

Technology Assisted Audiation in New Composing Practice

Abstract. Technology assisted audiation is a composing practice that offers deep insight into the unexplored sound territories, gives more control over manipulation of the material, and potentially opens doors to new and unexpected options in the creative process. This paper presents an overview and brief analysis of the composing practices open to technology assisted audiation that were involved in the making of several contemporary works for live performances by musicians or audience. The main focus of this research is works that are not written for electronics or fixed media, but intended to be performed by live human factor.

The development of sound recording devices through history had a major impact on the way we imagine, use and edit sounds when composing music. It is interesting to see how much of technology is involved in composing practices behind works that are actually mainly acoustic in the end, as well as how many of electronic devices are almost always present in our environment and, consequently in every music performance.

To present different levels of technology that can be involved in the process of audiation, it is crucial to observe some of the approaches employed by several composers: John Cage, David Helbich, Stefan Prins, Johannes Kreidler, Simon Steen-Andersen and Jessie Marino.

In order to present practical methods of creating realistic audio sketches or “performance simulations” during the course of my own composing practice, I describe procedures undertaken in two case studies based on my works with musicians and smartphones.

Presentation of various approaches to technology assisted audiation and practical explanations of methodology in composing practices should be able to offer an extended technique for creating music material and obtaining full control over new.

Keywords: new composition, composing practice, music technology, sound recording, conceptual music, digital concepts in music, audio sketch, electronic device.

Introduction

This article explores the processes of technology assisted audiation in the composing practice of non-electronic works. During the past years, I have been interested in observing how much of our audiation is influenced by technology and consequently it requires us to further rely on electronic devices to upgrade and improve our composing practice. As a result, we have many interesting works of new music that are based around digital concepts, or are replicating the artificial methodology, even when works are to be performed live, without any electronics involved in the final production. It is particularly interesting to examine the results of works that begin with technologically assisted audiation and end with live acoustic reinterpretation of material that was initially brought by electronic devices. It could be discussed that they take a form of a “re-make” or “replicas” of digital material. These works play with rotating roles, using human performers to model technology, as well as propose notion that we have, perhaps already evolved far enough to start thinking of technology as our prime model from which we copy systems for our own functioning.

Ever since the first forms of *Musique concrète* we have been familiar with technology assisted audiation, where technology assists composers in testing-out and hearing-out the ideas during the writing process. It can be defined as a form of audiation that relies on the use of devices in order to search, explore, record, document and manipulate material needed for composing of a new work. It most often means producing sound samples and/or using recordings of sounds to examine, select, edit and simulate the results of their performance as precisely as possible for a new piece in the making.

1. Technology Influenced Audiation

The development of technology through history had a great influence on what one can imagine as sound, as well as how close one could examine and understand the sound. “Since the moment when technology allowed the scientist and engineers to capture sound to the various storage mediums, those recorders and playback devices captured the imagination and minds of general public all around the world” (Brief History of Sound Recording). Following the list of patents of devices through history from Phonoautograph to iPod (see Table 1) we get a clear reminder of how perception, creation, availability and ownership of sound has progressed in our lives, and it most certainly had impact on what we audiate in our composing practice.

Table 1. Inventions of sound recording and reproducing devices in chronological order from Phonoautograph (1857) to Apple's ipod (2001) (Morton: 2004, Greg: 2010)

