Enhancing the Performer-Spectator Communication at Electronic Concerts

By Jón Helgi Hólmgeirsson
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Abstract

During the traditional electronic musical performances there is a lack of communication between the performer and spectator. Communication is necessary to a performance as it is a social act, created both by the performer, as well as the spectator. Through exploring the augmentation of visibility and physicality in regards to the electronic performance I attempt to enhance that communication through a concept called Sonicality, created out of the findings of this paper, that addresses the use of tactile vibrations, controlled by a performer in a visible manner, received on the spectator’s body, in relation to the music heard. Through the validation of this concept I manage to get an insight into the spectators’ needs and desires, grounding the validity of the concept as something that augments experience, interaction and understanding, enhancing the performer-spectator communication.
Acknowledgements

I would like to thank Erling Björgvinsson for his very effective advises while guiding me during the research and design process, as well as for our extremely inspirational and often oh so very confusing conversations. Additionally I would like to thank Jonas Löwgren for his help in my challenging search for a suitable thesis topic. All of my helpful test participants do reserve a big thank you and a very high high-five and so do my fellow students and other professors and lecturers that have guided me to the point were I am now. I am forever grateful.
“There is an emotion which runs through each of us when, as part of a crowd, we find ourselves united in an overwhelming passion.”
- Georg Fusch (as cited in Fischer-Lichte, 2008, p.52)
1. Introduction

A performance is a genuine act of creation (Fischer-Lichte, 2008). Its creation consists not only of the performer and what he does. It consists of that, and everything else connected to that particular performance, whether it is the performer, the spectators, the situation and placement, the organisers of the event or even the cleaners that clean up afterwards (Small, 1998). Everything that helps shape the performance is a part of its creation. While the performer creates the act, the audience create the expression of how the act is perceived and therefore influence the overall outcome of it.

A performance when narrowed down to a musical context is no different. The performer creates his music and communicates it to the audience, which take part in the creation by attending the show and by communicating to the performer their experiences, whether it’s in the form of applauding, frenetic dance movements or even clear disgust. This communication, if the situation encourages it, is accomplished through a feedback loop, where everything the performer does brings out a response from the spectators, which affects the whole performance (Fischer-Lichte, 2008). This communication, the participation in the performance, is generated through sight and sound as well as through the physical sensations of the entire body (Fischer-Lichte, 2008).

The scope of this project is on the traditional solo performance of the electronic music artist, playing music in the midst of electronica and trip-hop with a tempo ranging from 110-120, not fast enough to dance to aggressively but still influences the body to move to the rhythm.

When focusing on the traditional solo performance method of electronic concerts, some aspects in the communication are missing, or are at least quite vague. The performance being discussed is when you see an artist on stage hunching over his computer nodding his head in a rhythmic fashion, normally pushing buttons or sliding sliders on a MIDI-controller situated beside his computer, while covered in strobe lights and fog. The audience hear the music the performer creates, but their visual perception is limited to an almost expressionless upper body part of the performer, preferably wearing a hoodie and looking down, while what stands out in their field of vision is a bright illuminated half-eaten apple.

This description is of course an extreme one, although it pretty much describes the most traditional form of this type of performance. A communication thrives on the sharing of ideas and feelings. It is a two-way communication. When a performer triggers or changes sounds by pushing a button or sliding sliders he is not showing the audience how the music was really made, mostly because it is not visible, while the only thing communicated is what the ears perceive (Collins, 2003). While exaggerated movements from the performer could make the triggering more appealing for the audience (Gurevich & Cavan Fyans, 2011), it is not enough to
have only one of the two. They are, at least if gaining the whole performative experience is the goal, a whole. Neither body movement nor sound alone can tell the whole story when it comes to the perception of music performances (Gurevich & Cavan Fyans, 2011). It's like communicating half of a sentence, you get where it is going but you miss the punchline. Other physical senses are just as important, whether it's the emotions created by the music or the physicality of the sound generated through low frequency bass and beats, a performance needs to, or at least should, address all of these aspects.

As stated, the traditional electronic performance mostly focuses on the auditory senses of the spectator while the bodily movement of the performer is kept out of it. Instead of a bodily based performance the electronic artists often augment their performances by using graphic visuals which often dilute or even replace their movements, distancing them from the audience (Thompson et al., 2005). On the other hand, the physical movements of the performer are most often limited to his instrument, the MIDI-controller, making it hard for him to communicate to the audience anything else than the music.

The physical aspect of music is another thing. It is a feeling not necessarily thought of by the performers although the impact on spectators can be extravagant. The booming dance floor, the throbbing bass and the hardcore techno beat are all internal aspects of electronic music, and they are extremely important because these are aspect you can feel directly on your body, whether it is in your gut or on your skin, generated through low frequency sounds on a high volume. The tactility of sound, of vibrations, is one of the things that make live performances into what they are. They generate feelings, both psychological and physical and add another layer onto the experience of music which almost only happens in live situations.

As stated by musicologist Jane W. Davidson (1995), a “live music performance is a social communication” (p.105). A communication in that context should therefor involve, in order to tell the whole story, an auditory aspect, which is already there, as well as both a visual aspect allowing the performer to express himself and a physical one to address the spectators participation.

I have therefor in this thesis explored these important aspects, the visual and the physical, and how they can be augmented in order to enhance the communication between performer and spectators at electronic solo performances.

1.1 Research Question

How to enhance the performer-spectator communication at an electronic solo performance through augmenting the visual and physical aspect of the performance.
2. The Musical Performance

In order to design for the complex situation musical performances pose, it is necessary to understand its complexity.

Musicologist Christopher Small (1998) presents in his book *Musicking: The Meaning of Performing and Listening*, the term *musicking*. How music is not a thing but an act. Musicking is therefor a verb for the act of music, to music. He states that “the act of musicking establishes in the place where it is happening a set of relationships, and it is in those relationships that the meaning of the act lies” (p.13).

“… musicking … is an activity in which all those present are involved and for whose nature and quality, success or failure, everyone present bears some responsibility. It is not just a matter of composers, or even performers, actively doing something to, or for, passive listeners. Whatever it is we are doing, we are all doing it together - performers, listeners (should there be any apart from the performers), composer (should there be one apart from the performers), dancers, ticket collectors, piano movers, roadies, cleaners and all.” (Small, 1998, p.10)

It is needless to say that the complexity of the situation, of a musical performance, is very high. Each of these situations is unique which is inevitable when performers and spectators are confronted with each other with their various tempers, moods, desires, expectations and intellects (Fischer-Lichte, 2008). There are so many factors that influence this human encounter, if not to mention all sorts of substances used in these situations to affect the overall experience, such as drugs and alcohol. This takes place in a social and physical setting and those too have to be taken into account (Small, 1998).

As interaction designer Birgitta Cappelen and musicologist Anders-Petter Andersson (2013) point out, musicking is interesting from a design point of view because Small incorporates both the power structures of architecture of the concert hall as well as the whole service journey and how the physical and virtual aspects maintain and produce meaning and culture.

The music itself, not to be kept out of this, plays a huge role also as music is internally connected to mood change, whether it’s slow and dreamy or fast and trippy and everything in between can have a great influence. Not to forget if the music is perceived as good or bad.

When talking about an electronic musical performance, it is therefor not only possible to blame a performer if the performance is a success or not, though he, like everyone else there, plays a big part in it as well. The fact that he is stuck to his MIDI-controller or laptop, or that he doesn’t know how to make pleasing graphic visuals, or his performative skills and energy are very low due to e.g., shyness, all play a part in the big picture, and they certainly do not help although the moods,
desires and drunkenness of the audience also have a lot to say about the final outcome.

2.1 The Visual perception of Spectators

Referring to Davidson (1995) most psychological investigations of music performances have been focused on the musical sound, leaving out the role of body movements. By leaving out the investigation of body movements a big part of music making is disregarded, as making music does not only involve the communication of musical sounds but is also characterised by the use of facial expressions, body movements and hand gestures (Thompson, Graham & Russo, 2005). Historically, music making is typically experienced as events in which people interact with each other in person (Thompson et al., 2005).

“Facial expressions and hand gestures allow performers to cozy up to the audience, emphasising the music performance as reciprocal human interaction, whereas an absence of visual information leaves an impression that the performance is a solitary act in which the listener’s role is primarily that of a voyeur. That is, visual aspects of music personalise the music, drawing performers and listeners closer together in a shared experience.” (Thompson et al., 2005, p.204).

It has also been shown by Davidson and Correia (as cited in Thompson et al., 2005) that non-musicians, or unschooled listeners, may often rely more heavily on the visual aspect than the audible when evaluating the affective meaning in the music. Following that with the work of Runeson and Frykholm (as cited in Davidson, 1995), while the non-musicians are not trained to listen to differences in expression between performances, they are highly trained observers of expressive differences in movement. Body movement does provide valuable information about the state of mind and the involvement of the performer with his music (Davidson, 1995).

2.1.1 Graphic Visuals vs. Body Movement

Most commonly there are two visual sides to electronic musical performances. One is using graphic visuals to augment the performance and the other is to focus more on the bodily performance of the performer. My aim is not to rule one or the other out, my view is in fact that these two different styles are equal. They augment the same things, the visual perception. When one is used the other isn’t as necessary. On the other hand, when addressing the communication between performer and spectator, the graphic visuals do not help. The graphic visuals could almost be compared to the setting of a film, where the soundtrack functions as wallpaper for the visually dominated setting (Thompson et al., 2005) or a film to which the audience dances to. The visuals influence the audience’s interpretation of the music (Thompson et al., 2005) just as a bodily performance would, but through graphic
visuals the communication between the performer and spectators is completely different than from a body-movement perspective. The performer is more distanced from the audience (Thompson et al., 2005), as the audience’s focus is on the graphic visuals.

Controversially, historically in rock music, the appearance or look of performers such as Jimi Hendrix, Janis Joplin and Jim Morrison, made just as much a statement of rebellion as their music (Thompson et al., 2005). What is remembered from their performances is their attitude and their behaviour. Referring to Thompson et al. (2005), the look, the gestures, the poses, and the frenetic movements are all a part of what the audience is known to appreciate during a musical experience. The spectators of an electronic musical performance, which relies on graphic visuals, are more likely to remember them as the icon for the artist rather than the attitude of the artist himself, because, when stuck to a computer or a MIDI-controller, giving away a lot of frenetic movements is not such an easy task. As described by Dahl and Friberg (2007) music has an intimate relationship with movement in several aspects. The most obvious relation is that all sounds from traditional acoustic instruments are produced by human movement. Usually, that is not the case with digital musical instruments. Movement is therefor not as internally connected to digital musical performances as to the more traditional ones. Goodwin (as cited in Auslander, 1999) mentions that the musician standing immobile behind a synthesizer was once a mark of coldness which now is as normal as playing the piano. Now it is the image of the musician hunched over a computer that is problematic, but just like the synthesizer, the image of the computer musician, can and will change. And it is already changing.

2.2 The Instrument as a Factor in Limiting the Performer’s Expression

One of the key reasons for the electronic performer’s lack of visibility and expressivity, which limits the communicational directness, is his instrument, the MIDI-controller; traditionally a box-shaped apparatus allowing the performer to create and shape sounds. This controller limits his movements and sort of forces him to hunch over it while turning small knobs and sliding sliders.

