Defining and Evaluating the Performance of Electronic Music

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Abstract

This paper presents suggestions for defining what constitutes a performance in electronic music. I propose the use of the term pseudo-direct causality to illustrate where a performer's intended action results in the output of an intended sound and although the causality is indirect, it is felt to be direct. I suggest considerations for composers, including gesture and audio-visual syncresis, when composing an electronic work for performance. I present my own gestural mapping designs as examples of methods for creating syncresis and pseudo-direct causality in electronic music instrument design. Parallels are drawn from acoustic music performance and similar evaluative methods are presented in the aim of developing virtuosity in electronic music performance and evaluating performance separately to the composition and the tools.

1. Introduction

The performance of electronic music is a developing field that raises many philosophical questions around what constitutes performance, what a performer requires and what an audience expects. The development of the tools and techniques associated with electronic music has opened up new possibilities for both composition and performance. While this development continually extends the opportunities for music creation, it has in some ways limited our performance possibilities. Digital instruments cannot be directly performed in the same manner as hardware instruments. The agency associated with performer and instrument comes into question. However, one might also argue that the amplification of instruments and use of effects pedals is removing agency and direct causality. Pseudo-direct causality could be considered an action or gesture that invokes a feeling of direct causality; the performer can perform a physical gesture and hear a gestural correspondence in the resulting sound. Chion defines syncresis as "the spontaneous and irresistible weld produced between a particular auditory phenomenon and visual phenomenon when they occur at the same time." (1). If syncresis occurs, then it may also be pseudo-direct causality, but syncresis is not always required. Physical gestures that result in an intended gestural sonic output need to be repeatable, require skill and retain the idea of craft in performance to constitute performance (2). One can subsequently bypass the literal definition of direct causality and consider computer-mediated performance as performance, as long as it still retains these elements of performance.

I present guiding definitions in order to discuss the development of performance in electronic music and find a means for critiquing performance detached from the composition. The discussions in this paper thereby exclude the performance of improvised works, however there may be some crossover.

The discussions are not intended as a criticism of the electronic music performance community, but rather the intention is to highlight some challenges facing the community and present ways in which they may be addressed to progress the field.

2. Live Electronic Music

There are different methods of working with live electronics. They can be categorised as follows:

- Extending instruments through audio processing
- Tape/fixed media
- Electronic/digital instrument
- Sonfication through the use of controllers
- Or a combination of the above

The focus will be on the technical implementation and use of electronic and software instruments, with a focus on the use of controllers.

The degree to which an electronic/software instrument is performed by a human varies significantly. The composer and/or instrument builder must consider how the instrument is to be performed. The composer might even consider how multiple instruments could perform together in an ensemble, as can be seen in many works for laptop orchestra. Using the acoustic instrument as an analogy for an electronic instrument, the builder might consider the range of sounds that can be produced, the way in which those sounds can be controlled and manipulated, and following on from that consider the way in which they can be performed. With software instruments, the performer can produce a perfect realisation of a work, one that is identical in each performance if that is what the composer wishes. For example, if the composer desires specific frequencies, a performer can read it from a score and enter it using the computer keyboard and mouse. In this scenario however, the computer is really the performer; since the human is assisting the computer in its performance and not the other way around.

Alongside this 'input' approach, composers and performers often use controllers or hacked technology to control certain elements in an electronic music performance. At the loss of computer precision, we gain human expression. The controllers generally enable the performer to produce physical gestures that will produce data which results in the production of a sound. For example, the mi.mu glove(3) tracks many elements in the movement of the performer's hand to enable him/her to control musical parameters. A performance by Imogen Heap (4) demonstrates pseudo-direct causality as it does not directly cause the sound, but it is developed in a way that feels like the performer has direct control of the sound output. This is often achieved through the use of haptics and tactility. The interest in hacked controllers in the DIY community has led to the development of many commercial products. The outputs from both DIY and commercial communities appears to prioritise providing the performer with expression and control over the sound. Composers and performers are creating musical gestures that will produce sounds electronically in an analogous musically meaningful way to how a performer produces sound from an acoustic instrument. For example, Stanford Laptop Orchestra's performance of Monk-Wii See, Monk-Wii Do (5), illustrates a tactile-kinesthetic-sonic connection. The piece is performed using a wii-mote. It may seem that the differing factor between acoustic and electronic performances is technology. However, all instruments are technological (6). The issue is really one of performer agency. Godlovitch defines four aspects of agency in performance: causation, intention, skill and intended audience (2). One might consider that tactility, as in the wii-mote example, might be required for performer agency. However, "the first gesture-controlled electronic musical instrument" (7), the Theremin, establishes agency and pseudo-direct causality without any physical touch. Therefore, tactility is not required, but often present.