Year	Device	Author / Inventor / Patent / Copyright
1857	Phonoautograph	Édouard-Léon Scott de Martinville
1876	First electrical synthesizer	Elisha Gray
1877	Phonograph	Thomas Edison
1898	Telegraphone	Valdemar Poulsen
1952	Blattnerphone	Louis Blattner
1926	Field-effect transistor	Julius Edgar Lilienfeld
1930	Magnetophone	Fritz Pfelemer
1937	Stereophonic sound-system	Bell Laboratories
1947	Point-contact transistor 1947	John Bardeen, Walter Brattain, and William Shockley
1951	CSIR Mark 1 (CSIRAC) First computer to play music	Team led by Trevor Pearcey and Maston Beard
1952	Transistor radio	Intermetall company
1954	Stereosonic Tape	EMI
1955	Multi-track recorder	Les Paul
1956	Clavivox Synthesizer	Raymon Scott
1957	Mark II Music Synthesizer	Herbert Belar and Harry Olson
1962	Compact audio cassette	Philips
1978	Digital Editing System (first DAW software)	Soundstream
1979	Walkman	Sony
1979	IXI (first digital audio player prototype)	Kane Kramer
1982	Cds	James T. Russell, Philips and Sony
1983	MIDI standardized	MIDI Manufacturers Association
1983	DX-7 First stand alone synthesizer	Yamaha
1991-1993	MP3 file	Karlheinz Brandenburg
1997	AAC files	Bell Labs, Fraunhofer Institute, Dolby Labs, Sony and Nokia
1999	Mobile Phones as music players	Samsung
2001	Apple ipod	Apple

1.1. Different relations between audiation and technology

In attempt to explore the initial need for technology in the composing process of some of the works written for live performances, we will shortly observe different approaches to audiation in general, particularly different levels of detailed audiation, starting from composing a free space in which anything can happen, to controlling and preplanning every single detail in the work. In order to draw comparisons, we are going to take a brief overview over several works developed around concepts that allowed openness of interpretation and their final sounding results, but also pieces that were in need of precise, thorough and detailed audiation. At the same time, we are going to pay attention to the use of technology in their composing process and note its purpose and relation from one case to another.

The pieces used as examples in the upcoming paragraphs serve to give us an overview of different approaches, as well as different levels of intensities of the composers' audiation during the writing of works, through variety of materials, forms, concepts, aesthetics and performing medium. Needless to say that there is an enormous list of works that were not used as examples here, which is not, in any way, in relation to their significance or artistic value.

1.2. Unintentional assistance of technology

Moving towards close examination of technology assisted audiation, we shall first step away and take a look at works that did not necessarily rely on devices to produce them, but counted on their existence during the performance. The fact is that when we imagine sounds of environment today, we think of sounds of streets, engines, alarms, constructions, air conditioning, coffee machines, phones, or all of the above. It seems that, even when audiating accidental sounds of the environment today, we are always co-working with technology and acknowledging its existence. Although, composers do not need to use technology to audiate the sounds of the environment, just by imagining all possible sounds they are audiating the presence of technological

devices. They might not use technology, but they are open to, or even counting on, sounds of technology entering their works. It is clear that we do not need technology to imagine sounds of our surrounding environment in a concert space during Cage's 4'33", yet it is interesting to ask how much technology is usually present in performances and how much technology was considered present back in the time when the work was audiated in Cage's head? Even though, the premiere was exposed to organic accidental sounds made only by nature and people (Maverick Concert Hall in Woodstock, New York, August 1952), while audiating this work in New York in the 1950s, I believe that Cage was open to having sounds of cars, trains and planes in the background, a ventilation fan or a buzzing light bulb in the room. This theory can be backed up by his perception of the "activity of sound" he explained in the interview with Miroslav Sebestik in 1991. He said "When I hear what we call music, it seems to me that someone is talking. And talking about his feelings, or about his ideas of relationships. But when I hear traffic, the sound of traffic – here on Sixth Avenue, for instance – I don't have the feeling that anyone is talking. I have the feeling that sound is acting. And I love the activity of sound ... I don't need sound to talk to me" (Cage 1991). This leads us to assume that the assistance of technology in Cage's audiation of this work was certainly present in his own surrounding environment. As mentioned earlier, listening to the environment back then, as well as today, almost always considered, listening to technology, too. Alvin Lucier claims that there is audible technology in the recording of this piece made by Gianni-Emilio Simonetti on Sramps Records in Italy: "You can hear the sound of the piano lid being opened and closed as well as the record noise" (Lucier 2012: 66).

