Performing with a Sonic Tool

An approach to designing and analysing new instruments

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In recent decades, digital technology has accelerated the development of new musical instruments, not only establishing new techniques for creating sound but also enabling new performance practices. Audiences have been exposed to new ways of performing music ranging from more or less static laptop performances to expressive use of bodily gestures to control sounds. These changes are becoming even more acute since contemporary artists are increasingly using software and open-hardware platforms to create their own one-of-a-kind instruments. While much research has focused on these new creative possibilities from the perspective of composers and performers, less attention has been directed towards how audiences perceive them. In most musical performances, the audience's comprehension of how an instrument functions is vital (Tanaka 2000: 398; Medeiros and others 2014: 645). In a traditional setting, when an artist performs with an instrument, the audience can build on their cumulative experience and knowledge to evaluate the skill of an artist, but how does this change when a performance is based around a new one-of-a-kind instrument?

This text discusses a method for exploring the aesthetic impact of new and uniquely designed instruments, when these are used in performances, through the concept of 'sonic tools'. This concept intends to describe a set of tools that might fall into a broader category of musical instruments, but that deliberately break with the audience's expectation of what a musical instrument should be, either through their degree of novelty or by their introduction of technology from outside the established musical domain. The focus of this article will be on my experience, gained from my work on the dance performance *Sound of Silence*, developed together with the dancers Maria Ulvestad and Mari Bø. This performance was important for developing 'sonic tools' as an analytical concept, and also exemplified how this concept shaped our creative process of designing a tool we named the Looping Camera. This was a repurposed Super 8 camera that was fitted with a microphone and controllers, enabling the dancers to record, loop and manipulate sound on stage.

Sound of Silence was a performance where all sounds were created by the dancers on stage using different microphones and digital technology. The performance was developed in parallel with an academic PhD project researching media technology and sonic aesthetics and the creative process was therefore deeply influenced by writings on the subject of sound and listening. As a theme for the whole performance, we chose the idea of 'Schizophonia', a term introduced by the Canadian composer R. Murray Schafer in the 1960s. This term describes the effect listeners experience owing to the splitting of sound from its original acoustic source through means of electronic recording and communication technology. In the performance we wanted specifically to aesthetically explore the connections and disconnections between sound and the dancers' gestures through amplifying, recording, and manipulating sounds made by the dancers on stage. Developing the concept of 'sonic tools' and the designing of the Looping Camera were therefore infused by theories and ideas of the listener's position as well as the audience's reception of new musical instruments. The Looping Camera was designed to be used by the dancers at one point of the performance, in part like a musical instrument, enabling them to

record and manipulate sounds as they were moving on stage. Using the concept of ‘sonic tools’ we wanted, however, to create a device that through its design, in line with the theme of ‘Schizophonia’, could challenge how audiences perceive the creation of sound. The idea was that adding other technological references to that of recording and manipulating sound would influence how the audience experienced what they heard and saw.

The text starts by sketching out how previous experience, together with theories about audience perception of experimental digital musical instruments, led us to choose the concept of ‘Schizophonia’ as a theme for our performance. It then moves on to describe the process of developing the performance and the creation of the Looping Camera, including how artist talks played a part in shaping the creative work. To conclude, I will discuss how the final performance and the use of the Looping Camera was perceived by the audience, and give some thoughts as to whether our idea was understood.

Alma Bø and Maria Ulvestad testing the first prototype of the Looping Camera, Olomouc 2016. Photo: Mari Bø.

The starting point: Digital technology, performances and audience experience.

Sound of Silence was developed through various workshops from 2016 to 2018. After working as a more traditional composer for a dance performance with Bø and Ulvestad, I wanted to develop a project exploring new technological possibilities for using dancers’ movements to create and control sound. Our first informal talks centered on using digital sensors to control different

sounds. However, looking back on some previous experience I had gained working with such new concepts, we decided to take this in a very specific artistic direction. Instead of using available digital sensor technology, we chose to use microphones and sound recording as a starting point for developing the performance. The reason was that we felt that this could enable us to explore an effect that many users of new technology had understood mostly as an obstacle to overcome—that of breaking the established relationship between the sound and what the audience would assume was creating it.