Although the traditional controller is limiting regarding movement, it is made to be extremely efficient for the performer. That aspect alone is not enough though.

There are research networks such as Future Instruments, international conferences within HCI such as NIME (New Interfaces for Musical Expression) and even classes such as Stanford’s 250a, that all are dedicated to bringing new and interesting instruments, normally referred to as digital musical instruments (DMIs or music instruments based on computers (Jordà, 2005)), into the world, ranging from being equipped with better expressive features to being very interesting for the sake of their utter absurdness.
In order to make clear the diversity of available digital musical instruments and how they differently enhance performative expression and visibility 35 examples were gathered. These examples, although only representing the tip of the iceberg, are then divided into 5 different categories, with 7 instruments in each, to show the multiple focuses within the field of DMIs. These groups are Basic-MIDI-control, Instrument-like, Experimental, Tables and Futuristic.

2.2.1 Basic-MIDI-control

This section contains the most common form of what a MIDI controller is known to be. Normally a box with buttons, knobs and sliders that is situated on a table beside the performer’s computer. This is what is described in the introduction and is the foundation to the performance problem at hand. The upside of these controllers is that they tend to be extremely efficient for the performer performing.

2.2.2 Instrument-like

MIDI-fying traditional instruments isn’t uncommon, or as the instruments in this section have in common, to be based on a shape and even function that relates to a traditional instrument. The instruments in this section range from laser-string harps to mobile-driven multi-instruments. The visibility of these instruments relates to that of conventional instruments where the performer holds them or interacts with them in a relatable way. Many of these examples, although relatable, do take the interaction to a new level by presenting them with touch-free interactions by using distance sensors.

2.2.3 Experimental

This section contains a more artistic approach to the musical instrument as the examples range from a box that triggers sounds when shot at with a water gun to controlling sounds through a typewriter. The instruments in this section have an interesting take on sound making although the effects often seem quite random. As

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1 Examples: Launchpad by Novation, Velokeys by Austin Whiltier (Stanford’s 250a), Multimidi by Gio Jacuzzi (Stanford’s 250a), Monome by Brian Crabtree and Kelli Cain, Sucarcube by Amanda Ghassaei, TNR-W by Yamaha, O^3 by David Bordow and Erich Peske (Stanford’s 250a).

2 Examples: Laser Harp, Trevor Freed (Stanford’s 250a), Instrument 1 by Artiphon, Laser harp controller by Prolight Du-touch by Bruno Verbrugghe and Jules Hotrique, Touch keys by Andrew McPherson, Seaboard Grand by Roland Lamb, Nomis by Jonathan Sparks.
they are experimental these instruments fit perfectly in art installations or to be used in unusual musical experiences rather than in efficient music making\(^3\).

### 2.2.4 Tables

This section could most easily be describes as an expansion of the conventional MIDI controller where the interactions all take place on some sort of flat interfaces, both digital and physical. Similar to the instruments grouped in the section Basic-MIDI-control these instruments are not that visible to the audience although the efficiency for the performer can be high\(^4\).

### 2.2.5 Futuristic

This section contains the most futuristic approaches to controllers where the main source of inspiration is the hands, the body and gestures. These instruments have a more innovative take on controlling MIDI by introducing new types of interfaces and gestures. The instruments range from distance sensor based controllers to MIDI controlling gloves and mouthpieces. These instruments have in common to be quite visible for the audience although some show limitation for the performer and others show high complexity\(^5\).

### 2.3 Performative Digital Musical Instruments

Now that the broad landscape of DMIs has been introduced the next step is to define a cross-section group more connected to the performance aspect of music. To do so I suggest a new term for digital musical instruments with the notion of enhancing musical performances, *Performative Digital Musical Instruments* or PDMIs. As stated by interaction designers Gurevich & Cavan Fyans (2011), music performance is often framed in terms of communication and cognition where the spectator receives and decodes messages that are encoded by the performer. In order for an instrument to be performative in that sense, it needs to help the

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\(^{3}\) **Examples:** Sonic anxiety by Victoria Grae and Joel Chapman (Stanford’s 250a), String by Josh Coronado (Stanford’s 250a), The processed typewriter by Andrew Watts (Stanford’s 250a), Electroacoustic JellyMuse by Byron Walker, Maria Malone, Jack Cook (Stanford’s 250a), Sonic Drop by Elliot Kermit-Canfied, Pablo Castellanos, Cooper Newby, Justin L (Stanford’s 250a), Mediated Body by Mads Hobye, Interactive Butoh by Future Instruments.

\(^{4}\) **Examples:** Airplane by Future Instruments, Multi-touch everywhere by Future Instruments, Touch table by Future Instruments, Sound rose by Future Instruments, percussion by Future Instruments, Surface Editor by Future Instruments, Reactable Live! by Reactable.

\(^{5}\) **Examples:** Mi.mu by Imogen Heap, Beatjazz by Onyx Ashanti, Tact by Caleb Rau (Stanford’s 250a), Flex effects by Holly Jachowski (Stanford’s 250a), Hand Controlled Orchestra by Hagai Davidoff, Midi Controller Jacket by Machina, Crystal ball by Naonext.
performer perform. It needs to augment communication and cognition. The definition of a PDMI is therefore defined here as an instrument that combines visibility and expressivity. **Visibility** connotes thus that the instrument is visible to the audience and therefor promoting the communication of where the source of the music is. **Expressivity**, connotes thus that the instrument promotes bodily movements of the performer, as movements are essential in the production of expressive performances (Davidson, 1995), in order to augment the visual perception of the spectator.

A chart dividing the DMIs into how visible and how expressive they are is here presented in order to understand which of these instruments could be defined as PDMIs.

### Expressivity

<table>
<thead>
<tr>
<th>Visibility</th>
<th>HIGH</th>
<th>MID</th>
<th>LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td>Nomis</td>
<td>Midi Contr. Jacket</td>
<td>Sonic Anxiety</td>
</tr>
<tr>
<td></td>
<td>Instrument 1</td>
<td>Laser Harp Contr.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Beatjazz</td>
<td>Interactive Butoh</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mi:mu</td>
<td>Sonic Drop</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flex Effects</td>
<td></td>
</tr>
<tr>
<td>MID</td>
<td>Crystal Ball</td>
<td>0^3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seaboard Grand</td>
<td>Laser Harp</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Touch Keys</td>
<td>Hand Contr. Orchestra</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TNR-W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Suncube</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mediated Body</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electroacoustic JellyMuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOW</td>
<td>Airplane</td>
<td>Launchpad</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multi-touch everywhere</td>
<td>Multimidi</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Touch table</td>
<td>Velkeys</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sound rose</td>
<td>Monome</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Percussion</td>
<td>String</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surface Editor</td>
<td>Processed typewriter</td>
<td></td>
</tr>
</tbody>
</table>

As seen in the figure the instruments that scored high in both visibility and expressivity are the ones that are defined as PDMIs. Two of these instruments come from the *Futuristic* section and two from the *Instrument-like* one. When the graph is analysed it can be seen that the division between categories has almost nothing to do with where the instruments get situated within the graph. Although the categories *Tables* and *Basic-MIDI-Control* are situated at the rear end from where the PDMIs are placed, the explanation is their low visibility when being used on...
stage. When it comes to other categories they seem to be divided reasonably equally.

The instruments defined as PDMIs are Nomis, Instrument 1, Beatjazz and Mi.mu. These instruments have in common to be very visible to the spectator as well as allowing for bodily movement.

2.3.1 Nomis

Nomis by Brooklyn based artist Jonathan Sparks is created with the aim of making loop based music more expressive and transparent ("Nomis," 2015). Sparks’ instrument doesn’t necessarily allow for the performer to be running around on stage but it introduces new types of interactions and it is highly visible. Defined within the Instrument-like group, although on the edge, it somehow reminds of a steel drum where the performer tips his fingers inside a gigantic circular object to produce sound. He then rotates this circle in order to loop the sound and start playing on top of the already looping music. This rotation of the circle is somewhat a mechanical gesture and playing a circular keyboard is something uncommon and allows for new and big movements here translated as expressivity. The visual feedback shows both when the notes are being played and also how many loops the performer has made. Although interesting to look at, the interface shows some limitation on its own as looping short sequences of music, in most cases, quickly becomes tiresome. So although being performative in the sense of visibility and expressivity, it could gain from more diversity regarding music creation abilities.

2.3.2 Mi.mu

The Gloves project with the musician Imogen Heap in the front is an experimental gestural music ware developed for the purpose of the musicians studio and stage work. Through the gloves Imogen Heap can both create and control sounds with gestures and movements in space ("The Gloves," 2015). This instrument is probably the most expressive digital instrument there is at the moment, both by allowing the performer to walk around the whole stage and by using the whole body to create and shape sounds, its possibilities seem limitless. At the same time as it is very interesting to watch, it is also very strange, as normally you would see a performer touching something physical, generating change in sound, where with the gloves you only see the movements of the body. For example you could see Imogen Heap drum with her hands in mid air, still producing drum sounds without touching anything. These wearable gloves could free the electronic artists from their knob turning performance methods and allow them to express themselves in a whole other dimension. While the traditional table-based MIDI controller and laptop shield the performer from giving anything away, the PDMI forces the performer to give it
everything he’s got as he has to move around the stage in order to create and shape the music he is there to perform.

2.4 DMIs as PDMIs (Deviation)

To be absolutely clear, PDMIs are tools that help the performer perform. It is not necessary to perform with a PDMI to make a body movement based performance. Using a PDMI just makes it easier. For instance, Icelandic electronic artist Hermigervill dances and moves frantically when performing behind his equipment although using very static tools that don’t necessarily augment the use of movement. American based artist and DJ Gaslamp Killer does the same and even takes it further by stepping in front of his setup armed with an Ipad, not the most expressive tool, mainly because of its limited finger gesture interface. He manages to transform the Ipad into a PDMI through his movements and exaggerated gestures.

As shown with these examples they are deviation from what can be classified as a PDMI. Although a PDMI is only an instrument that enhances the performance of a performer, transforming DMIs into PDMIs is possible with the right attitude and with a high degree of expressivity between the performer and his instrument. The
performative part of that particular instrument is hidden but becomes visible when used in combination with high performative energy. Performative energy explained here as the power the performer puts into his musical interpretation. It is, and this I state as the obvious, much more effective to watch a performer high on performative energy, giving the performance everything he’s got, than watching someone murmuring lines, while frozen in time and drowning in shyness.

2.5 Sonic Warfare & Performance (Sight, sound and …)

In the opening of his book Sonic Warfare: Sound, Affect, and the Ecology of Fear, musician (known as Kode9) and lecturer in music culture Steve Goodman (2009) tells the story of the Israeli air force using sonic bombs, or sound bombs, on the Gaza Strip in November 2005. He describes the affects of sonic bombs, how you would experience an intense sound that shocks you to your very core, but when looking for the sound source, there is no damage visible, with you left resonating with the encounter.