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3. Performance

Music is inherently gestural and arguably audio-visual. Bergeron and McIves Lopes, in their study on interpreting musical expression from sight and sound, found that audio and vision were amalgamated by the observer in their interpretation of the music. They found that "body movement conveyed roughly the same structural information as sound" (8). With instrumental music, a performance can often be visualised without being seen. This is largely due to causal listening, whereby the listener is aware of the source causing the sound and therefore is highly likely to visualise that source (9). The visual associations from acoustically produced sounds do not directly correspond to electronically produced sounds. In the composition of electronic music, a composer often designs an electronic instrument using synthesis methods or manipulated field recordings and therefore can be without a discernible causal sound source. This means the performance situation offers new scope for gesture and the creation of an imagined sound source identification based on acoustic and instrumental traditions. What is meant by performance in an instrumental concert is well understood, although what can be considered performance in electronic music is less defined and precisely what this paper aims to address. The use of controllers allows for the creation of a relationship between what the listener sees and hears - or it at least allows for the creation of a symbiotic relationship. Many concerts of electronic music focus on the acousmatic, actively disengaging with the visual, however audio-visual performance elements of electronic music is a growing field that is well supported by the rise of laptop orchestras around the world. For example, Stanford Laptop Orchestra's performance of Ge Wang's *Twilight* (10), shows performers rising to their feet as we hear a swell in dynamics and quickly go to silence as they crouch back down.

3.1. Performance or Presentation

Traditionally speaking, in acoustic music the composer composes the piece and the performer performs it. However, this is not always the case in electronic music. It is important to note that the origins of electronic music involved a composer composing and a machine performing, or a composer performing a machine. Human performers are not required in the production or performance of electronic music. "The electronic composer produces his score direct from his ear to the ear of the listener, sanitary, even sterile sometimes. The tide is away from the performer as it is away from the instrument." (11). There were many composer-performers working with live electronics and performing electronic music in the earlier days of electronic music, even if it is thought of as only a recent development. For example, Gordon Mumma performed *Hornpipe*, using custom-build circuitry to process the sounds from a French Horn and sounds from the performance space (12).

The skills employed in performance differ to those employed in composition. Although the composition and the performance of a work can be developed in tandem, their considerations differ greatly. In electronic music, often once the composition process is complete the work is 'made' performable. For example, certain effects and filters are used to offer some control over a sound that is already sounding. Another approach is the triggering of sounds and tweaking of volumes and EQ. In these scenarios, a piece is music is being presented and is aided by a performer. The result is that the performance closer resembles a presentation of the work, rather than a live performance. Direct causality is brought into question because it is often unclear to what extent the performers actions are affecting the sound output. This is a question around the connection between the performers input and sound output.

Another issue surrounds the audience's interpretation of this connection. That is the performer input - sound output relationship cannot be understood by the audience. This is most common when the performer is using a laptop and the screen is hidden from the audience. This issue can arise in popular music and avant garde music settings. The prevalence of it leads to remarks such

as ‘he/she is just on facebook’ or ‘it isn’t even plugged in’, etc. Performers are acutely aware of this perception and many have responded to these remarks by adding more performative elements to their performance, others by adding more equipment. Many performers make use of lighting and projections, many elaborate on existing gestures for pressing buttons. However, these responses do not address the issues highlighted; these responses have answered the wrong question: ‘how do I look like I am performing’, instead of ‘how do I perform’. This is not to say that the easy option has been chosen, but rather that other means were not known or available. Scenarios where there is little skill required for the performance of a work, could be better considered as ‘presentations’ of a work, rather than a performance. That is not to say that it is not valid, but rather that there is no room for advancing one’s performance skills, but only advancing one’s presentation of a work. The focus in these scenarios has been placed on the composition of the work. Where human performance is not required or is minimal, defining this as presentation may be more useful. This also may deter negative comments around presentations of works and enable composers to unapologetically present their work without a need to introduce superficial performance elements. A concert may be made up of presentations of works as well as performances.