In the mid-2000s I was one of many composers/musicians experimenting with sensor technology and computer software. By fastening sensors onto musicians and dancers, artists at that time were searching for new ways of performing music by letting body gestures or biometric impulses control different parameters in the music software. Atau Tanaka, one of the 'veterans' in this field, saw the growing interest for such experiments as a consequence of the technological development, at the time enabling digital technology to establish a new performance praxis (2000: 389). Tanaka had experimented with making performances based on sensors and computers since the 1990s, applying specially designed technology (2000: 391; 2006: 275). At the time I started working with such tools, they were widely commercially available, enabling us to use bodily gestures to manipulate sound and alter sequencing patterns in the music software.

My previous experience with digital sensor technology, however, was not entirely positive. As it turned out, the use of such tools had brought me into a rather challenging creative landscape. Not only were there issues with cables and sensors breaking and wireless connection getting lost; what was most frustrating was the audience reception. Through talking to audiences and reading reviews it turned out that it was hard for them to comprehend the link between what we were doing on stage and the resulting sound. The parts of the performance where we felt that we were successfully enabling the performer to control the sound with their bodies were the parts the audience were least satisfied with. The parts where more traditional instrumentations were in focus were always what the audiences liked the most.

At the time, our ambiguous experience with how audiences comprehended our use of new technology was also a problem that was being addressed by others. According to Tanaka, it was the sheer novelty of such technology that caused problems. New instruments might enable the creation of new musical expressions, but from the audience perspective there are few to no shared points of reference that may serve to facilitate comprehension. The problem with such new instruments lies in the fact that much of the audience's aesthetic appreciation of any musical performance is related to their familiarity with instruments used (Tanaka 2000: 398; Medeiros and others 2014: 645). The performer develops a first-hand knowledge of how the instruments work, but since most audiences are usually encountering them for the first time, it is hard for the artist to convey their artistic intention. Tanaka, therefore, proposed a strategy to solve this problem:

> A performative vocabulary and memory must be developed for each new instrument, sometimes even within the course of a one piece. By doing so, the composer helps the performer to establish the clarity and coherence of the gesture, and provides the audience with keys to musical comprehension. (2000: 404)

Gaute Barlindhaug explaining the Looping Camera at an artist talk. Petrozavodsk 2018. Photo: Julia Utysheva.

This same problem with audience comprehension of new technology was also discussed by John Croft. In his opinion, new interactive digital technology had resulted in a loss of much of the *poetic* relationship between the interaction and the sounds produced, rendering the result often banal or even meaningless (2007: 59). Croft saw the cause for this problem as what is often referred to as ‘controller dislocation’ (Barbosa and others 2012). Within most electronic music the creation of sound is not dependent on the type of physical performance, in contrast to what we experience with instruments such as guitars and drums. With such earlier instruments, the physical energy of the performer’s actions is what creates the sound. When breaking this bond to the physical realm, digital and electronic instruments subsequently dislocate the performance gestures from the source of the sounds, enabling an interaction beyond that of acoustic instruments (Miranda and Wanderley 2006). When using sensors, whatever bodily gesture could be mapped to create whatever sound. The traditional link between sound and gesture, as experienced with earlier acoustics and electric instruments, was lost (Leman 2008: 163; Magnusson 2010: 62; Schloss 2003: 24).

