Visible Excitation Methods: Energy and Expressiveness in Electronic Music Performance

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ABSTRACT
In electronic music performance, a good relationship between what is visible and what is audible can contribute to a more succesful way of conveying thought or feeling. This connection can be enhanced by putting visible energy into an electronic interface or instrument. This paper discusses the advantages and implementations of visible excitation methods, and how these could reinforce the bridge between the performance of acoustic and electronic instruments concerning expressiveness.

Author Keywords
Expressiveness, performance, excitation methods, visible, visual feedback

ACM Classification
H.5.2 [Information Interface and Presentation] User Interfaces-Haptic I/O, J.5 [Arts and Humanities] Performing arts, H.5.5 [Information Interfaces and Presentation] Sound and Music Computing-Methodologies and techniques

1. INTRODUCTION
There neither is any limitation to how the means for making electronic, digital music should look like nor to how they should be operated, since they can be built "without regard to the way sound is to be produced" [6]. This can be considered both an advantage and a disadvantage. We are free to make whatever design, but attendees of a performance containing novel instruments mostly don't know the new interfaces in advance. They have no clue what sound is about to fill their ears and we should actively kindle their interest and convince them of our expressive skills.

This paper discusses how visible excitation methods can enhance expressiveness in electronic music performance, concerning every performance containing electronic elements.

2. EXPRESSION AND EXPRESSIVE
Contrary to what Dobrian & Koppelman do in [3], a small but important distinction is being made between the content of the words 'expression' and 'expressive':

Expression: the action of making known one's thoughts or feelings [9];

Expressive: effectively conveying thought or feeling [10].

These two definitions can be discerned regarding 'effectiveness': being *expressive* is the successful way of expression, while *expression* is just the fact of the action, neither mentioning anything about its way of manifestation nor its efficiency.

Succeeding in effectively conveying thought or feeling encapsulates many aspects which depend on personal background, experience and many other influencing circumstances. Therefore, generalizing successful expression, here called *expressiveness,* is not the intention of this paper and may not even be possible at all. However, trying to instigate expressiveness in electronic music performance can be a worthwhile task. An overarching theme that I encountered while analyzing and categorizing my own expressive needs and which could help this process, appeared to be *visible ways of putting energy into a system*.

3. HOW VISIBLE EXCITATION ENHANCES MUSICAL EXPRESSIVENESS
At least four main results of applying visible excitation contribute to the enhancement of expressiveness:

1. *Clarification of a performer's role*. Andean states, based on the writings of James J. Gibson, that we as organisms scan the environment which we are in "at any of a number of levels" [1] until every unidentified element (audio in case of a musical performance) is linked to a visible active agent. Visible excitation methods simplify this process and result in more space to welcome thought or feeling expressed by the performer(s).

2. *Being involved physically.* For both performer and listener physical involvement is benificial:

a. *The more physical, the more visible.* Physical input causes visible actions and clarify a performer's role.

b. Causing *specific, recognizable audible output by performing specific physical actions* contributes to a clearer role of a performer, too. If for example pressing the same button causes totally different audio every time it is pressed, the 'live' actions by the performer can come across as less plausible and less 'shaped' by explicitly *that* performer at that moment.

c. *Physical feedback, being able to feel the music.* A performing artist needs physical feedback in order to control articulation [6]. For physical excitation of electronic systems, physical feedback should be programmed deliberately, since these aren't a product of sound creation.

3. *Providing insight into how the music is being produced*. Musical parameters as tempo, timbre, volume and note length lay in articulation which is inherent in the way of excitation. Visible articulation provides insight into how the music is being produced.

4. *No exceeding of the idea about a limited number of actions a human can execute simultaneously.* Robert Henke poses that there is a general idea about how many actions a human can perform simultaneously [8]. If visible excitation is applied and every specific action causes its specific, matching audible output, it will be difficult again to exceed this link.

4. VISIBLE EXCITATION METHODS
4.1 Learning from Acoustic Instruments
We can learn a lot from the clarity which accompanies the way most acoustic instruments are played. The link between what we see and what we hear is often very transparent. If we isolate this quality as a significant ingredient which could instigate expressiveness, we can think of applying it to ways of making electronic music. This has a frequently discussed advantage:

reducing "the learning curve for those performers who are experienced on the acoustic counterpart" [3].