In some way, Cage distanced himself from responsibility over the material that is the activity of sound of the environment during the performance of 4'33". While for instance, composer David Helbich, obtains closer control of what we hear of the environment and creates a work for more engaged interaction of the listeners. Helbich instructs audience on how to use their ears, as well as in which direction to listen to their environment. Cage audiated free non-instructed listening and relied on the focus of passive listeners on spontaneous and accidental sounds of environment. Whereas, Helbich is "committed to the idea of an 'audience as active individuals'" (Gottschalk 2016: 240), and he audiated various ways of intentional listening to the environment while using hands to close and open his ears, or focus on listening in a specific direction.

Instructing listeners on how to use their ears while listening to the environment is the method Helbich used in his "NO-MUSIC: earpieces" (previously titled *Keine-Musik*) compositions for ears (2009, 2013, 2014), that are scores and performances for self-performing or conducted audience in various situations, set-ups and contexts. "These compositions are for the reader. The reader is the listener is the performer, without anybody or anything in between the score and the ear. The pieces are also performable on the spot, wherever you are right now. All you need are two (more or less working) ears and two hands. The notation tries to be readable without a musical education. Reading the explanation of signs and intuition should be enough. These interventions are entirely personal and therefore not so much interactive, as 'inner-active', self-performative. The reader as the performer as the listener. The acoustic results change radically with every new location, but the piece still keeps its structural identity. Together, environment and composition dissolve into the responsibility of the listener him/herself; it becomes your own thing, as personal as a bodily experience can be" (Helbich: 2010).

Both of the examples propose ideas of audiating free or directed listening and being open to any sounds of the technology-filled environment entering the works. When working with sounds of environment, composers consent to not knowing precisely what will happen during the performance, but nevertheless they do expect technology to be present in the accidental activity of sounds.

1.3. Mixing intentional and unintentional assistance of technology

In some way similar to previous examples, composer Stefan Prins opened the door for unexpected sound events to enter one part of his work FITTINGinSIDE for mp3 players and trombone. Prins provided semi-controlled / or semi-free space for the appearance of surrounding sounds by making the audience listen to his audio track on their mp3 players, while being exposed to the world outside of the concert venue. After this, they enter the venue and listen to the solo trombone performance while still listening to the track from their mp3 players' earphones. The track for mp3 players intentionally twists the content of the two different spaces: when the audience is outdoors, the track they listen to is based on trombone sounds, whereas during the trombone solo performance indoors, they listen to the sounds of the streets. In our correspondence Prins explained in his own words: "I used mp3 players to be able to create an inversion (and I already knew that the audience would be walking from one gallery to this museum). That is why on the mp3 players they can hear

in the beginning trombone sounds, while the ‘real’ city sounds are all around them, and then at the end it’s the other way around: once they’re in the museum the trombone sound is ‘around them’ and the city sounds are on the mp3-players. I edited the recordings and the sound-processing on my headphones instead of on loudspeakers. And I would go outside to listen to the recordings on an mp3-player, the way the audience would do” (Prins 2018). Therefore, counting on the appearance of technology in the environment was only one part of technological assistance required for this work. Prins additionally relied on technology to record and produce the audio track for mp3 players, and at the same time, used his mp3 player to walk on the street and play the track, in order to simulate the performance results during his composing practice.

1.4. Intentional assistance of technology

When speaking of audiating accidental sounds of the environment, we have a feeling that there is an idea of giving up control over some details in the piece. At the same time, composers cannot be held responsible for whatever sounds happen in the surrounding environment. The composers allow different material to possibly enter their works and hand out responsibility to a matter of circumstances and accidental events.