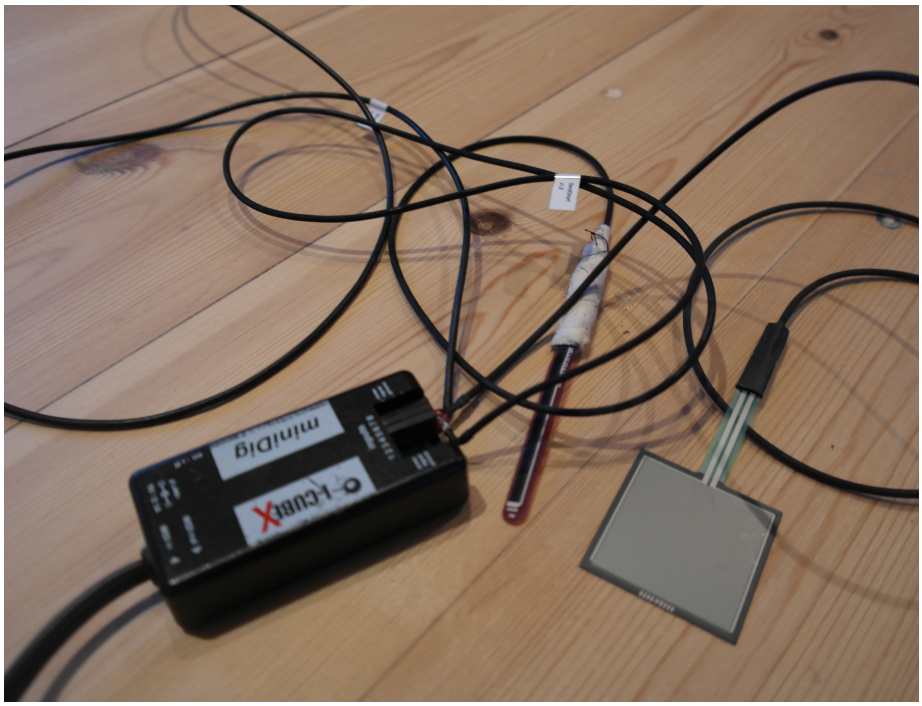
Different ecological approaches to sound also provide explanations for this fact. According to Eric F. Clarke, the act of identifying what the sound is, is crucial for understanding the sound’s meaning. Through involvement in our auditory environment, we learn to recognize what causes the sound, and through this we establish a perceptual meaning with a corresponding action (2005: 7). This is also crucial for our appreciation of musical performances. For instance, when a child plays with a musical instrument like a xylophone, experimenting with the hands and the sticks leads them to establish the connection between action and different volumes and pitches (23). Marc Leman argued that an audience’s personal experience with musical instruments can create a ‘behavioral resonance’ that unifies them with the music. They recognize the intentions behind the performer’s gestures and are themselves immersed in the sound and music (2008: 4–5). The ‘controller dislocation’ as created with most digital instruments will easily break with how our former sonic environments have established our understanding of sound in relation to its source. In the worst case we end up in the situation that Tanaka described as a meaningless performance praxis (2000: 398).

Following this line of thought, there have been suggestions of possible solutions to the aesthetic challenges created by ‘control dislocation’, the easiest being to simulate established connections between sound and gesture by mimicking the actions that could create a similar acoustic sound (Leman 2008: 164). But one could also create meaning through taking advantage of how the sonic environment is conditioned by culture and technology. In the case of new performance technology, if the audience themselves have experience with such tools, they can establish an understanding of how the actions connect to the sounds. Notably, Tanaka worked extensively with making interactive installations in which the audience themselves were invited to engage with the sensor technology (2006: 280). In this manner, he deliberately worked with expanding the audience’s sonic environment, enabling them to comprehend a new causal realm for sound and establish a new but common ground for aesthetic exploration.

However, what we thought would be more interesting was another way of approaching new technology in performances, also rooted in an ecological approach to sound. Instead of attempting to reconcile audiences with how bodily gestures could create sound, we wanted instead to explore how technology could disrupt audience expectation of sound and its cause. We wanted to use the effect of ‘control dislocation’ to investigate, and exploit disruptions in, what Leman (2008: 4–5) defined as ‘behavioral resonance’, observing how this could create an aesthetic experience.

In developing his concept of ‘Schizophonia,’ R. Murray Schafer embarked on a project of documenting our auditory environment with a specific focus on how historic and cultural conditions have shaped it. Natural sound varies with landscape, weather, and fauna, while human technology has infused our environment with new sounds as a result of industrial development. Throughout most of human history, every new sound has been connected to a clear acoustic cause. With the introduction of media technology, this changed. As Schafer saw it, before the introduction of electroacoustic transmission and reproduction, sounds existed only as originals. ‘They occurred in one place and in one form only. Sounds were indissolubly tied to the mechanism which produced them’ (1994: 90). By the twentieth century, telephone and radio had detached sound from its original location, spreading our voices over infinite distances. Recording technology severed sound from its location in time, enabling us to re-experience musical performances over and over again.

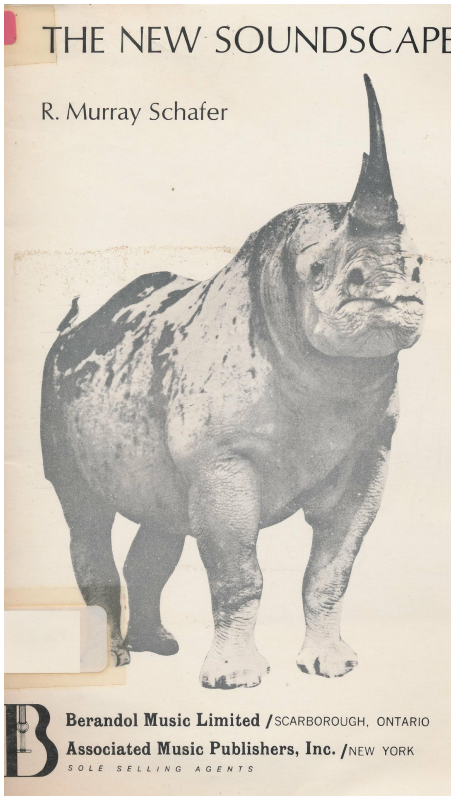
The type of I-CubeX sensors used in the mid 2000s. Touch and bend sensors could easily be sewed into clothes or attached to surfaces. The inputs was then translated to midi and transmitted either through Bluetooth or cables.