“A sonic boom is the high-volume, deep-frequency effect of low-flying jets traveling faster than the speed of sound. Its victims likened its effect to the wall of air pressure generated by a massive explosion. They reported broken windows, ear pain, nosebleeds, anxiety attacks, sleeplessness, hypertension, and being left “shaking inside”.” (Goodman, 2009)

<table>
<thead>
<tr>
<th>Physicality</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
</tr>
<tr>
<td>HIGH</td>
</tr>
<tr>
<td>MID</td>
</tr>
<tr>
<td>LOW</td>
</tr>
</tbody>
</table>

![Diagram of Physicality](image)
This description of horrible warfare methods reminds us that sound isn’t only audible but can also affect the entire body. Sound is vibration and vibration is tactile. Whether it is an explosion or just a forcefield of distorted guitars being played through high volume amplifiers.

Quoting Fischer-Lichte (2009) a professor of theatre studies, “the audience’s physical participation is set in motion through a perception which is shaped not only by sight and sound but also by the physical sensations of the entire body” (p. 36). Sound doesn’t only affect the body through the auditory senses but also through the tactile. How you can feel sound, its vibrations, on your skin or in your gut. A physical sense in its most literal meaning.

When looking back on the chart of PDMIs, and taking into account other senses than sight and sound, as an aspect of the Ultimate Performative Digital Musical Instrument, all of the examples fall short. Physicality is here described as how much the spectators feel the effects of the instrument on their bodies. The instruments all keep the same visibility but their physicality is low. The explanation is of course that the literal physicality isn’t felt through a digital musical instrument but the instruments’ extension, the loudspeaker. And for it to be felt, it has to be loud. Even with a more traditional instrument you need to be very close to it to literally feel its effects. Based on my own experience, feeling sound can be a very extraordinary experience.

2.5.1 Related to Physicality

Although the instruments mentioned do not focus on other senses than sight and sound, there have been projects made focusing on the tactility of vibrations and on the body as an interface.

2.5.2 STiMULiNE

STiMULiNE is an audio-tactile concert for 28 spectators and 2 musicians, Julien Clauss and Lynn Pook, where they explore the tactile dimension of sound and its transmission through the body. Each participant wears an overall suit in which are 15 speakers that transmit vibrations to the skin. The vibrations move between speakers across the body creating tactile feeling and ambient music is transmitted to the sense of hearing through the bones of the participants. The participants lie on the floor and each participant has his individual experience. The performers are playing live and are equipped with an interface showing a body where they can draw in the movement of the sound across the bodies (“STiMULiNE,” 2015).
2.5.3 Mediated Body

Mediated body by Hobye and Löwgren (2011) is a symbiotic system consisting of a suit which a performer wears while interacting with a participant. It focuses on the tactility of touch between performer and participant, as when the participant touches the skin of the performer the sound, played through headphones, is affected. In the same way, when the performer touches the skin of the participant, the soundscape is affected as well. It is a shared experience between a performer and the participant. Although it doesn’t focus on the tactility of sound it focuses on the tactility as a sound generator, bringing performers and audience closer together through the bare-skin touch of strangers.

2.5.4 KOR-FX Gaming Vest

The KOR-FX gaming vest uses audio signals from games and turns them into haptic feedback that allows the gamer to feel what is happening in the game on his body. You can therefor feel explosions, when someone shoots at you or even the blades of a chopper thumping in your chest. The vest uses special transducers that echo output into the chest turning the body “into an instrument that allows you to feel the environment extremely accurately,” instead of normal spinning motors to create vibrations (“KOR-FX 4DFX,” 2015). It seems to be a very enhancing game experience to be able to feel all the interactions in the game on your body. Interestingly enough their website still emphasises that their gear creates a strong physical and emotional effects, and if you have a heart problem you need to check with to your doctor before using the vest (“KOR-FX 4DFX,” 2015).

2.6 Vibrations

Going back to Steve Goodman’s Sonic Warfare, sound is not always pleasant. As mentioned in KOR-FX’s safety notes it can for example interfere with your heart in an unpleasant way. As Goodman (2009) describes:

“Noise, like anything else that touches you, can be a source of both pleasure and pain and that “beyond a certain limit, it becomes an immaterial weapon of death. The ear which transforms vibration into electric impulses addressed to the brain, can be damaged, and even destroyed, when the frequency of a sound exceeds 20,000 hertz, or when its intensity exceeds 80 decibels. Diminished intellectual capacity, accelerated respiration and heartbeat, hypertension, slowed digestion, neurosis, altered diction: these are the consequences of excessive sound in the environment” (p.10).

Sound, or noise, is fundamentally nothing else than a vibration. And to describe the tactile part of that vibration, according to Roads (as cited in Goodman, 2009) the
force of an explosion, for example, is nothing else than an intense acoustic shock wave. Going away from the negative aspects of sound, noise or even music - as destroying ears and explosions are not the topic of this thesis - it is fair to remind that vibrations are in fact the main source of life.

“When the atoms are travelling straight down through empty space by their own weight, at quite indeterminate times and places they serve ever so little from their course, just so much that you can call it a change in direction. If it were not for this swerve, everything would fall downwards like rain-drops through the abyss of space. No collision would take place and no impact of atom on atom would be created. Thus nature would never have created anything.”
- Titus Lucretius Carus (as cited in Goodman, 2009, p.106)

If a particle ceased to vibrate, it would cease to be. We can therefor say that vibratory energy is the energy of existence (Goodman, 2009). Musical instruments create vibrations, both audible and tactile, although in most cases the audible is what the audience notice. While the tactile vibration isn’t always felt directly it can often be felt as it embodies us and through its rhythm, enforces us to move.

2.7 Rhythm

Embodying rhythm is something we do automatically. Rhythm is everywhere in nature. It happens within our bodies without us having any control over it. Most notably within us, counting on a steady rhythm, is our heart, pumping blood to our veins, assuring our wellness and, literally, our being. We see certain movements, hear certain words, sound and melodies and we perceive them all rhythmically (Fischer-Lichte, 2008). Georg Fuchs (as cited in Fischer-Lichte, 2008) assumed that the rhythmic movements of the human body could be capable of infecting other people with the same or similar rhythmic vibrations, resulting in them entering a state of ecstasy. It could therefor be said, if assuming that Fuchs was right, that by infecting bodies in a similar state, let’s say bodies in an audience, with rhythm which they therefor embody, could leave them in a state of ecstasy.

2.8 Feedback Loop & Community

When performing without graphic visuals, the performative energy has to come from within the performer. When watching a performer that shows clearly that he feels like he’s in an awkward situation, the awkwardness is transmitted to the audience. It is clear by watching the performer’s movements, gestures and facial expressions in what state this person is (Davidson, 1995).

“The actors act, that is, they move through space, gesture, change their expression, manipulate objects, speak, or sing. The spectators perceive their actions and
respond to them. Although some of these reactions might be limited to internal processes, their perceptible responses are equally significant: the spectators laugh, cheer, sigh, groan, sob, cry, scuff their feet, or hold their breath; they yawn, fall asleep, and begin to snore; they cough and sneeze, eat and drink, crumple wrapping paper, whisper, or shout comments, call “bravo” and “encore,” applaud, jeer and boo, get up, leave the theatre, and bang the door on their way out.” (Fischer-Lichte, 2008, p.38).

Everything the performer does demands a response from the spectators and in return effects the whole performance. This is what is called a feedback loop. Each performance is unpredictable and spontaneous to a certain degree (Fischer-Lichte, 2008) where the feedback loop is fuelled through the particular attitude and experience of the audience. The audience physically experience and absorb the energy emitted by the performer and transfer it back to him (Fischer-Lichte, 2008), looping the energy between them. In order to form a feedback loop it is necessary to create a community out of the performer and spectators based on their bodily co-presence (Fischer-Lichte, 2008).

Philip Auslander (1999) a professor of performance studies disagrees with that generating a community is even viable by stating that while “the experience of theatre (of live performance generally I would say) provokes our desire for community … [it] cannot satisfy that desire because performance is founded on difference, on separation and fragmentation, not unity” (p. 57).

Although there is, in traditional musical performance, a clear separation between performers and spectators, a community is normally not based on communism, where everybody is equal. A community, in my opinion, can therefor be created and be united although there is a person that has a different role in the community than the rest. Nevertheless, based on these speculations, it is interesting to focus on the spectators in this scenario, and how their unity can be enhanced. Quoting Auslander (1999) again, he also states that “the sense of community arises from being a part of an audience, and the quality of the experience of community derives from the specific audience situation, not from the spectacle for which that audience have gathered” (p.54). It is the situation that matters. Relating back to the quote from the beginning of this thesis, an interesting question is how it is possible to help create the overwhelming passion we experience when we find us as a part of a crowd, united.

2.9 A Summary in Relation to the Research Question

As my focus is on the visual and physical aspect of musical performances I presented the two main aspects of visual perception in electronic music, stating that in order to enhance communication the bodily performance would have to be present.
I presented the traditional MIDI controller as one of the main reasons for the performer’s limitation in expressivity, meaning limitations in movement. From a vast diversity of instruments I proposed a cross-section indicating performative instruments, which help the performer perform, that is, augment the visibility of the performer’s interactions as well as his expressivity which should enhance the communication with the spectators.

I discussed the physical aspect of sound, how instruments do not address that aspect although being an important part of the audience perception. I discussed how sound can both have devastating consequences through its tactility as well as being the main source of life. I discussed rhythm in that context as well as mentioning the idea of generating ecstatic experiences between people with the same mindset through rhythm. I then discussed the idea of the feedback loop, how everything the performer does demands a response from the audience. How a feedback loop, the ultimate form of communication in a performance context, generated through energy looped back and forth between the performer and spectators, can be produced through the creation of community, which is based on the bodily co-presence of performer and spectators as well as the specific audience situation.

The most important insights from this section for my ongoing process are therefor:

1. **Visibility and expressivity of the performer’s actions regarding his creation of music are important for the spectator to receive and decode messages that are encoded by the performer.**
2. **The audience's physical participation is set in motion through sight, sound and physical sensations of the body, here referred to as the tactile side of sound.**
3. **Infecting bodies with rhythm could generate an ecstatic experience with the spectators, resulting in a community and therefore a feedback loop, the ultimate communication between performer and spectators.**

### 3. Method

The method for this thesis is *Research Through Design* as described by Zimmermann, Forlizzi & Evenson (2007) where the notion is to produce knowledge for other designers, rather than producing a “commercially viable product” (p.7). Through the process the focus will be on “identify[ing] opportunities for new technology” (p.5) and designing the right thing, an artefact “intended to transform the world from the current state to a preferred state” (p.5) and not be a refinement “of product that already exist in the research literature or commercial markets” (p.7). This model of design research encourages designers to do what they do best: “to study the world and then to make things intended to affect change” (p.7).
My notion is therefore to change the world from one state to another, from the electronic musical performance I’ve described in the beginning of this thesis through my design process ending with a concept. This concept, as well as the process of how I got to the concept, is my contribution to other designers. By doing so, my knowledge contribution is intended to not have this type of performance get stuck in space but rather to help design future interactions, enhancing the communication between spectators and performers, one leap at a time.

3.1 Methods Implemented During the Process

During the time period of the design process I attended a few concerts in order to compare different types of performances between different genres of music. These were electronic, hip-hop and rock concerts, DJ discotheques and orchestral concerts. I attended them as a spectator focusing on the performers and how they communicated to the spectators as well as the spectators’ feedback to them.

This method only gave me insight from the spectator’s perspective, and only from my own point of view and how I experienced it and the people around me. Other insights might have given different results. By interviewing the performers addressed here I might for example have gotten a better insight into their view and intentions.