Almost opposing concept to this would be the idea of relying on a device and another person to pre-compose rules for a new piece, and then having some expectations of the outcome, but not knowing precisely what will it sound like. This is a concept created by Johannes Kreidler in *Fremdarbeit* for flute (or clarinet), cello, drums, keyboard and moderator (2009). The work is moderated by the composer, where he explains that in order to compose this work he outsourced tasks to a programmer from India and a composer from China to produce the work for him. The programmer’s task was to produce detailed statistical data of the content material of Kreidler’s previous works, while the hired composer from China wrote a new piece, respecting these rules. Hence, Kreidler could have had various assumptions of the possible musical results of the work, while the hired composer would have had expected to precisely audiate the piece in detail, during composing in requested style, following the statistical data given by the Indian programmer (based on the analysis produced with assistance of the computer). Of course, there always seems to be a reasonable doubt wrapped around the facts about the actual outsourcing of the composing tasks in this work. In his article, Martin Iddon remains skeptical throughout his writing, stating that “once one’s skepticism has been aroused it seems obvious that a much simpler, easier solution exists than the one which the complete score of *Fremdarbeit* – including the moderator’s sections – describes, which is to say that the piece was written, in all of its specifics, by Kreidler himself” (Iddon 2016: 46).

Be it as it may, we suppose that computer was used to generate statistical data after the analysis of Kreidler’s previous works that had to serve as a recipe for composing (and audiating) a new work produced by someone else. In this work’s concept we encounter the idea of a clear technological assistance for its audiation, yet still being open to accidental events.

Although there is the idea of audiation being handed over to someone else, the other person still had to follow certain parameters that were required by computer statistics. Hence, the control over the material of the work was not entirely given up on, and free audiation was allowed only inside and in between stylistic requirements.

1.5. Audiation provided by technology

This takes us further to examples of works that were built upon materials that originate from electronic devices. Consequently, composing practices of these works did not only include assistance of technology for material audiation, but also for allowing composers to obtain full control over the new material they wanted to manipulate.

Simon Steen-Andersen’s *Piano Concerto for solo piano, orchestra, live electronics and video* (2014) develops on the material that is based on the recording of a grand piano smashing on the floor after falling from the ceiling. Technology was used to record the actual smashing of the piano, and furthermore, to manipulate the recordings and use samples as models for arranging materials for the live reproduction of these sounds by symphonic orchestra and piano. Furthermore, we have a reproduction of an idea of “cloning” of the pianist. We are shown a video of the same performer playing on the broken piano, while the actual pianist on the stage plays on the sampler in these sections. Obviously the concepts presented in this performance are derived from technological ideas, and their production is only possible by the use of electronic devices.

In a similar manner, Jessie Marino based her work “Nice Guys Win Twice” for ten performers, live electronic audio and video (2018) on an archive of video recordings. Marino searched, browsed and collected

recordings of television presenters on the news and used them as a form of an aural and visual example for the composing practice that unraveled in the workshop with performers (SCENATET group). When I interviewed Marino, she explained that performers were given recorded materials of video samples and then worked on their own interpretation of their content. They watched the video recordings, re-enacted them, recorded themselves, watched, replayed and made adjustments. The final performance of the piece was created in the rehearsals with Marino's direction, with "not more than only 30% of the material notated, eventually" (Marino 2018).

Pre-recorded audio and video materials served as a base for the development of both Steen-Andersen's and Marino's pieces, and electronic devices (audio/video recording equipment, storage media, internet etc.) were used to obtain and reproduce the material, as well as to further manipulate, test and simulate the performing results, during the entire composing practices.

2. Case Studies

In order to be able to take us even further inside the practice of technology assisted audiation, I am going to present two case studies of mine that will explain the use of devices during the composing practice involved in the making of the two works. Both works were composed for live performances, yet they were entirely produced with the assistance of recording devices, smartphones and a computer. Only after the final audio simulations were completed, were they transcribed into music scores. Again, we are going to examine the work based on sounds of environment, but this time, the sounds of devices are not accidental, but transformed into pre-planned, manipulated and completely controlled music material. Then, we are going to focus on the practice of audiating sounds that are conditioned by the options provided by free applications for smartphones.