Using ‘Schizophonia’ and creating the performance

Inspiration from Schafer’s writing not only provided the conceptual theme for the performance but was also a primary motive for us doing away with the use of digital sensors. In his writing Schafer not only described the disrupting effect that sound recording can create but also explained how this technology could present a creative potential. Recording, then changing the speed and reversing the sound, had the potential to create new and unheard sounds (1969: 46). Inspired by this, instead of using digital sensors, we took the recording of acoustic sound made by the dancers as a starting point for a further exploration of the audiences’ perception of the relation between sound and its source. By contrasting these acoustic sounds made on stage through replaying and manipulating the sounds in conjunction with new gestures and movements, we wanted to first establish and then dissolve the connection between the acoustic sound heard and actions seen on stage. The use of microphones would hopefully help us convey all stages of this process to the audience. While few people would have any knowledge of how the sensor-based technology I had used earlier could create and manipulate sound, the functionality of microphones and sound recorders should be familiar to most people. By extensive use of microphones on stage, we hoped to establish common ground for understanding how the sound was created and captured, a common understanding that then could be contrasted by deliberately splitting the sounds from its source.

Schafer´s book *The New Soundscape* where he introduces the concept of 'Schizophonia' in 1969.



Based on our technological choices, the very first part of developing the performance was experimenting directly with how the body could create acoustic sounds. Naturally, the most obvious way was exploring how the body's kinetic energy could be transferred to other objects, such as by falling to the floor or simply walking, tapping, or stroking it. Other ways of making sound would of course include using our vocal capability, but also wearing clothing that could generate sound when the dancers moved. However, it turned out that even if we could hear many of these sounds, it was difficult for a microphone to capture the details of such sounds. We therefore had to experiment with different types of microphones and see how they could be used in the performance. To achieve the sound recordings we wanted, we had to apply different types of condensate microphones and high-quality pre-amps. In addition, we experimented with using contact microphones (also called piezo microphones) that just registered the physical vibration of an object and not the air pressure we normally perceive as sound. The work that followed therefore focused on exploring the creative potential in different microphone configurations. One set-up used two condenser microphones on stands close to the dancers; another used numerous contact microphones attached to the surface of the floor.

First experiments with using the sounds from the dancers falling to the floor. Tallin 2016.

On the basis of these two technical configurations, we started to explore what actions and movements dancers could do to create sound. Using the condenser microphones, we could easily pick up sounds the dancers were making in high detail, meaning we could replay a sound very close to how the audience would originally hear it in the room. The first part of the performance we developed consisted of a cycle of movements and sound development. The dancers would first make a loud sound by falling to the floor; the sound would be recorded and replayed in reverse while the dancers worked their way up into an upright position. The dancers would then fall to the ground again and the cycle would be repeated each time with a more extensive manipulation of the reversed sound. We also used the same microphone configuration in another sequence where the dancers created a rhythmic sound using their hands to clap and rub against the floor. This sound was recorded and replayed as a loop while the dancers started to carry out other movements. The dancer's choreography gradually evolved as the sounds recorded became the basis for a larger musical piece created by computer.

Early experiments with contact microphones on the floor. Tallin 2016.

The contact microphones on the floor were used in a part of the performance where the dancers were lying on floor moving in synchronization with small, abrupt movements. The contact microphones picked up the slighter movements the dancers made and in addition to just amplifying the sounds we used the signals to trigger other crackling sounds. Gradually, as the

dancers moved faster and faster, the crackling sounds grew more intense and new, more tonal, electronic sounds were added.