To understand the performer’s perspective I carried out a survey, pointed at electronic artists used to performing live. The survey was sent through social-media to Icelandic electronic artists that will remain anonymous, as promised. This survey, that was written in Icelandic, was mainly formed in order to confirm my ideas of the standardisation of electronic performances, aimed at the use of MIDI instruments, setup, music software and performance. The replies I got were in total seven.

I only included Icelandic artists due to my access to their social-media-society. To my experience the use of MIDI controllers, music software and this type of performance discussed is quite consistent throughout the field of performing electronic music and does not, to my knowledge, change between countries. Including more than seven could have given other results although the take from this survey was mostly to gain a stereotypical understanding.

In order to get a better understanding of spectators I conducted a twofold test involving participants all having been in the role of spectators at concerts before. The participants were in total six, aged between 22 and 34 and the gender division was equal. All of the participants come from different countries; Iceland, Sweden, Greece, Netherlands, Mexico and Bulgaria, and therefore have different cultural backgrounds, different taste in music and different perspectives on what a musical performance should be. Their musical background ranges from none to very high and everything in between. The first part was an interview addressing previous concert experiences, establishing an overview of what the participants focus on
during concerts, what they expect from the performer and why they attend live concerts.

Broader or more narrow age range could have given different results although I speculated this age range to be a group that goes regularly to electronic concerts. Different backgrounds gave different perspectives, and I don’t think narrowing that down would lead anywhere, as the concert spectator is normally not limited to one origin. Including more participants from even more diverse backgrounds could have given different results. Only one of the participants had really high musical background and including more with similar background, as well as participants with background in electronic music could have given other answers.

In the second part I used a participatory research method found in IDEO’s method cards (2003), called Conceptual Landscaping which is described as a research method where the designer sketches the aspects of abstract social and behavioural phenomena in order to understand people’s mental models of the issues related to the design. The sketches were in the form of seven video scenarios showing a performer controlling various sizes of MIDI controllers created with quick-and-dirty prototyping. Therefor the controllers were not real but faked by adding a layer of music on top of the videos while showing the performer moving objects around to make shifts in the music.

The participants were asked to imagine that they were in a live situation and that they were amongst the audience watching the performance acted out in the videos. The scenarios were performed in front of a white background with no lights or visuals for enhancement, in order for the participant’s focus to stay on the different performances. The same line of questions were asked after each video, how they perceived the performance, what they focused on, how connected they felt with the performer, if it was interesting enough to watch for 30 minutes and if they understood the performer’s interactions. The visibility and expressiveness escalated with each scenario.

The music used in the performance was an unheard electronic soundtrack without vocals which was split into three 30 second parts, divided between the videos. By using an unknown soundtrack and using the same setting in each scenario instead of using well-known performances and songs, the notion was to be able to show different performance scenarios without popular songs influencing the perception of the participants.

A video scenario leaves out many aspects of the musical performance. I left out graphic visuals and lights deliberately for the participant to focus on the performer but then asking the participant on what he is focusing on the other hand might have influenced him in his answer. Also having to imagine being in a social situation watching something live interrupts the flow of similarities between participants, as I don’t have insight into how different persons’ imagination works, I can’t speculate how the situation was acted out in the minds of the participants. On the other hand I had to be able to produce the test in a fairly quickly and easy way, so the setting was created within a classroom, which doesn’t really resemble a live concert. I also wanted to be able to show the participants the same thing and by
using video scenarios I was able to fake things in a more “real” way than if I had done it live, making the classroom situation much more obvious. Lastly, the song used being unheard was not necessary, because when it comes down to it, musical taste is already so diverse.

The notion of this test was to gain an understanding of how necessary visibility of the performer’s interactions with his instruments are to the spectator, how important expressivity is in a performance, if the scale of the controller had anything to say, what raises their interest, as well as addressing the importance of communication between performer and spectators.

The results from this test generated an idea of introducing the tactility of music straight onto the spectators’ body as an attention captivator. In order to explore that idea a session of bodystorming was carried out to find the most responsive spots on the body for tactile perception of sound. Bodystorming as described by Oulasvirta, Kurvinen & Kankainen (2003) is “the attempt to solve the problem [which] occurs in a place where the phenomena (or parts of them) are directly observable” (p.126).

To conduct the session I used two speakers transmitting low frequency signals in different places of the body. I used my own body to find these spots using the criteria that if a spot is not responsive on myself it is not responsive on everybody. Out of this session I identified seven spots as the most responsive. Out of these seven, one was identified as the best pick for an ongoing design process after meeting the criteria of being visible to other spectators, responsive to the body, and normally not covered in clothes.

The session was conducted in the studio which relates more to the idea of brainstorming (Oulasvirta et al., 2003), although I would argue, as the body is in this context the phenomena being observed, that in order to find its most responsive spots, the environment has nothing to do with the result. In a slightly different environment, the body will very unlikely change his state of responsiveness.

From the knowledge gathered from the tests and observations in the design process I generated a concept. A tactile sound wearable called Sonicality.stereo presented as a new dimension for the performer to communicate with the spectators by allowing them to feel certain parts of his songs played on the back of their necks. The product was designed to some detail presenting probable aesthetic and functional aspects of it in order to see how it could look, work and feel.

To validate the concept I assembled a small concert space that held approximately four spectators and one performer. As small as possible so it would be as natural as possible, to get as accurate response as possible of how Sonicality would be experienced in a social setting, for the participants to be able to ideate in a natural way what they would want to feel or experience, as well as to see how it would affect the performer-spectator communication. In order to enhance the naturalism of the situation the participants were offered beer before the test which half of the participants accepted. Three songs were played during the concert, Kiasmos -
Looped (2014), Four Tet - Parallel Jalebi (2013) and Gold Panda - Marriage (2010). In each song I tried different use methods of the equipment. During the test I also tried several performance methods. The concerts were then followed by a discussion about the experience. The participants were four, from Denmark, Netherlands, Bulgaria and Greece. The gender division was equal and the age ranged between 24 and 29, with musical training ranging from none to medium high.

The participants were only four due to limitations in the prototypes I was able to produce. Although given beer before the testing, the first minutes were kind of awkward, similar to the first minutes in a party. Preparing the participants more beforehand of what was to come could have limited that awkwardness, which may have affected the results of those first minutes. The test was also set up in a class room, and would probably have provided different results if held in a real concert situation where the number of participants is higher while not necessarily being aware of that they are participating in a test. In the discussion that followed I am aware of that by conducting a group discussion some voices may be stronger than others but I carefully saw to it that everybody would share their opinion. Because of the limitations in number of participants I felt it was very important to have the gender division equal. Again, a different or more diverse age range could have equipped me with different results.

Straight after the test I conducted another test with the same participants. This test addressed new interactions of the equipment as I had already discovered some limitations with it. In this setting the participants were tested individually. For this test I used the Wizard of Oz technique which “involves making a working system, where the person using it is unaware that some or all of the system’s functions are actually being performed by a human operator, hidden somewhere “behind the screen”” (Buxton, 2007, p.240). The participant sat on a chair listening to a song, Four Tet - Parallel Jalebi (2013), in headphones while watching graphic visuals on a computer screen. Meanwhile I stood behind the person ready to use the participant’s back as an interface on certain cues in the song. I tested four different scenarios, multiple touch points, moving an object over the whole back, vibrations crawling up the back and a big object moving and producing cold.

Although the Wizard of Oz can be a very effective technique in many scenarios it displays certain limitations when the interface being tested is the participants body. Without blindfolding the person being tested, she is quite aware of what is happening around her, especially if another person is poking or rubbing objects onto her body. Furthermore, the person performing the test is limited to the back of the participant’s body, as the criteria is that the tester is not seen. Here the same issues as in the previous test might change the results, number of participants as well as age range.

From these tests the concept was revised into a product called Sonicality.surround presented as a sketch created out of the findings in this thesis, based on its knowledge contribution.
4. Concert Observations

4.1 Defining the Design Research Frame

The scope of this project circulates around the solo performance of the electronic musical performer that is hunched over his laptop or MIDI-controller. The music focused on is somewhere in the midst of *electronica* and *trip-hop*, but as genres very quickly become confusing a better description would indicate a tempo ranging from 110-120, not fast enough to dance to aggressively but still influences the body to move to the rhythm, an electronic beat and bass accompanied with higher-frequency instruments and sampling, while build-up of the songs is still quite traditional (verses, choruses, bridges, drop downs etc). The music mentioned is in the realm of Four Tet, Gold Panda, Kiasmos, Burial and even Massive Attack, but non-vocal and as a solo performance. The place had in mind is a small gig venue. A controlled space where spectators don’t count hundreds, but rather a few dozens. As mentioned before, so many external factors influence the act of music, so narrowing the scope is done to help with the design process.

4.2 The Performer-Spectator Relation

During the time period of the design process I attended a few concerts in order to compare different types of performances between different genres of music. These were electronic, hip-hop and rock concerts, DJ discotheques and orchestral concerts. Without going into too much detail, what I gathered from these concerts was:

- The electronic artists were hunched over their equipment not communicating nor engaging with the semi uninterested spectators sitting around the venue, which both were watching and chatting amongst themselves. The music was very experimental accompanied by graphic visuals with no clear connection to the music being performed.

- The hip-hop artist interacted with the crowd and captivated them, having them standing up and moving their bodies, even taking part in the singing. A clear appreciation for the artist's performance was felt.

- The rock artists communicated with the crowd between songs through speech. During their songs they were focused on their instruments but not in the same way as the electronic artists because in this situation the spectators could see the music being created. Their instruments and their manipulations weren’t hidden. How the guitar player strummed the notes on his guitar in a cool and confident manner and the drum player hit the skins of his set creating a complex and groovy beat. This expressive movement, especially when involved in a skilled bodily practice, can enhance the aesthetic experience (Gurevich & Cavan Fyans, 2011) of the spectator. Spectators stood still and watched them, some wandered off and others joined instead. The venue was much bigger than the electronic and hip-hop venue and the
connection between the performer and spectator was therefor not as direct as in the smaller venues.

- The DJ discotheques are only mentioned as the DJ’s have a very similar setup to the electronic artists. The spectators, mostly being listeners as almost no one seemed to be focused on the performer, interacted with each other in dance, as that was the clear goal of the situation, while disregarding the performer.

- The orchestral concert has a clear deviation from the other situations mentioned. There are so many rules and traditions in the conventional orchestral concert. The audience have their place and are expected to be quiet, not to talk amongst themselves, not to go to the bar (if there even is one), and definitely not applaud between chapters of a piece. The conductor turns his back to the audience and the only time you see his face is when he walks on to stage and at the end of the concerts. It was still very satisfying for the eye to watch the conductor control the ensemble with his gestures, transmitting energy with his exaggerated and energetic movements, through his baton and hands, clearly audible in the intensified power played by the instrumentalists. During this performance I could also sense the power of the music during specific chapters, like a sonic wall pressing up against my body.