2.1. Case study 1: "The Upgrade" – for a group of musicians with phones (2017)

The material for the music theatre work "The Upgrade" (2017) for a group of musicians with phones derived from the concept of people sitting in the waiting room and looking at their phones. The general rule was that musicians should all be looking at their phones and they could only use one hand to hold and play their instruments. The soundscape of the piece was to be made out office noise, such as keyboard buttons, air-conditioning in a corner, phone notifications, someone talking to assistant at the desk, construction works outside the window, as well as a bit of people's whistling and singing of pop tunes to pass the time while waiting.



Figure 1. "The Upgrade" (Darmstadt International Summer Courses for New Music, July 2018)

Preparations. In the pre-composing phase, I created a two-minute audio "pilot" sketch of the work, using suitable sound samples I downloaded or recorded for this purpose [Devices: laptop, internet, smartphone, voice recording app, music software (Logic)]. Making this sketch helped me listen through the soundscapes I initially desired as many times as I needed. It assisted me to experiment, explore and input or take out some of the samples, until I had the right excerpt of the sounds I would attempt to replicate with live musicians and further develop the piece from.

Workshop. Since, the piece was imagined as a music theatre, in respect of the story plot, the musicians were meant to look at their smartphones at all times. This meant they could use only one hand to hold and play their instrument. I met with each of the instrumentalists for a session of exploration and trials of all the options that were possible for them to use to produce sounds on their instruments, with one hand, while

holding and looking at their smartphone in the other. All sounds were recorded with a recording application on my phone (it could also be any recording device). After all musicians were recorded and all their sounds prepared for further use, I could begin the actual composing the work.

Composing with audio simulation. All the recorded samples of musicians helped to design a precise soundscape for this work. Being able to manipulate the recordings in the music software assisted me in composing the work, almost as a piece in the style of *Musique Concrete*. Even though I was well aware of all the possibilities and techniques available for musicians who can play with only one hand, having all this sounds recorded, improved my awareness and control over the material in the work even more. Audiation of the piece during this composing process was constantly on a short relation between hearing ideas in my head to instantly trying them out by simulating results in the computer. It felt like the process one would have to follow while writing a piece of electronic *Musique Concrete* work, and it more or less was the same, the only difference being that this work would eventually have to be performed live in the performance, which was the only thing that at certain moments “constrained” and tamed a stream of my audiation.

Therefore, the audiation was most often initiated in my head, but then lead into research and trials that could be tested, checked and heard in my computer software, before I decided upon solutions I was satisfied with. This type of technology assisted audiation provided me with great convenience of having a detailed control over the outcome, even though I was working with, until then, unfamiliar setting with one-handed musicians.

Composing the entire work with the assistance of music software provided me with a valid simulation of how the performance would sound, and I was able to create, step back and listen to different versions of my piece before I decided which one is going to be a final representation.