4.2 Risks of Using Acoustic Excitation Methods on Electronic Systems

Despite the above named advantage, some risks may appear whilst using acoustic excitation methods on electronic systems:

1. *We have certain expectations when visibly witnessing acoustic excitation methods*. When a vibrating string is being put into vibration, then it will resonate based on its physical properties. Because we now *know* how it works and how it sounds, our expectations are based on that.

Marier (2010) made an interface, 'The Sponge', that "was designed so that it does not remind of any traditional acoustic instrument and so that it would not dictate any musical paradigm" [5]. Witnessing the performance of the piece 'Origami' at NIME 2014 I considered this as an advantage, because it made room for every possible sound to come out.

2. *Using a way of putting energy into a system that was made to fit another goal can restrict the encounter of new music.* Along with the expanding possibilities electronic music provides, the *music* itself has changed a lot as well. Although I do agree with Cook's fifth principle for re-designing computer music controllers: "copying an instrument is dumb, leveraging expert technique is smart" [2], electronic music is such a wide area providing many unpredictable new possibilities, that existing (acoustic) ways of excitation may not leave all possible room for the creation of new electronic music.

4.3 Tailored Electronic Excitation

Regarding the points mentioned above, it could be that playing electronic music could require its *own specific ways of excitation* – whether this is yet possible. It may be difficult but worth trying not to (totally) copy excitation methods of an acoustic instrument. Touching this, it might be plausible that we need a brigde here as well, covering another gap between both excitation methods that we know and those that we don't know yet.

4.4 Two Novel Interfaces Scrutinized

The Splorer, [4] and the Sponge [5] are two interfaces applying visible excitation. Especially the Splorer's touch surface is a successful example [7]. It refers to an acoustic membrane which is put into vibration with a clammy finger, sliding over it. The physical model that Gelineck uses, called 'friction', fits well within the area between touching and stretching our expectations. Also, the interfaces use or refer to one or more acoustic excitation methods. The Sponge for example is hit by the hand to create a volume and immediately poses a funny question: 'how does a sponge sound when you strike it?'. Further shaping possibilities of the sound reveal its articulation and clarify how Sponge-music is being made, for example by bending en twisting - clearly visibly linked to audible results.

4.5 Experiences with La Diantenne

La Diantenne is an interface which I designed in order to analyze and translate my own needs for musical expression from the acoustic domain into the electronic domain. In version 1.0 (Figure 1), the pitch of my voice defines the pitch of a graindelay sawtooth synthesizer within SuperCollider. Pressing various locations of the string enables me to multiply the pitch of the voice-controlled synthesizer. Performing in different contexts with this first version taught me a few important lessons regarding excitation methods. The reference to the acoustic means of a string to produce sound is confusing until I would tweak the mapping into the area where it touches but also stretches the general sound expectation of a string.

Figure 1. La Diantenne 1.0

Figure 2. La Diantenne 2.0

Also, visible excitation is present but rather minimal: my voice determines pitch, which is reasonably clear, but the 'first' visible excitation is minimal: the data and the sound run continuously once turned on, even when I don't do anything. Therefore I am not able to define timbre, note length or volume by means of excitation. And the continuous 'excitation' is only caused by the facility of electricity… and therefore excitation remains invisible. Especially while performing within a group, it did not become clear to everyone what my role was and which sounds were produced by me specifically.

Learning from these lessons, I built La Diantenne version 2.0, which looks very different (Figure 2) and always needs physical excitation to produce sound. It is built out of a tin plate with a contact microphone attached to it of which the input goes through a Karplus-Strong model in SuperCollider. I removed the string and used a 50 cm long ribbon controller for controlling pitch and two flexsensors for controling note length and timbre/frequency spectrum by bending the plate back and forth. Altogether, these changes make version 2.0 a much more physical and visible experience than version 1.0.

5. CONCLUSION

Visible excitation methods can enhance expressiveness in electronic music performance. As long as these are part of conveying thought or feeling during a music performance, a need for these methods will remain. They can be based on both acoustic and novel excitation methods simultaneously. At least we now live in a time when visible ways of putting energy into a system could reinforce the bridge towards attaining expressiveness in electronic music performance.

6. REFERENCES

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