4.3 Understanding the Performer

Because I’m looking into the communication between performer and spectators, understanding the performer’s perspective is needed. To do so I carried out a survey, pointed at electronic artists used to performing live. From seven replies I gathered that all of these artists base their performance on conventional MIDI controllers positioned in table height, accompanied with their computer. Notably, my statement of electronic artists standing behind their equipment mostly nodding their head, although trying to look active, proved right in all cases, even from their own point of view. The survey also revealed that four out of seven use Ableton Live, both to compose their songs as well as to perform them live. The controllers they use to control volume, filters, equalisers, effects, dry/wet, play, stop, tempo and as triggers.

To explain the electronic performer’s actions I find it more appealing to compare him to the orchestral conductor. In many ways they seem to have more in common than the electronic artist than the rock performer. A conductor is someone that controls an orchestral operative performance by means of gestures. This control involves the beating of time, the ensuring of correct entries, and the shaping of individual phrasing (Kennedy & Kennedy, 2007). Comparing this definition with the digital musical performance, the performer is conducting a mixture of instruments, or an orchestra, inside his computer using gestures, although sometimes very subtle. This involves controlling the tempo, triggering correct entries of sound clips by hitting buttons on a MIDI-controller and shaping a track’s individual phrasing by changing its timbre, usually by turning knobs. And in both cases affecting the audience’s auditory and visual senses. The physical sense is not kept a part of this comparison.
because it is not always a factor, but something that is only felt if the situation allows for it.

The interesting thing about MIDI-controllers is that they can be mapped to control anything in the music software. Therefore the setup for each performer is different from the next one, and the fact is, if the performer wanted, he wouldn’t need to map to anything, as this can all be pre-written into the software. Therefore most legit performers create live sessions of their compositions where they actually need to practice and use their skills in order to be able to perform them. Regrettably, in most cases there is no way of knowing if the performer is showing off these skills or not as his interactions are mostly hidden from sight. Relating back to Nomis and Mi.mu, that kind of controllers could help the performers show off their professionalism.

4.4 The Spectator

In order to establish an understanding of different spectators, how they experience musical performances, what they focus on and what they think is important for them to enjoy a performance I interviewed 6 participants, all having been in the situation of being spectators at concerts.

In part one they were asked a few questions regarding their past experiences and in part two they were showed seven video scenarios showing a performer controlling various MIDI-controllers in order to see if visibility and expressivity, as well as the
scale of the controllers, had anything to do with their experience. The setting of the interview was informal and the interviews were held separately.

4.4.1 Interviewing Spectators

The first question addressed the participants' usual focus when attending any kind of concerts. All of the participants seemed to think about concerts as something where a band performs with traditional instruments. The singer was mentioned more than once mostly because he is the one addressing the audience while the most common answer was that the focus would be on the performers and what they were doing.

When asked about if they saw a difference between a rock band or an electronic music artist the answer was without exception yes. When asked to expand on that the participants' explanation of difference lies in that members of a rock group usually use their body to perform, whilst performers relying on a computer rely more on some sort of external output to enhance their performances, such as projected visuals or lasers. When asked about difference between these performance methods the answer was that the main difference is that by watching a body-based performance you relate to the movements and get the connection to the music being generated. It's an expression tool whereas the connection between pushing a button to change a projected animation isn't as obvious.

When asked to describe how they imagined a standardised electronic musical performance, the descriptions were very similar, stating that the most common version is quite subtle. It is common to see only the upper body of the performer where he's situated behind his computer, or his equipment, moving sliders to control the sound. Combined with limited use of lighting or fog while his body performance is at most raising his hand to communicate with the audience sometimes accompanied by external graphic visuals. Understanding what the performer is doing isn't always important but getting a glimpse of something that he does that can be related back to a shift in the music can be very enhancing. It could for instance bring you closer to the performer. Amazement and questions raised in how a certain thing is produced can also work as enhancing for the performance. Two participants mentioned that understanding what the performer would be doing could be important in order to know that the performer was actually doing something, that he wasn't only checking Facebook. Another emphasised that although you wouldn't necessarily understand everything that the performer would be doing, seeing his interactions is a big part of the performance and a part of why you would want to see the artist live, otherwise watching the performance on Youtube, without paying for entrance, would be just as good.

When asked about why the participants attended concerts in the first place, what they expected to experience the answers were that they wanted to see the performer in real life as live performances often adds something unique and
unexpected, plus that the quality of the sound experience is much higher. What almost everyone mentioned was then the social situation, to have an experience with friends and to be surrounded by people that have the same taste in music.

5. Design Inquiries on Visibility and Tactility

5.1 Video Scenarios of Performances

In the second part of this test the participants were showed seven short videos presenting different performance scenarios, where the notion was to explore the importance of visibility and expressivity as well as scale of the instruments, as a tool to augment visibility, in relation to the performer-spectator communication.

5.1.1 Scenario One

In the first scenario the performer uses only his computer to control sound. Two participants were troubled by the fact that the performer didn't acknowledge them by looking straight into their eyes. Others were not as concerned about that if the performer was busy manipulating his instrument. In this case the participants agreed on that this performance method was not that interesting. It could work but the likeliness of going to the bar or talking to friends while this performance was taking place was very high. The overall focus of the participants was on the performer and his movements, waiting for his body language to change. The understanding of his actions were none as what he was doing wasn't visible and he could as well have been doing something completely different. This method was also described as very ordinary.

5.1.2 Scenario Two

In the second scenario the answers were similar. In that scenario the performer had moved his interactions out from the computer over to a small MIDI controller that
wasn’t visible to the participants. The participants thought the movements were more exaggerated and the change in music was therefore more obvious. The performer’s effort level seemed to be more visible and the focus of the participants was more or less on the performer’s movements while trying to see change in sound based on them.

5.1.3 Scenario Three

The difference between scenario two and three is that in this scenario the performer takes the controller hidden in the previous video and holds him so all interactions are visible to the audience. The participants thought the balance between music and performance were becoming more equal although the interaction with the controller seemed a bit awkward due to its smallness. If the performance was interesting and if the participants understood the interactions varied. It was perceived as a one way communication. Two participants said that they focused especially much on the facial expressions.

5.1.4 Scenario Four

In this scenario a much bigger controller is presented, tilted in a way that the audience can see the manipulations of the performer. The participants didn’t feel that the interactions were as exaggerated as in the previous ones but instead the movements were bigger due to the bigger interface. To one participant it reminded him almost of a piano or something very analog while others didn’t find it interesting at all and tilting the controller didn’t help much as the interface didn’t allow for much expression from the performer. The focus in this scenario was on the movement of the hands, which interactions were quite obvious.

5.1.5 Scenario Five

In this scenario the proportions of the controller were scaled enormously, making all
movements very exaggerated and also introducing new controlling-movements such as pulling a string in the air and pulling back an object which resembled more of a machine-like manipulation, relating to Nomis. The participants thought the sizes of things made the performance interesting and kind of surreal, as well as more amusing looking and more like a show which enhances the performance. Understanding of the manipulations varied, hearing the effects of the manipulations was obvious although a clear understanding of what each object did wasn’t clear. One participant mentioned that using such big controllers could be fascinating as it is harder to time things right but then another mentioned that the usability for the performer would be less.

5.1.6 Scenario Six

In this scenario a more free performance method was presented. The performer holds two different controllers in his hands, relating to Mi.mu, shaping sound by moving them within a three-dimensional space. Here the focus was on the hands trying to understand what they were doing. The movements were perceived as more natural and not as pretentious as in the previous examples. In relation, Imogen Heap was mentioned as a successful version of something similar and another one related the performance to playing a theremin. The performer was thought to resemble a magician, while doing something that speaks to the imagination although the gestures used showed limitations.

5.1.7 Scenario Seven

In this scenario four colourful objects represent different instruments where the performer pushes them to trigger sounds or moves them back and forth like gigantic sliders to shape the sound. Going back from the wearable example in scenario six to this scenario which is based more on the conventional button/slider combination showed a clear lack of interest as it was too traditional after having seen the
previous scenario which was described as being close to science fiction. The focus here was on the instrument because of size and the colourfulness of the objects. The instrument was described as a wall between the performer and audience. By using more untraditional movements, such as the mechanical movement mentioned in scenario five, the audience could possibly be kept captivated longer.

5.1.8 Analysis

In relation to the statement that visibility and expressivity of the performer’s actions regarding his creation of music are important for the spectator to receive and decode messages that are encoded by the performer, I came to the same conclusion. The idea that a scale would augment the visibility on the other hand didn’t seem to be true because it doesn’t necessarily make the performer’s interactions more visible but rather makes his gestures bigger. The scale of the instrument can transform the performance into more of a surreal show for the audience but meanwhile limiting the usability for the performer. The interest level on the other hand isn’t likely to be captivated unless the manipulations presented show something new.

The musical background of the participants didn’t seem to have anything to do with their perception. The participant with the most musical experience focused mostly on stage performance and changes in facial expression, most likely relating to her own experience as a performer, but other participants with less musical experience did still focus on the same. The participant with the least musical experience said he normally focuses most on the other spectators in the crowd, while he emphasised he wouldn’t understand the manipulations of the performer because of his lack of musical knowledge. Interestingly enough the participant with the most musical experience, mentioned that when seeing a guitarist play, she wouldn’t necessarily understand his interactions because her instrument isn’t the guitar. From this can be speculated that although seeing what the performers are doing is important in order for the audience to be captivated, understanding what they are doing isn’t necessarily as important, but if a clear effect of a visible manipulation is noticed once in a while, that can be very intriguing.

It is therefore not a question of scale but rather about introducing something new, expressive and visible, whatever the size.
5.2 Attention Captivators

Referring to the interview in 4.4.1 it is noticeable that the spectators are used to having a front man, normally a singer, to watch which in the case of the electronic performance isn’t comparable. It goes without saying that not even one of the scenarios seemed pleasant enough for the participants to watch for 30 minutes. The advantage a rock group has is its multiple members, whereas in a solo performance, the performer, of course, is alone. Although the performer would be playing a more traditional instrument like a guitar, and even singing, he wouldn’t keep the spectator’s attention 100% for his whole set. Perhaps through his audible music, but unlikely through his visual expression because the focus tends to shift on the surroundings, the people around, to the mobile, and the mind wanders. Peoples focus span is very limited.

Quoting Goodwin (as cited in Auslander, 1999), rock “has always stressed the visual as a necessary part of its apparatus - in performance, on record covers, in magazine and press photographs, and in advertising”. As seen previously in the concert comparison, rock concerts and electronic concerts are maybe not that similar. Not more than electronic concerts and orchestral concerts. Which leads to the question if disregarding the ideas of other music genres when designing for electronic performances isn’t justifiable? To gather what is good in other musical performances and translate it into something that makes sense for the genre of electronic music.

As the electronic solo performer is not equipped with a singer or a lead guitarist, finding a replacement, an attention captivator, could augment the spectator’s experience. What comes to mind is the core of all music, rhythm. Rhythm, translated accordingly to “drum and bass”, comes to mind as it could be asserted that a beat is the essence of electronic music; the booming dance floor, the throbbing bass, and the hardcore techno beat. These are all things that are internally connected with the idea of electronic music.

5.3 Introducing Tactility

The audience’s physical participation is set in motion through sight, sound as well as the physical sensations of the body, understood as the tactility of sound. As mentioned before, sound and therefor its rhythm can be felt, as vibrations create it. Although the rhythm can be heard and sensed and in some cases even felt, by augmenting this feeling, by giving the audience a direct access to the tactile side of the music, to infect them with rhythm directly onto their skin, based on the idea presented in a previous chapter, could generate a state of ecstasy.
5.4 Most Responsive Spots to Vibrations.