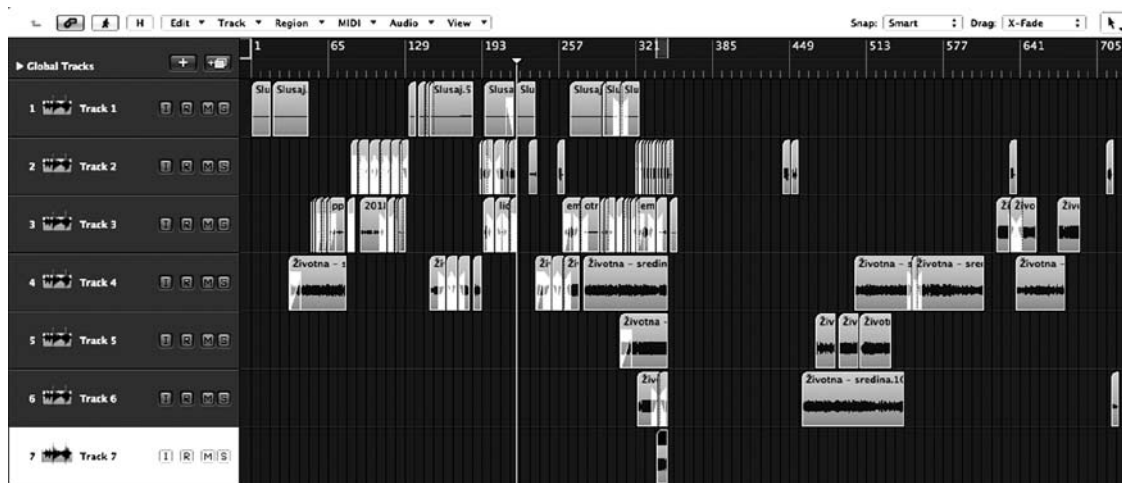


Figure 2. Music Software (Logic)

Notation. It is only after “The Upgrade” was completed in my computer software that I started thinking about notation. Therefore, notation is literally a transcription of the audio-simulation of the piece, just a tool for communicating musical messages. This process of notating an already complete work is quite interesting because it requires decoding sounds into music symbols, as well as rethinking how they would be interpreted, and on occasion having to compromise certain small details for achieving clearer notation.

The composing process in the computer was freed from thinking about bars, measures and rhythmical figures. Making of the score required analyzing and rethinking of transcription of the works’ time and pulse. Consequentially, tempo often responds to the real-time flow (a second = 60 bpm), and rhythmical gestures inside the bars are often rubato. Minor changes were placed inside the score and defer from the audio-simulation of the piece in dynamics, in need of more exaggerated expressivity of certain gestures and sections in the live performance.

Phone Scores. As mentioned earlier, “The Upgrade” is a music theatre with a story plot placed in a waiting room “from a not-too distant future”, and it is why it is of great importance that everyone on stage is looking at their phones. There are no note stands or paper scores on stage. Thus, the final part of the preparations for the performance involved creating animated video parts for musicians specifically made to be played on

each of their smartphones. Musicians' regular parts were sliced in small fragments of pictures of dimensions that were convenient for phone screens and recreated in slides. Using these slides for phone screens, I created perfectly synchronized video parts with a visual counter. Although, the production of video parts was a demanding process, it allowed me to exploit lighting effects and create sections where the phone screens are reacting to the sounds musicians are producing and illuminating their faces while the room is in the dark.






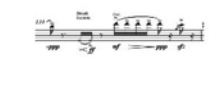




Flute	Piano	Accordion	Violin	Double bass
				
				

Figure 3. One slit of all instrument parts of videos for smartphones

2.2. Case Study No 2: “/com.app.data” – ever-changing piece for two groups of musicians with phone apps (2018)

Smartphones have become crucial parts of our environment. Where there are humans, there are smartphones. Next to sounds of human steps and breathing, there are sounds of notifications, vibrations, video calls, reminders and various apps and games. Inspired by these technological sounds of human environment, this piece's music material is based on sounds of phone apps. This is a music theatre piece for musicians who play their instruments, as well as use their phone apps. The line between their “instrumental” and “app” performance is somewhat blurred, since both instruments and phone apps are used in equal amount, and instrumental material also imitates the sounds from apps, making us wonder which ones we prefer better. There are sections where phones are just a lightning decoration to performed music; there are sections where they are used together with instruments, as well as sections where musicians are just playing on their apps. Some parts are choreographed in various ways with synchronized and unsynchronized movements.

