Scholz 2019)

14  
„Es ist  
eindeutig ein  
Gesamtkunstwerk,  
das viele der  
Möglichkeiten  
ausschöpft, die  
die elektronische  
Welt zu bieten  
hat, und da  
gehört das  
Spielen auch  
dazu. Spannend!  
Super!“  
(Scholz 2019)

Susanne considers *Anna & Marie* a *Gesamtkunstwerk* that exploits the potential of electronic music. In her words, the work includes ‘gaming,’ and with that comes fun and playfulness.<sup>14</sup> She experiences the work as a space that offers scope for development, a space of differentiated freedom on many levels.<sup>15</sup> However, this freedom comes with enormous challenges and almost overloads the senses: “You steer something with this freedom; and you concurrently relate to somebody else, not to a person who is really there, but rather to an automatically generated music, and you never know where this music will lead you; and on top of that there are loads of visual impressions. Really, the senses are totally maxed out. ... An unbelievable workout for the brain” (Scholz 2019).<sup>16</sup> Susanne deals with comparable unusual demands all the time in her daily professional practice: new tuning systems, the spontaneous deciphering and transposing of unfamiliar keys, instruments that need to be played in unusual ways, and consequently not knowing how to hold them and where to put her fingers. She finds excessive demands

17  
 „Das macht unglaublich  
 Spaß. Ich spiele  
 irgendein Instrument,  
 das anders gestimmt ist,  
 als ich gewohnt bin, lese  
 einen anderen Schlüssel,  
 und dann transponiere  
 ich es noch,  
 und halte das Ding so,  
 dass ich eigentlich  
 gar nicht weiß, wo  
 und wie ich greifen  
 soll. Vergleichbare  
 Überforderungen finde  
 ich eigentlich ganz  
 spannend.“  
 (Scholz 2019)

quite fascinating *per se*.<sup>17</sup> However, she also felt that the computer system of *Anna & Marie* was immovable and relentless, impossible to negotiate with. Goals are set and cannot be circumvented or redefined as they can be when dealing with human beings. I, on the other hand, have worked in the world of multimedia for many years. I am used to the multiplicity of impressions that come with the use of multimedia, and to the relative inflexibility of a computer system. Thus my focus was less on exploring the many levels of freedom the work offers and the boundaries the system imposed on me and more on guiding the audience into the world of *Anna & Marie* and sharing my fascination with its images, sounds, story, and setting. My personal challenge is not knowing how the audience will experience the multitude of information that surrounds them. Will they contentedly immerse themselves in it? Will they follow individual threads and ignore others? Or will they feel engulfed and overwhelmed? How can I help them to find a way into and through it by acting as a cinematographer, musician, and storyteller, or through my body language?

In her early music practice, Susanne is deeply rooted in the ‘person to person’ relationship. Originally, I too learned a classical-music approach that likewise is based on the interpersonal relationship. We both care deeply about how we relate to our audience. Thus it made sense that it was the chamber-music approach through which we could meet most easily in *Anna & Marie*. Chamber music is built on the principle of negotiating person to person. It is expressed in the body language of the performers, something the audience can easily follow. It structures the music-making and is embedded in the overall context. The more we know about the way *Anna & Marie* works, the more we know about the behavior of the electronics and our interaction with it and the agencies the piece offers, the better we are able to navigate the environment, improvise and play together, and the more satisfying it is both for us to do so and for the audience to watch.

/CICILIANI/ At the beginning of this chapter, I described why I found the lives and work of Anna Morandi and Marie Bihéron so fascinating that I decided to base this elaborate project on them. To conclude, I would like to outline once again what this choice of subject seeks to convey. I will address three aspects I consider of special relevance.

Morandi and Bihéron lived during the High Enlightenment (Peters 2019, p. 886). Although historians and scholars have criticized the period of the Enlightenment on various occasions, it is often described as the era that gave Western culture its particular identity. As Brian Duignan, senior editor in philosophy at Britannica, states:

“[I]deas concerning God, reason, nature, and humanity were synthesized into a worldview that ... instigated revolutionary developments in art, philosophy, and politics. ... The goals of rational humanity were considered to be knowledge, freedom, and happiness” (Duignan 2019). Morandi and Bihéron were not only contemporaries of the Enlightenment, but also practitioners of some of its central ideas. They followed a rigorous methodological approach to science that was based on verifiable investigation. At the same time, they went beyond the discipline of medicine by turning it into an artistic practice. Quintessential ideas of the Enlightenment, such as modern science, education, and a valorization of art, were thus all embodied in their work and life.