In order to find the most responsive spot to vibrations on the body, bodystorming was used. To carry out the bodystorming session two speakers were placed on different places on the body, transferring vibrations from the speakers, which because of the movement of the diaphragm, is felt on the body. Each speaker has its own channel, therefor allowing for transmitting differently timed beats.

The criteria here is that the most promising spot needs to check off three main elements. **Visibility**, meaning the equipment is visible to other spectators so they can see each other’s interactions with the equipment, possibly affecting each other’s behaviour and perception. **Directness** refers here to a clear contact with skin so the effect of the speaker is maximised. **Responsiveness** refers here to that the spot transmits the feeling of the speaker-impact very well. As seen in the figure seven

![Most Responsive Spots to Vibrations](image)

**MOST RESPONSIVE SPOTS TO VIBRATIONS**

- **FRONT**
  - 1. front of neck
  - 2. back of neck
  - 3. chest
  - 4. biceps
  - 5. shoulders
  - 6. groin
  - 7. wrists

- **BACK**
  - 2. front of neck
  - 5. back of neck

**SPOT ISSUES**

- 1. feeling of choking
- 2. best pick
- 3. heart interference
- 4. crowds
- 5. covered with sleeves
- 6. groin
- 7. wires all over
spots on the body are presented as the most responsive. Six of them have issues regarding their placement on the body, leaving one as a best match.

1. **Front of neck.** Because of the carotid artery this place is very responsive to vibrations. It is very visible to other spectators but the main issue here is the feeling of choking when the speakers are pressured up against the neck.

2. **Back of the neck.** This spot was concluded as the best pick as there were no issues with this very spot. It could even be directly linked to shoulder massage.

3. **Chest.** The chest is very responsive to vibrations. Normally you feel bass vibrations on your chest and just under the skin is the heart. It is because of the heart that this place doesn’t work; both because of unpleasantness after a while of transmitting vibrations to it and the question of if placing the speakers so closely to the heart could interfere with its beating, and therefore count as dangerous, just like the safety notion with the KOR-FX gaming vest.

4. **Biceps.** Biceps are quite responsive but when in the situation of concerts where a crowd of people easily collide, this spot could prove harmful to the equipment.

5. **Shoulders.** The shoulders are somewhat responsive but are in most cases covered with clothing that limits the directness of the speaker.

6. **Groin.** The groin area is very responsive but because of its placement it was concluded as non-usable. Keeping a pair of speakers between your legs doesn’t seem viable.

7. **Wrists.** The radial arteries in the wrists are just as responsive as the carotid artery in the neck but wires connected to the front of very movable limbs quickly becomes problematic.

To sum it up, the spot meeting all the criteria is the back of the neck. It is visible and responsive and normally not covered with clothing which helps in the directness of the sound waves interacting with the body.

### 5.5 A Shift In Focus

After testing the tactile vibrations on the skin it became clear that the similarities with what is already felt when the volume of the bass is cranked up was too high. The feeling was a little bit like feeling a continuous buzz on your skin, which is often already felt, concluding that a shift in focus was needed.

As the tactility should be used to enhance the experience of the performance, enhancing something that is already there but could gain from being dragged out in the open makes more sense than enhancing a feeling already felt, instead of only augmenting kick drums and bass.

There are other aspects to rhythm than drums and bass, such as instruments that are not felt due to their high frequency. Most melodies and all sorts of important sounds that are more in the background are just as important aspects to the song as the lower tactile frequencies. These sounds do often not follow the same static-rhythm beats normally follow, but give away more of a live movement, showing irregularities in rhythm and different emphasis on the timing of notes played.
On the other hand, there are many other aspects of a composition that are very powerful and by adding tactility to them could enhance them. For example in a long build-up where everybody waits for a power explosion, a sudden drop of volume, and when everything kicks in again, the tactile vibrations on the back of the neck participate in creating an overwhelming feeling.

It was also noted in the testing that the tactility shouldn’t necessarily be something that is felt all of the time because just like the tactility from loudspeakers becomes uncomfortable and strange if it is felt the whole concert. It becomes overwhelming in a negative way. Rather to have the tactile vibrations kick in when it is not expected or to bring forth and emphasise sounds that get lost in the background.

6. Putting the Pieces Together

From the observations and tests made I generated a concept addressing how the communication between performer and spectator can be enhanced.

A wearable artefact consisting of two speakers that are strapped to the back of a spectators neck that vibrate tactile rhythmic sound waves, generated by the performer, straight into the spectators body in order to enhance their communication, with the anticipation of generating a feedback loop.
The artefact was given the name *Sonicality.stereo*, a merge of sonic and physicality accompanied with *.stereo* to indicate its limitations to two speakers. The spectators attending a concert wear Sonicality. The equipment is strapped over the shoulders, allowing for frenetic movements, that is connected to the spectator’s phone through its audio plug. The performer controls from his favourite music software what and when the spectator feels the tactile vibrations from Sonicality. The music is sent to loudspeakers allowing for auditory perception, while a signal dedicated to Sonicality is sent through separate channels, through a wireless communication to the spectator’s phone which sends the audio signal to Sonicality which then translates the signal into tactile vibrations on the spectators neck. The performer, as stated, can choose what the spectators feel, although limited to two channels, leaving the interpretation open on the performer’s end. When used in the right way he can therefore attempt to produce an ecstatic experience, a community, an overwhelming rhythmic unity, among the spectators and himself, enhancing the spectators’ experience of his performance.

Sonicality is not an instrument but works as an extension of what electronic musicians use to control sounds. Whether it is a standard MIDI-controller, Nomis or Mi.mu, the performer enhances the experience of his music in a live situation by interacting directly with the body of the spectator with his music and through his instrument.

As the performers are aware of their behind-laptop-haunch-ness, a speculation could be that they do not necessarily want to straighten their backs in order for a
more direct communication with the audience. Being limited to a laptop or a MIDI-controller provides a certain amount of safety for the performer.

Sonicality is therefore a different form of communication. More in the like of social-media messaging than a face-to-face conversation, taking place through tactile vibrations generated by the performer on the spectators’ neck, making it easier for the performer to share his ideas and feelings of his music, as well as for the spectator to receive it, decode it and reply.

In relation to the resemblance to a conductor mentioned earlier, the electronic artist would with this concept be adding to the mix a tactility not known in other traditional musical situations, but nevertheless brings the electronic artist closer to the conductor as of augmenting his control over rhythm from different instruments.

Referring to the analysing from the video scenarios, in order for a performance to be captivating for the spectator it needs to show something new, visible and expressive, whatever the size. When translated to this concept, the new is given, its visibility is substituted for tactility and the expressiveness, instead of meaning movement of the performer, means movement in sound, on the spectator’s body.

6.1 Prototyping

To make this concept a viable one I created a frame for the idea. There are many aspects to consider in a concert situation where every spectator is equipped with a wearable. The back of the neck had already been identified as the best pick for a concert situation as it is visible to other spectators, it touches bare skin and the danger of hitting another spectator ruining the equipment is very low. The equipment has to be cheap, as drunken spectators are not to be trusted with expensive equipment in a concert situation. Being cheap could open for the possibility for the equipment to be included in the ticket price so the audience could take it home with them afterwards and therefor use it again.
Assuming that every spectator has a mobile phone, and that all of these phones have two things in common, a possibility to connect to WiFi and a 3,5 mm audio output, turning the mobile into an audio signal receiver and through the mobile’s audio output, communicate with Sonicality. In its most simple form an audio input gives signal to two separate channels, left and right. Therefor two different signals on each side of the neck can be felt.

### 6.1.1 Envisioning the Aesthetics

The look of Sonicality is quite minimal, and is made to be simple and inexpensive. The two speakers have over them a 3D printed casing attached to an elastic band that with a clip is fastened at the back of the spectator’s body, adjustable to every size of bodies. Between the speakers at the back of the neck is a small casing.

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6 For technical setup of the prototype see Appendix.
holding an amplifier and a lithium battery, chargeable through USB with a cable the spectators get when they pay for the equipment.

6.1.2 From the Performer’s Perspective

In any music software - (here Ableton Live) - the performer writes in his music as normally and allocates two separate channels to be sent to Sonicality. It could be speculated that by using Sonicality, could change the way the performer writes his music in order to maximise the effectiveness of the tactility.

6.1.3 Envisioning Use

An application layout was designed to vision how it would look like to use Sonicality. When the user takes up his mobile at the venue he is greeted by a notification indicating that he can connect to their WiFi and download the Sonicality application.
When he has done so he is shown two steps of how to get the equipment working. Then he has the ability to connect and adjust the strength of the signal.

6.2 Validating Sonicality with Mini Concerts

I decided that to validate the idea I had to do it in a more real situation. I therefore assembled a small concert space that held approximately four spectators and one performer. As small as possible so it would be more natural, like being at a crowded mini concert.

I wanted to get as accurate response as possible on how Sonicality would be experienced in a social setting for the participants to be able to ideate in a natural way what they would want to feel or experience, and to see how the social setting
would effect the performer-spectator communication. Before the test the participants were offered beer, which two out of four accepted.

6.2.1 Validation - Mini Concerts for 4 people

Three songs were played addressing different focus in tactility.

   In this song I tried to have the vibrations focus on background sounds, dragging out things that the ear wouldn’t necessarily focus on with fading in a line, escalating in strength until it changes into following a chord transforming the tactile feeling into a more aggressive vibration.

2. Four Tet - Parallel Jalebi (2013).
   Here I focused on augmenting a particular part in the song. After a build-up I created a clear drop in volume in the song and then gave a hand gesture indicating that everything would kick in, both audio and the vibrations, which followed the music in a high tempo rhythm.

   In this song I focused on playing the clear high pitch melodies jumping between left and right like a piano, like the device was playing the participants necks.

I tried several different things regarding the performance in relation to what I had tested prior.

- **Traditional performance.**
  Focusing mostly on my computer nodding my head in a rhythmic fashion.

- **Playing a hidden keyboard or pushing buttons.**
  When the first vibrations started to fade in, in the song Looped by Kiasmos (2014), I faked playing a keyboard hidden from sight following the music.

- **Raising my hands and getting people to dance.**
  Acknowledging the audience by communicating with them through movement.

- **Giving the cue that something was happening.**
Making a very clear and visible hand gesture after a long build-up when everything, both the music and the vibrations, kicked in.

### 6.2.2 Performance Methods

The performance was perceived as quite normal, which was my intention. To begin with, the anticipation for something to happen was very high and the participants were asking between them if they felt anything. When it started they felt it was interesting, although it quickly lost its magic due to its limitations to only two impact points. When it started they were wondering if they all felt the same and needed to be reassured by touching each others speakers.

When I played the imaginary piano hidden from sight one mentioned that she connected it to what she felt, but she couldn’t really see what I was doing so she got confused.

The most powerful moment of the whole performance, everybody agreed on, was when after a long build-up in the song there was a sudden drop in volume, I hit my hand out in the air, and at that same moment everything kicked in, the music and the vibrations. This was mentioned throughout the discussion as having been the most interesting sequence of events and very powerful due to the visibility from the performer’s side, combined with audible music and direct tactility on the spectators’ body. Like the performer was controlling and actually interacting with them.