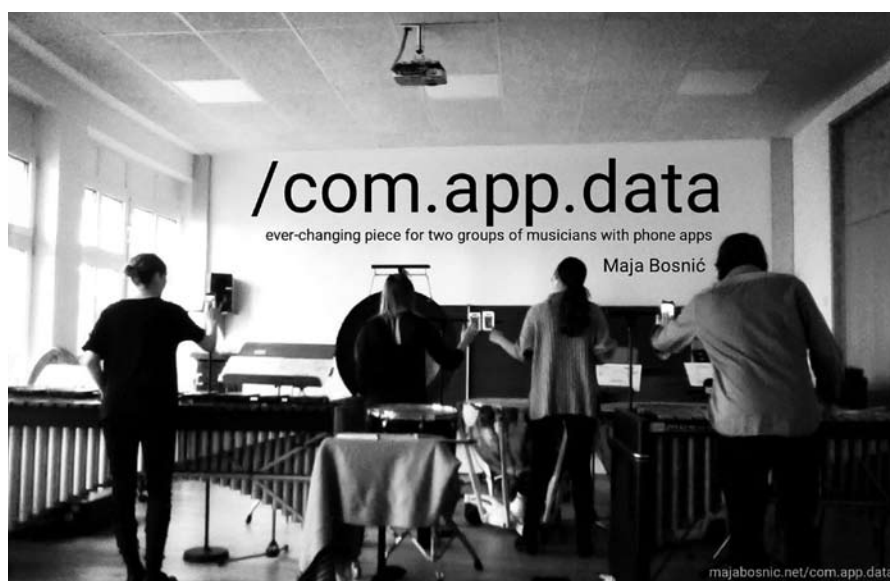


Figure 4. /com.app.data set-up at Impuls Festival 2019, Graz

Preparations. The initial pre-composing phase of making of this work understood researching, downloading and testing many available free applications for smartphones that could serve well in a live music performance. I created a large list of available apps and categorized them by their purpose:

- Reacting – apps react to sound or motion of the phone, producing flashing lights or sound notifications,
- Conducting – apps that instruct and conduct performance by counting the time or displaying moving shapes,
- Playing sounds – apps that produce sounds, as well as record and playback performed sounds with or without added effects.

Eventually, I made a selection of applications that I would use in this piece which instantly influenced audiation of the piece in my head. In order to explore as many possibilities there were, I spent time using the applications and composing fragments of what was to become a new composition.

Composing with audio simulation. As in “The Upgrade”, which was the subject of the previous case study, I recorded every sound that apps could produce and began composing the work by manipulating the recordings in the computer software. Working this way, again, I felt instant gratification having all the musical ideas played back by computer, shortly after they appeared in my head.

This time, I did not record musicians and was not able to create simulation of performance with sounds of actual instruments before the piece was finalized. Nevertheless, I used recordings of the applications to reinterpret instrumental sections with a little added help of MIDI, and again was able to listen to the final version of the composition through audio simulation before I even started working on notation.

Notation. Same as in the first case, notation is a literate transcription of the already completed and finalized audio-simulation of the piece. This process of notating an already complete work and adjusting it to conventional and familiar musical symbols was a challenging task. Finally, to have a live performance from the score, to precisely replicate the audio-simulation of the piece, icons and buttons from applications had to appear in the score, as well as the use of a stopwatch.

Conclusion

Speaking from composer’s point of view, I can state that I could have assumed how all the materials would sound during the composing process, and therefore I could have written the entire piece by audiating in my head. However, I am more than certain that working with recordings of desired materials set me free to work and combine more options of their use and alterations, and while doing so, simultaneously arrive at new ideas that came out of actually knowing the previous results. I was able to arrange various layers in sections of organized living sound-masses in more precise detail, and consequently thoroughly examine and work out details of every gesture in the piece in the exact direction I wanted them and actual and definite sound result that aimed for.

Technology assisted audiation makes use of unconventional material more available and efficient. It creates opportunity for instant testing of trials and making fictional musical ideas simulated and actually sounding out, helping composers not work in the domain of assumptions, but having control over the new material. It allows actual listening to all possible options of the use of recorded material and gives opportunity for a great span of manipulation. All of these tasks are performed in the courtesy of composer’s computer, without having to schedule additional meetings with musicians.