The period of the Enlightenment contrasts strongly with the new dark age that we—in my opinion—entered several years ago, in which various forms of populism have led to an erosion of notions of freedom and knowledge. This has gone so far that the term “post-truth” was selected as the Oxford Dictionaries’ 2016 “Word of the Year” (Oxford University Press 2016). Public opinion increasingly is dominated by debates that try to evoke particular emotional responses rather than convince through plausible argumentation. This clearly betrays the most basic principles of “rational humanity” as stated above. With *Anna & Marie*, I want to draw attention to a precious cultural heritage—personified by Morandi and Bihéron—that I consider under threat.

What also fascinates me about the Enlightenment is that the transition to a modern form of science took place gradually. In medicine in particular, it was a long process before pageantry and alchemistic approaches to healing were replaced by more modern medical findings. One might even argue that this process has not yet come to completion. I refer to this in some versions of the ergodic storytelling in which I emphasize Bihéron’s family, who were apothecaries. In my counterfactual free interpretation, Bihéron inherited a knowledge of traditional healing methods through her family, thus making her an expert in alchemistic practices as well as in modern medicine. By placing modern and traditional medicine side by side, I wished to hint at how complex the struggle to find the truth can be when different and partly contradictory concepts of reality and indeed truth itself are involved. In my personal understanding, this is a ubiquitous struggle that may be the very core of human nature.

A third aspect that drove me is that of gender. Both Morandi and Bihéron managed to survive professionally in a field that not only was dominated by men, but where the institutions they depended on—most notably universities and the Church—manifested power structures that for centuries lay exclusively in the hands of men. Morandi and Bihéron are thus rare feminist role models who prevailed under

these unfavorable circumstances. For me personally, feminism is important not only for reasons of equality between genders. I find it generally valuable as a rigorous approach to sociological analysis, uncovering gender-based roles and behaviors as well as social power structures. In the process of composing *Anna & Marie* I started to question techniques of composition as forms of gendered behavior, in the sense of how technofeminism unveils gendered practices in many cultural artefacts (Wajcman 2004). Composition techniques usually pursue the goal of finding methods to introduce some order into musical material and thus make it controllable. I asked myself: are patterns of gendered behavior inscribed into such processes and techniques? As a consequence of these deliberations, I attempted to conceive alternatives to common approaches to composition. I only started to scratch the surface of this complex issue, and a discussion of it would far exceed the scope of this article. It is nevertheless a question that arose through my work on *Anna & Marie* and remained present throughout the course of developing the work. For me, this particular issue has definitely not yet been resolved, and will remain an important concern in my works to come.

### THE VOICE OF A VISITOR

Last Saturday, William and I really enjoyed the premiere of *Anna & Marie*, a new multimedia work for two violinists (one playing electric violin and one baroque violin) surrounded by video and sound by composer Marko Ciciliani. ... The work is about two women pioneers of anatomy in the 18th century: Marie Marguerite Bihéron and Anna Morandi. The piece also functions as an immersive installation.

There were two large video projections on opposite ends of the room with anatomical imagery that visitors could control with a game console. The room had numerous specially built cube speakers with horns on all four [horizontal] sides. A rich fabric of pointillist sound was created that moved all about the room. On seating cushions on the floor there were several computer tablets. One could focus them on several smaller ... screens around the room that had static images. Once focused, the tablets recognized the static images and came to life with moving images and text. There were also many wireless headphones lying on the cushions through which one could hear a dialog between the two women anatomists as imag[in]ed by Marko. The text was excellent, as was the music and Klangkunst.

No two versions of the performance are the same, since the composition can be structured in various ways at the moment which alters the story about the two women anatomists. The two violinists, positioned quite a way apart in the room, read from tablet

computers and reacted to the ever-changing story for each performance. ...

The work was enormously complex due to all the computer code that had to be written, the music, and the refined text based on the lives [of] the two women from the 18th century which were excellently recorded. It took a year and a half to complete (Conant 2019).

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