### 6.2.3 Enhancing Communication

When asked about the connection between them as spectators and me as a performer, in relation to the traditional electronic musical performance, the participants agreed on it being much higher than normally. They preferred when they felt the creation of the vibrations was live, especially when I did the hand movement, because then they understood it as something that I was making. I was creating the rhythm and they could feel it. They explained that if the communication wasn’t there, the clear connection between me controlling it and them feeling it, the vibrations weren’t that far from being perceived as the normal bass. One participant explained that he felt like he was more connected to the music because of the vibrations, and therefore more connected to the performer, as he understood him better. In relation to the social situation, the connection between the spectators was
also perceived as higher than usually because it was a unique experience they were sharing together. One participant mentioned how the vibrations kind of woke her up, and helped her focus on the music, which relates clearly back to the mentioning of peoples’ short focus span. It was also speculated that if implemented in the right way and if the audience would subject themselves to the situation, it could produce a very enhanced experience.

6.2.4 Making the Music More Clear

The participants mentioned that the focus on higher frequencies, or melodies, in the songs, helped with following the music as melodies are what comes naturally to us to understand, while the normal vibrations, the bass, isn’t necessarily perceived in the same way. One mentioned that in regards to her musician friends that often commented on particular beats in the music, she didn’t hear it in the same way. Through this equipment on the other hand they were put more on the same level, feeling the same things. When a melody was played jumping between the left and right speaker, it was perceived well, while they wanted to move with the rhythm. It was still described as disconnected if the rhythm was too fast or too complex.

6.2.5 Future Interactions

The participants all agreed that multiple touch points would be more interesting and they wanted it to feel freer. That only left and right channel were used, with pre-arranged placement, proved limiting. There was clear desire for multiple impact points that could be rearranged and experimented with by the participants.

They saw potential in leaving it open from the performer’s side, that different artists would use it in different ways. One could therefor use it to have the spectators move within space by placing the speakers on left, right, front and back while another one
could focus on parts within a song. When done right, they thought it could be very enhancing for the performance.

They mentioned that by having lights attached to the object you could see the rhythm as well as feel it, which they speculated would be enhancing. Knowing when it’s on and when it’s off and therefor telling you that what is happening in your device is the same as for everybody else present.

6.2.6 Analysis

From this I can ground my findings from the previous test that by seeing a movement that can be directly linked to a shift in music, and now also tactility, can be very enhancing. To help with that Sonicality could easily be connected with a performative instrument, like Nomis or Mi.mu, where you could see the interactions and feel their effects.

The participants wanted to explore, to experiment and socialise with each other because of the equipment they were wearing and the vibrations it produced. They also felt more connected to the performer as they understood him better when they both saw and felt what he was doing which made the communication between them much more direct. In relation, by allowing for the speakers to be moved around by the spectators I would be meeting the same criteria as mentioned from the previous test, to bring forth something new, visible and expressive. New, as each new placement brings forth a new experience. Visible, as everybody wears the speakers differently. Expressive, as the spectators express themselves through the usage.

In the same way it can be seen that the spectator’s participation is not only set in motion through sight and sound, but also through tactility it provokes the spectators to explore, interact and participate in a whole other sense than in a normal concert situation.

Through the rhythm emitted into their bodies the connection between the spectators and performer becomes much stronger, allowing the spectators to understand the music created better, bringing them closer to the performer, enhancing the communication.

6.3 Exploring Future Interactions

6.3.1 Testing Possible Additional Features

As I had already discovered there were some limitations that accompanied the prototype of Sonicality, I conducted another test straight after the mini concert, addressing different interactions for future development.
As mentioned before I think graphic visuals and body performance can be equal. As I wasn’t able to stand both in front of the participant to perform and to stand behind him creating the physical feeling I used graphic visuals.

In this setting the same participants as in the other one participated, since they had both experienced the former prototype as well as commented on what they had experienced. This test was conducted individually. Each participant sat down in a chair and was asked to listen to music in headphones and watch graphics while doing the test. I stood behind the participant listening to the music (Four Tet - Parallel Jalebi (2013)) with another set of headphones, ready to use the participants back as an interface on certain cues in the song. The graphics the participants were focusing on were “live visuals // retox 04_25_13” (Delaney Schenker, 2013), which fitted extremely well to the high tempo rhythm of the song.

Four different interactions were tested.

1. *Multiple touch points.*
   With a vibrating speaker I played a melody heard in the song on the upper part of the participants back like a keyboard, pressing down the speaker like pressing down keys.

   The participants talked about some sort of disconnection. That it felt more like I was poking or tapping them on the back. One mentioned that the neck was clearly a better responsive spot than the back.

2. *Moving object over the whole back.*
   When the melody stopped I started moving another speaker, not vibrating, around the surface of the whole back creating a feeling of something travelling around the back with the flow of the music.

   The participants described this as a very interesting feeling although one had difficulties imagining how this could be done without wearing some sort of an overall or a vest, which would not be feasible. She said that as an abstract sensation, she
would love it. It was described as a natural movement, helping to get into the flow of music.

3. **Vibrations crawling up the back**
   In the build-up chapter, in the middle of the song, I used the vibrating speaker dragging it up the spine of the participant creating the sensation that something was crawling up their back.

   The spine was described as interesting, even being mentioned as an interesting placement for an interface, focusing on the spine. Another referred to it as feeling-like-a-cyborg, which was perceived as strange, but nice.

4. **Big object moving producing cold**
   When the build-up chapter reached its high point I put a big sack of frozen Wok-Mix vegetables on the participants back and moved it around until the song finished to generate a sense of a chilly feeling, trying to see how introducing a new sense instead of the vibrations could work.

   The cold Wok-Mix was described as both disconnecting and interesting at the same time, and although the cold didn’t reach everybody through his or her layers of clothes it still left some sort of sensation. One even connected it to a beach ball travelling around her back.

6.3.1 **ANALYSING**

   The variety in different movements was appreciated. The “moving object over the whole back” and the “vibrations crawling up the back” was felt to connect the best to the music. Feeling something on your body moving almost like an animal inside your t-shirt. The participants liked the idea of more diversity in interactions although they didn’t see how it would be implemented without them wearing a suit. As stated in the previous test, the participants had a longing for being freer. Wearing a suit would not enhance that feeling. The test still grounds even better the idea mentioned in the previous test, that tactility, when properly connected to music, can bring the spectator closer to the music, and through the music, closer to the performer as he understands him better, e.g., the communication is enhanced as well as fellow spectators.

6.4 **Sonicality II**

   Through the findings in the previous sections I revised the pieces and out of Sonicality.stereo, came up with the concept of **Sonicality.surround** (here after referred to as Sonicality II), created out of the findings from the previous two tests.
Instead of being a wearable strapped on the spectator’s body, Sonicality II should consist of a set of multiple speakers allowed to be moved around at will. They should therefore afford to be attached to a bodily surface, not limited to one spot, but have the opportunity to be interpreted differently during every situation. Spectators could therefore share their speakers amongst themselves, experiment with situating them in different places of the body. Practically, the spectator’s phone could still be the signal receiver, although being attached to a device capable of communicating to the multiple speakers wirelessly.

The speakers should all be capable of transmitting different rhythms so from the performer’s perspective he would also be completely free in his use of the equipment. What he would use them for and when he would use them. How he would use them would although be advised to be in relation to visual expressions. The performer could then also advise the spectators to place the speakers in specially determined places in order for them to experience the concerts like he intended to, although obviously not being able to control the spectator’s behaviour. Sonicality II is not a form of controlling but of communicating. Allowing for such an open-ended use would make each concert a completely individualised experience, based on the spectator’s positioning and interpretation of Sonicality II, as well as for the performer’s usage.

This type of freedom in interpretations and use could also be speculated to generate new types of scenarios, unthought-of, when used in a real live social setting where multiple spectators find themselves, as a part of a crowd, united.
7. Conclusion

The electronic musical performance is, like every other type of performance, a genuine act of creation, a social communication. In the traditional electronic performance the communication is however limited due to the performer’s almost invisible instrument, limited body movements and frequent use of graphic visuals. In order to produce a social communication, a performance should address its auditory aspect, as well as the visual and the physical.

Through fieldwork I concluded that the electronic musical performance showed highest limitations of communication between performer and spectator compared to other methods of musical performance. While other methods build on clear communication through speech, visibility of actions and high expressivity, the traditional electronic performance encourages an introvert performance where the performer is forced to hunch over his laptop or controller.

In my research I sought to understand the performer’s perspective, seeking to get a clearer image of the equipment used and how it is used. I gathered that most common is the traditional table based MIDI controller, hidden from the spectators’ sight of vision, is used to control different parameters within a song. I also stated the performers being aware of their limitations in expression. To explain the performer’s actions I compared him to the role of the orchestral conductor, both being conductors of rhythm and its tempo, as well as the shaping and triggering of multiple instruments and their sounds which they control through hand gestures. In the case of the electronic artist these gestures are very subtle because of his controller.

When getting to understand the spectator I found that they attend concerts with the expectations of experiencing something unique and unexpected, as well as assuming higher quality in the experience of sound. Generally, the most important thing in a live performance is the social situation, experiencing the performance with friends while surrounded by people that have the same taste in music. Amazement and questions raised in how a certain thing is produced enhances the experience of the performance for the spectator. They are used to having a front man, having someone that acknowledges them and that they can watch. Seeing the performer’s interactions is important, and a part of why the participants would want to see him live, as well as to verify that the performer was actually doing something live.

By introducing participants to different video scenarios showing various sizes of controllers being used in a performance scenario I was able to conclude that the size of controllers do not matter but their promoting of new visible bodily movement is thought to be captivating. Furthermore I noticed that when a persons’ musical background is not connected to the instrument being watched, the person doesn’t necessarily have any higher understanding of how it works than someone with no musical background. Understanding the performer’s interactions are therefore not necessarily important, but seeing a clear connection between the performer’s action and a shift in music once in a while can be very intriguing.
Because a front man is something unknown in the traditional electronic musical performance I suggest a different focus, the music’s rhythm. As the audience’s physical participation is set in motion through sight, sound and the physical sensations of the body, I propose this rhythm being the spectator’s attention captivator through their tactile senses.

Through testing I concluded the back of the neck as the most promising position of the body in a concert situation to be infected with rhythm, meeting the criteria that it is visible to other spectators, directly in contact with their skin and responsive to vibrations. This testing also reveals two main aspects of the music to be augmented by the tactile vibrations instead of the normal continuous buzzing often felt through loud bass; high frequency instruments, such as the ones playing melodies, as well as to be used to augment certain parts of a composition, such as a powerful chapter following a long build-up.

From my findings I proposed a concept, Sonicality.stereo, an artefact spectators wear in a concert situation infecting them with rhythm controlled by the performer with the intention to enhance the communication between them. When validated I noticed that the most important and effective use of Sonicality was when sight, sound and tactility were all brought together, enhancing the experience, the understanding of the music and therefor enhancing the communication. I noticed limitations in the concept with restricting it to only two speakers and to having its positioning prearranged. I noted a very high desire from the spectators to be able to experiment with Sonicality, wanting to interpret the positioning of the device themselves and share their experiences with others.