It results in audio simulation of the performance which allows listening, checking, changing until we are completely satisfied with the piece and also can later serve as a great reference for performers during the studying of the work.

Technology assisted audiation allows composing for instruments without thinking about notation. Sounds are used, altered, placed and mixed freely inside the work without necessarily thinking about time, measure, tempos or rhythmical figures.

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Technologijų veikiamą audiaciją naujojoje komponavimo praktikoje

Santrauka

Straipsnyje pristatoma technologiniam asistavimui palankių komponavimo praktikų, kurios buvo naudojamos kelete šiuolaikinės muzikos kūrinių, skirtų gyvam atlikimui muzikantams ir/ar klausytojams, apžvalga ir trumpa analizė. Pagrindinis šio tyrimo objektas yra ne elektronikai ar fiksuotai medijai parašyta muzika, o ta, kurios atlikimas tiesiogiai priklauso nuo žmogaus.

Tobulėjančios garso įrašų technologijos padarė didžiulę įtaką garsų įsivaizdavimui, naudojimui ir redagavimui komponavimo procese. Stebėtina, kiek daug elektroninių įrenginių yra mūsų aplinkoje, kiek technologijų naudojama absoliučiai akustinių kūrinių sukūrimui ir atlikimui.

Pradedama nuo kūrinių, kurių atlikimui technologijos naudojamos spontaniškai, o jų raiška – netiesioginė, vėliau pereinama prie pasižymintų sąmoningu ir tiesioginiu elektroninių įrenginių naudojimu. Galiausiai tyrinėjami du pačios autorės komponavimo praktikos pavyzdžiai. Pradžioje apžvelgiami tie kompozitorių kūriniai, kuriuose technologiniai įrenginiai naudojami neturint tiesioginės intencijos – čia tarpsta atlikimo erdvėje esantys (taip pat įvairių įrenginių skleidžiami) garsai. Šią kategoriją reprezentuoja Johno Cage'o ir Davido Helbicho darbai. Kitoje barikadų pusėje yra kūriniai, kuriuose technologijas kompozitoriai naudojo audijavimo tikslais. Čia aptartas Johannesas Kreidlerio *Fremdarbeit*, sukurtas trečiųjų šalių specialistų (anlg. *outsourced*), taip pat kūriniai, kurie buvo sukurti naudojant elektroninių įrenginių sugeneruotą muzikinę medžiagą (tokie yra Simono Steeno-Anderseno ir Jessie Marino opusai). Vis dėlto tarp šių dviejų kategorijų yra kūrinių, kuriuose audijavimo procesai pasireiškia ir tiesioginiu, ir netiesioginiu įrenginių naudojimu. Kaip pavyzdys panagrinėjamas Stefano Prinso kūrinyje publikai su mp3 grotuvais, kurį atliekant girdimi ir aplinkos garsai.

Pačios autorės kūrybinės tendencijos naudoti technologijas audijavimo tikslais pristatomos dviejose analizėse. Atskleidžiami metodai, padedantys sukurti realistiškus garso eskizus (arba „atlikimo simuliacijas“) komponavimo metu, aptiriamos įvairios atliekamos procedūros ir naudojama įranga. Apžvelgiama garso eskizų teikiama nauda tiek kompozitoriams, tiek atlikėjams.

Šių dviejų pavyzdžių analizė leidžia įvertinti technologijų teikiamą privalumą kuriant naujus kūrinius. Apibendrinant galima teigti, kad technologijų asistavimas audijavimo procese tam tikrais atvejais gali būti perteklinis, tačiau jis gali būti ir naudingas ar net esminis naujų kūrinių gimimui. Kad ir kaip būtų, technologijų veikiamą audiaciją siūlo pasizvalgyti po dar neištyrinėtas garsų teritorijas, suteikia daugiau galimybių manipuluoti garsine medžiaga, atveria duris naujiems ir netikėtiems kūrybinio proceso sprendimams.