In contrast, others have developed performance techniques and tools that require skill to perform. These often involve the use of expressive performative instruments and controllers. When composers begin to respond to the question of ‘how do I perform my music in a musically meaningful way’, the audience begins to see and hear interesting performances. The audience also begins to see virtuosity in the performance of live electronic music. A key component in acoustic performance is gesture. Physicality in acoustic music performance is required. This is not the case in electronic music. However, composers must consider if it is required for the audience and the performer to understand it as performance.

3.2. Audio-Visual Gesture

Gesture in acoustic music performance has existed for hundreds of years and is well understood and accepted by composers, performers and audiences. One does not need to have held a violin to understand a down-bow gesture, or a vibrato gesture. When the audience sees the gesture, they can predict a corresponding sound. This audio-visual relationship is so important to the audience that often when they hear something that they do not understand, they often look to see how it is being produced, so that they can create that audio-visual connection. With acousmatic listening, it is often difficult not to visualise a corresponding gesture producing the sound when the source is known.

Sounds themselves can be inherently gestural. Where this is the case, the composer may use it to influence how the sound is performed. The composer can synthesise causal listening by creating a physical gesture to match the sound output. Here the gesture of the physical movement and the gesture of the sound must harmonise if audio-visual syncresis is to be achieved. Considering the envelope of the sound, a sound with a sharp attack performed with a gentle fluid movement, is not likely to harmonise. However, if the sharp attack is met with staccato movements from the performer, the audience may be able to connect the gesture of the movement with the gesture of the sound. Many of these gestures can be borrowed from the well-understood acoustic instrument traditions. If a sound is percussive, even if it is not an acoustic sound, a striking gesture would seem to easily translate. A bowing gesture considered simply as a movement in one direction at a constant speed, produces a sustained sound. The physical and sound gesture relationship can again be mapped in electronic music performance, where expressive controllers are utilised. To illustrate this I have produced a video featuring gestural mapping using a Gametrak controller and a microphone as a controller (13). The Gametrak “is a small base station that sits on the floor. Two retractable wires are fed through what are essentially two analog sticks, and connect to the player's hands with little gloves. By interpolating the angles

of the wires and the degree of extension, the Gametrak is able to judge movement in three dimensions." (14).

The video demonstrates 6 gestural mappings:

1. 360 Percussion
2. Voice Timpani
3. Speech Bassline
4. Guitar Tether
5. Plucked Tether
6. Bowed Tether

360 Percussion

This instrument uses the Gametrak controller and the spatial positioning of the arms of the performer holding the controller determines the pitch produced from a downward strike. The speed of the strike also determines the amplitude of the sounding note.

Voice Timpani

The voice, specifically pitch and note duration, controls the sound output of a timpani. High notes trigger rolls and each lower note triggers single strikes.

Speech Bassline

This gesture again makes use of the voice, for each pitch produced by the vocalist a corresponding pitch will be produced on the software instrument that sounds similar to a plucked bass guitar.

Guitar Tether

A swinging arm gesture triggers a note on a software instrument. The word guitar refers to the gesture more than the synthesised sonic output.

Plucked Tether

By plucking the string on the tether a note is produced. The pitch is controlled by the height of the string on the left hand.

Bowed Tether

Similar to the plucked note, except a bowing gesture is used to sustain a sound and again pitch is determined by the height of the string. In contrast to a stringed instrument, such as a double-bass, the higher pitch can be found at by holding the string up higher and the lower pitches are further down by lowering the string.

The purpose of creating these gestural mappings is to provide demonstrations as to extended means of syncresis, pseudo-direct causality, performer agency and skill. It is not to recreate what already exists in the instrumental world, but to borrow and build upon those traditions. Conversely, this gestural mapping could be used as a tool for subversion, whereby there is intentionally a mismatch of gestures. The composer could choose to disrupt the audience's audio-visual

mappings. These performance considerations need to be contemplated and designed during the compositional stages, as to do so after the fact would likely require changes to the composition.