All the above-mentioned parts of the performance dealt with the very basic concept of creating a stage of ‘Schizophonia’. In all the parts we wanted to clearly let the audience experience the sound they had once heard in the acoustic realm being replayed and manipulated, breaking the perceived connection between what was being seen and what was being heard. Our focus on the sounds made by the dancers’ bodies in the performance did of course echo with what has historically been a re-emerging trope within twentieth-century experimental music: that of extramusical sounds. The most well-known exponent of this is John Cage and the name of our performance, *Sound of Silence,* was meant as a reference to his *4’33”*, often referred to as ‘the Silent Piece’. In the development of our performance, we wanted to make this reference a bit more apparent, and therefore decided to add a special opening to the performance. The computer was set to start recording sounds of the audience entering the room, sounds that would be picked by the condensate microphones on stage. These sounds would be played back through the PA system and rerecorded together with the new sounds from the actual audience in the room. Gradually this would create a louder and louder sound of people chatting among the audience. When the performance was about to start, I would go onto the stage and press a pedal in the middle of the floor, making the sound disappear, before the dancers came on stage. Through this we hoped to make the audience aware of the sound they themselves were creating: the same point Cage was making with *4’33*”.

Our use of recording technology and microphones also shared many similarities with Cage´s work. When it came to using recording technology, Cage was much opposed to using it to preserve and document musical performances (1961: 179). What became important, however, was how he viewed the technology as a means to create new music, such as through using tape technology in *William’s Mix* (Pritchett 1993: 91). An important reason for Cage´s attraction to recording technology was that it allowed him to work within the total field of sound, to: ‘allow for a representation that points beyond the symbolic grid of music’ (Grubbs 2014: 96). What he discovered was that microphones and recording technology pick up a wider array of sounds, not only the ones we would understand as musical. This is especially apparent in his work *Cartridge Music* where contact mics were used to amplify sounds otherwise impossible to hear (Iddon 2013: 167). Cage’s fascination with using recording technology to incorporate different sounds into his music came out of its potential to break with a traditional concept of musical composition and musical sounds (Grubbs 2014: 58–59).

Another important historical figure in the experimentation with sound recording and the use of extramusical sounds is Pierre Schaeffer with his ‘musique concrete’. Here, the recording and manipulations of everyday sounds become the basis for his musical works. The main goal was for him to reach a state of ‘reduced listening’: he was seeking to strip the sound of any connection to its cause and let the listener experience it without any reference to previous experiences (Schaeffer 2004: 78; 2012: 13).

In this respect, the concept of ‘Schizophonia’ drew us in a different direction than the more well-known historic traditions. In regard to Cage, ‘Schizophonia’ is not so much about whether the sounds are musical or not, but rather about how they break with our previous experience of the acoustic source of the sound. This meant that we adopted a more ecological approach to sound, investigating the whole field of sound and our experience as listeners, instead of questioning what is music or not. Compared with Schaeffer’s ‘musique concrete’, the concept of

‘Schizophonia’ is somewhat at odds with the idea of reduced listening. ‘Schizophonia’ describes the stripping of sounds from their original sources as creating a disruption in our auditory environment, not as a starting point for a new musical language. What we wanted to explore through the concept of ‘Schizophonia’ was more the uncertainties of the listener’s position. In this regard, David Toop’s observation in the introduction to his book *Sinister Resonance*, became important. Toop emphasizes that, as humans, we are so dependent on searching for the cause of the sound that the whole process of hearing is infused with an anxiety of awareness, making strange and unexplained noises a recurring trope in horror fiction (2010: vii–ix).

Taking inspiration from ‘Schizophonia’, we wanted to place emphasis on the ‘controller dislocation’ as introduced with much digital performance technology, not as a problem to overcome, but rather as a historic situation in our sonic environment that should be explored. Rather than seeking to reconcile the audience with new technology, as Tanaka did, our project aimed to explore how our performance could create a break with their earlier experience of the auditory environment. By disconnecting the sounds from their original acoustic sources, we wanted the audience to get a new experience of the sound and to underscore this new sonic experience by connecting it to new bodily gestures and movements. The previously mentioned examples underscored this in a very direct fashion, but we also wanted to seek out more subtle ways of exploring this. This involved finding other technical ways to record and manipulate sound.

The motivation for expanding our approach to microphones and technology was a desire to get more in tune with aesthetic reorientations that have occurred in the field of sound art and music. Joanna Demers, for instance, has claimed that contemporary electronic music has increasingly focused on sounds as objects in themselves, stripping them of their semantic meaning (2010: 14). Such a perspective also overlaps with Salomé Voegelin’s conceptualization of noise in sound art. Instead of defining noise as errors and the un-wanted, Voegelin describes it as sound that demands to be considered in its immersive contingency rather than in relation to a system of signifiers (2010: 65). Both of these writers describe an emerging focus on sound as a subjective and often bodily experience that goes beyond its meaning in relation to a traditional musical system. Such an attitude has more recently been advocated by Adrian Moore. In his book *Sonic Art: An Introduction to Electroacoustic Music Composition,* he states: ‘So let us throw “music” out of the window but bear in mind “musical”; something with phrases, starts, ends, middles, highs, lows, louds, softs, breaths, pace, shape, form, emotion and energy. Think about working with sound like a potter works with clay’ (2016: 2).