I explored possible additional future features of Sonicality which told me that a diversity of different tactile movements on the spectator’s body is appreciated, although the participants didn’t find it viable to wear a vest or a suit for it to be applicable. Their desire lies in freedom.

From these findings I revised the concept of Sonicality.stereo into Sonicality.surround, consisting of multiple speakers transmitting different rhythms, addressing diversity, that can be attached to the surface of the body, where ever desired, encouraging experimentation in a social context, generating different individual experiences through different interpretations. Meeting the same criteria as found to be important when watching a performer, the device should show something new, visible and expressive. New, as each placement brings forth a new experience, visible, as everybody wears the speakers differently and expressive, as the spectators express themselves through the usage. Being open ended for the performer to interpret as well should help generate multiple different scenarios of use. When used in context with the music and with clear visual interaction the tactility of Sonicality.surround should enhance the communication between performer and spectator, generating a state of ecstasy.
8. Discussion

With this thesis I have addressed the question of how to enhance the performer-spectator communication at electronic solo concerts through augmenting the visual and physical aspect of the performance.

I identified three important insights from previous research on performer-spectator relations:

1. **Visibility and expressivity of the performer’s actions regarding his creation of music are important for the spectator to receive and decode messages that are encoded by the performer.**

   Communication thrives on the sharing of ideas and feelings. In order to share those they need to be expressed, visibly. Visibility and expressivity from the performer’s point of view is very important for the spectator in order for him to understand the full meaning of the performer’s intentions. This is important in relation to the performance addressed because in the traditional sense, visibility and expressivity are not aspects with a high focus point as I concluded in my concert observations.

   Although having focused on visibility in the relation of performer’s actions regarding his instrument, I found the visibility aspect to be a semi dead-end regarding the design process. Through my testing I wasn’t able to come up with any knowledge of insignificance, other than the unimportance of scale, and after already presenting instruments with very high performative values such as Nomis and Mi.mu I found it more interesting to focus on the tactility and use the knowledge gained from the testing in order to validate the later produced concept. And that actually may have been of great importance in order to validate it properly. As I was able to connect the sound, the sight and the tactility all together. Sonicality could therefor very probably be used efficiently as an add-on to these instruments, where the performer can trigger audible and tactile vibrations through visible and expressive gestures.

   Sonicality, I would say, promotes a human encounter through digital technology. Relating to related work mentioned, Mediated Body produces a very intimate social encounter with the touch of bare skin. Sonicality tries to produce similar encounter, but through wireless communication, resulting in sonic interaction with bare skin, and while Mediated Body is a two way communication, Sonicality is too, but only through the feedback loop, if created, in the concert situation.

2. **The audience’s physical participation is set in motion through sight, sound and physical sensations of the body, here referred to as the tactile side of sound.**

   Through a design inquiry I explored the possibilities of implementing the tactile side of sound to the concert situation, identifying the most responsive spots on the body to vibrations, and from that generating the concept Sonicality. It was shown in the validation of Sonicality that by adding a sense, a layer, to the normal sight-sound
situation, the spectators got closer to the music and the performer as well, as they understood him better, as the communication was enhanced.

I address the physical sensations of the entire body and translate them into the narrow focus of tactility generated by the sound, because of the major impact it has in relation to musical performances, but leave out all other sensations of the body. It could be speculated that by opening up for other physical sensations the communication could be enhanced even more. At least it would have affected the outcome of the process.

Soninality is a more subtle version of the KOR-FX gaming vest. The technology used in the vest, turning audio signals into haptic feedback across the chest, proves that this idea could be taken further, where the spectators could feel the music all over their bodies. Although stated that wearing some sort of suit, or a vest, was not desirable by the participants in the two final tests. If possible to implement into a freer context, making the impact-speakers wireless and free to interpret would make it viable. Then again it poses the risk of health issues, where spectators could position all of their speakers, and even their friends', on top of their heart, interacting with its rhythm. The effect of placing multiple speakers all around the body could just as well influence the oscillatory system of the body in a health-dangerous way, although in the case of STiMULiNE it did not, to my knowledge. Soninality is a more accessible approach to STiMULiNE as the idea is not to limit the experience to one type of performance but that it could work in more traditional situations where the music is heard through the spectators’ ears instead of their bones.

3. Infecting bodies with rhythm could generate an ecstatic experience with the spectators, resulting in a community and therefor a feedback loop, the ultimate communication between performer and spectators.

Based on discussions after validating Soninality, if the concept would be implemented in the right way and the audience would subject themselves to the situation, the rhythm being pumped into their bodies, a very enhanced experience was speculated to be generated, translated here to ecstatic. Ecstasy is a very powerful word, normally connected to the drug, but my intention was mostly to emphasise the effectiveness of generating a feedback loop. Feedback loops are in my opinion always present in a performance situation. As stated, it is a genuine act of creation and spectators influence performers and vice versa. But the feedback loop isn't noticeable unless a community is created. You could therefor say that a community strengthens the feedback loop to a maximum level. A community, generated out of the bodily co-presence of spectators only when the situation is right. It is created by using Soninality because of the experience and the clear communication it enhances in the right context, generating this maximum level of feedback loop, the ultimate communication between performer and spectators. It could be said that a face-to-face bare-skin touch encounter such as in Mediated Body would be the ultimate communication, but in the case of having more spectators than one, that could prove troublesome. Relating back to Auslander
(1999) stating that a performance is founded on difference - when a performer is situated on top of a stage and the spectators glare up at him from the crowd, a clear difference is noted. In that type of situation, a face-to-face bare-skin touch encounter between performer and spectator is not viable. Therefore, Sonicality addresses this trouble through wireless technology. Creating the feedback loop with wireless technological aspects, addressing the bare-skin touch, the highest form of communication possible in that type of situation.

Drawing on the findings regarding these three statements the knowledge contribution of this thesis can be said to be that by introducing the tactile side of music’s rhythm directly to the spectators’ bodies, accompanied with visual cues from the performer, in relation to the music, the communication between the solo electronic musician and his spectators can be greatly enhanced resulting in an overall augmented experience for these two groups of participants partaking in the act of music.

In order to design for the complex situation musical performances pose, it is necessary to understand its complexity. If a focus is only set on a narrow aspect of a performance, for example the performer and his gadget, a particular result will be gained. Still, it is limiting because the situation is much more complex than so. When designing something for a performer, it is automatically being implemented for the spectator while it changes the situation as well because it is a part of an unbreakable chain of relations. It is necessary to be aware of it in order to design for it.

My focus within this chain of relation is the visibility of the performer and the physicality of the sound. These two aspects are internally connected to this very complex chain of relation and I try to discuss these aspects in a way that takes into account other stakeholders as well, although for example when conducting the tests I was limited to classroom settings and had to fake the situation as well as possible which may have altered the results to some degree.

It is of course speculative how and if the concept of Sonicality II could be implemented but it is grounded in the validation of Sonicality I (Sonicality.stereo). There are many issues and aspects of the idea of Sonicality I and II as artefacts not discussed, as they have not been fully ideated in relation to either look or use. There are many technical issues that have not been explored but somehow my view is that everything thought of can be implemented.

The desired playability from the spectators’ perspective would in the long run probably change the way spectators behave in a concert situation. As an attention captivator it can be speculated to have an isolating effect on some spectators, where they subject themselves to the tactility, even closing off their sight of vision to enhance the physical sense. The playability, if spectators become too engaged in their experiments with the devices, could dilute the need of a visual performer, or it could reduce the effects of the use from the performer’s perspective, as the
spectators wouldn’t notice visible cues from the performer, in his creation of powerful moments. What I have argued so far, and was grounded in the validation of Sonicality I, is that the most powerful moments are generated when sight, sound and tactility are all brought together. If one of them is left out the effect isn’t as massive. But then again, controlling spectator’s interactions, whether they focus on the concert being performed or not, has never been possible, not even if the device would be strapped onto their bodies. The spectators need to allow themselves to be subjected to the performance in order to experience it to the full.

From the performers point of view, having multiple speakers, not with any prearranged placement, could become complicated for the performers to compose for. It at least adds a layer on top of their already complicated songs. Although, if mastered, Sonicality could open up for multiple new interpretations of the performers’ songs, both from their end as well as the spectators’. It could even open up for a new occupation, for someone to control the tactility - just as VJs sometimes control graphic visuals instead of the musicians. Of course the performers could advice the spectators at their performance to wear the speakers in a defined way in order to get the full experience. The spectators would then have to decide if they do it or not. They could for instance, if they decided to go for it, change their mind midway, as the configuration from the performer’s hand wasn’t exciting enough, resulting in the spectators experimenting with new configurations.

It is also a fair point out the issues it could generate for the concert situation itself. Would it for example generate long cues and would there have to be technical support at every concert. If the communication takes place through WiFi could it possibly collapse, similar to mobile services in large crowds, ruining the show.

The idea of Sonicality as a product generates many issues regarding who’s responsibility the equipment is, environmental and disposable aspects; what kind of an impact it has on the world to produce multiple speakers to be used in situations where people tend to be more unaware of their actions than usually. It can at least be speculated that by implementing Sonicality into a musical performance, many things would be affected. First of all how the spectators would behave, and second of all how the performers would construct and write their songs.

It’s an interesting take to convert the electronic musical performance further away from the other traditional performances by introducing something not known in other musical performance methods. To acknowledge its uniqueness and build upon it. Instead of following any traditions try to create new ones. Of course it brings with it a whole lot of issues not addressed in this thesis, but nevertheless interesting. This type of performance is still so young, that changing it could be speculated to still be a viable option.


Ivanov, N., personal communication, April 20, 2015.

Ivanov, N., personal communication, May 21, 2015.


Overhage, D., personal communication, April 20, 2015.

Overhage, D., personal communication, May 21, 2015.

Pálsdóttir, S., personal communication, April 20, 2015.


Sipinen, A., personal communication, April 20, 2015.


Tsouni, D., personal communication, April 20, 2015.

Tsouni, D., personal communication, May 21, 2015.

Appendix

Technical Setup of Prototype

To get the prototype of Sonicality.stereo running, two mono speakers, each connected to a small amplifier with an attached mini jack plug were used. Each speaker was rerouted to be only left or only right, giving me two fully separate channels to work in stereo. Through a headphone splitter these speakers were then connected to the audio source.

The signal was created in Ableton Live, the same place as the music would be written in. By creating an aggregated audio device in Macbook Pro, allowed me to add two virtual audio-out channels to the two already existing (the built-in speakers). In Ableton Live I was therefor able to send channels 1 and 2 out of the built-in speakers and direct channels 3 and 4 through a software called Soundflower over to another software called Airfoil. Airfoil then communicated through WiFi with a mobile to which Sonicality was connected to through its audio plug, allowing for hearing the music from the computer while feeling tactile sounds on the skin.

Airfoil caused issues as it generated a delay of the tactile vibrations of 2 seconds, forcing me to write in to Ableton what I wanted to hear from the tactility speakers, and then move the tracks 2 seconds forward in order for both the tactility speakers and the auditory speakers to be aligned. The issues caused because of this was that performing the vibrations through live interaction, that is to trigger vibrations in real time, was not possible.

Another problem was that I was only able to communicate with one mobile at a time. Therefor when doing a test with multiple participants all of the Sonicalities were connected to one mobile, not making it very mobile.