4. Considerations and Evaluations

4.1. Suggested Performance Considerations and Evaluations

It is helpful to make a distinction between presented electronic music and performed electronic music, in order continue to advance the performance of electronic music and develop a skilled approach considering virtuosity.

Before a performance of an electronic piece can be evaluated and critiqued independently to the composition, one might consider what a good performance in electronic music looks like. When composing a performed electronic music piece, I suggest the following contemplations:

- Is it performable?
- Is it translatable?
- Is it good?

These are highly subjective questions deserving of further consideration and qualification.

Is it performable?

This question first needs to determine if a performer is even required. If the piece can be performed by a computer alone, then it is not performable. Assuming that a performer is required, then the composer must consider the degree of control available to the performer. What skills might the performer need to develop in order to perform the piece? If the piece can be performed instantly without error, then there is no opportunity to develop skill and virtuosity. There is also no opportunity for performer's interpretation. Can the performer perform the piece poorly? If he/she cannot, then he/she likely cannot perform it well either. If practice makes better, then it is performable.

Is it translatable?

Can the audience interpret the gestures and make sense of them? If pseudo-direct causality occurs and there are elements of syncresis, then the performers actions and intentions have translated and been understood by an audience. As with the violin, the audience does not have to know in any detail how it is being performed, however they can discern from the performance that the performer has command over the instrument. Therefore, a connection has been made.

Is it good?

This is the most important question and the most difficult to answer. When we as a community of composers, performers, musicologists and audience members bypass the gadgetry and the novelty, can the performance be critiqued and evaluated? When we can measure the performance independent of the tools and the composition, then it can be truly considered performance. When we can measure different performances of the work and different performers interpretations, it is possible to evaluate and therefore it is possible to progress the field of electronic music performance.

4.2. Suggested Composition Considerations

The performance of the work is best considered throughout the composition process. This is particularly relevant when the composition of the work involves the use or the creation of a new software or hardware instrument. Although it is very useful to consider all the comparisons with acoustic performance, there are many differences that need to be addressed. These differences allow for greater possibilities and greater challenges. Typically, acoustic performance is transforming the abstract instructions into concrete sound. Either the desired sound is known and the performer, with skill, knows the action to produce the sound, or occasionally the action or gesture is notated and the performer mimics the action that results in the production of the desired sound. When the gesture is notated, it generally accompanies text describing the desired sound. It is this approach which may best fit for the notation or instruction of performed electronic music. Knowing the physical and sound gestures will enable the performer to learn to produce the sound and so there is agency and intention.

Avoiding Determinism

When designing a work for performance or designing an instrument, it would be intuitive to only map the parameters that you wish the performer to control. However, consider the notation of scores for acoustic instruments, typically pitch, dynamic and timbre are notated. Although vibrato is occasionally notated, it is generally left to the discretion of the performer. Even considering a crescendo, there are many ways that it can be performed. Much is left to performers discretion and interpretation. We can consider these as improvised or nondeterministic elements. When designing a new instrument, I advise introducing scope for improvised elements in the performance of the work. This allows the performer to interpret the piece beyond the notation. These improvised elements, may help address the question of whether a performer is needed or it can be performed by a computer. If the piece requires the performer to interpret non-notated elements, then a performer is required.

5. Conclusion

This paper attempts to define and propose evaluative means for the performance of electronic music. Given the diversity in electronic music, it would be naïve to suggest a framework for electronic music performance. However, I propose guiding considerations in order to ensure that the performance is musically meaningful to both performer and audience. The composer's aesthetic in terms of performance is not discussed. Instead, some focus is placed on the performer; agency and skill as well as expectation and understanding from the audience. The idea is not to introduce similar etiquette of acoustic performance into electronic performance, but to enable the development of musicianship in electronic music performance. The gestural mapping examples are fundamentally based on gesture in the performance of acoustic music. However, they present some methods of enabling syncresis and pseudo-direct causality in an electronic music context. The aim is to develop virtuosity as there is in all other aspects of music. In the same way that composers might aspire to have their acoustic work performed by a certain performer, they might also wish for an electronic music performer to realise their work, for the same reasons. By developing our understanding of what constitutes a good electronic music performance, we can develop upon it, introduce new ways of performing that builds upon and surpasses the traditions of acoustic music performance.

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