Maria Ulvestad with the prototype for the jacket with contact microphones. An important aspect become figuring out what movements made the best sounds. Tallin 2016.

As mentioned, early on we had the idea that sound could be made as the dancers move around in the clothes they were wearing. Wearing a jacket made of some heavy textiles or lining will in many cases create sound, an experience that especially people living in cold weather would be accustomed to. However, it turns out that we could not find clothes that made sounds loud enough to be registered by a microphone. We therefore turned to the option of using a contact microphone within the lining of a jacket. The sound this produced was of course much noisier and somehow unrealistic compared with what one would expect from textile moving, so we figured out that we had to manipulate the sounds even more to deliberately depart sonically from how the audience might anticipate the clothes would sound. We therefore chose to send the sound through a vocoder software, enabling us to give the sound a tonal character. The result was a musical sound that followed the intensity and phrasing of what one would expect from such a piece of cloth moving, but at the same time would not be associated with the acoustic characteristic one would expect.

Mari Bø experimenting with the first version of the looping camera. Tallin 2016.

The main point in this text, however, is to describe how this performance made me come up with the concept of the ‘sonic tool’ through the development of the Looping Camera. Even though *Sound of Silence* was a dance performance, it became apparent that at a certain point, the dancers needed some sort of handheld device or interface that enabled them to record and manipulate sound themselves as they moved on stage. During our first workshops, the dancers were playing around with a microphone on stage, trying out what sounds could be made. Together, we started experimenting with layering different sounds on top of each other and also investigating how reversing these sounds could create unexpected results. In this process, we had fun with learning to say a word backwards, then recording and reversing it to uncover the sound’s linguistic meaning. The challenge was that the dancers wanted to do all such things themselves while moving freely on stage. From a technical perspective, looping sounds and manipulating them is a possibility implemented in a range of commercially available machines, but these are not designed to be operated by moving dancers.

As with the design of most other new musical instruments, our design also started out with an artistic need for the performers to express themselves. But since the overall aim of the performance was to explore the concept of ‘Schizophonia’, we needed to approach the concept

of instrument design differently. Our aim was not only to come up with a technical solution to the performer's expressive needs, but also turn our attention to how the audience would understand it. We wanted the audience to question and re-examine the relationship between what they saw on stage and the sound they heard, so we needed to design something resembling a musical instrument while at the same time designing it to steer the audience's apprehension in a specific direction. It was in the work of the design of this instrument that I developed the concept of the 'sonic tool' resulting in the Looping Camera, a handheld loop-recording machine used by the dancers in the performance. I came up with idea of rebuilding an old Super 8 film camera, fitting it with both a microphone and buttons for recording and manipulating sound. An Oktava condenser microphone was placed inside the camera and a set of buttons were added and connected to an Arduino, communicating with a computer running Max for Live patches.

Mari Bø with the Looping Camera. Tromsø 2020. Video-still. Camera: Erik Nicolai Heim and Sondre Sanbakken.

The Looping Camera: Musical instrument or "sonic tools"?

From the theoretical perspective of instrument design, the work and design of the looping camera meant that I needed to rethink some of the established theoretical assumptions about musical instruments. A major challenge confronting an artist developing new digital musical instruments is often the creation of a device that enables the sort of expressivity and virtuosity a performer would seek (Calegario 2019: 13). But in our case, to create a device that could convey a sense of 'Schizophonia' we also had to attempt to place ourselves in the position of the audience, and envision how they would comprehend it. As it turned out, there has not been much focus on this aspect within the design of new digital tools for use in musical performances. A survey of the research presented at the NIME conference on new interphases for musical expressions reveals that this aspect is frequently neglected (Barbosa and others 2012; Emerson and Egermann 2020: 323). However, some theories could help us on the way.

In recent years, developments in digital technology have profoundly influenced the academic discussion about musical instruments. Especially the possibility in digital instruments to dislocate the actions of the performer from the sound produced have inspired new approaches. In the introduction to *Musical Instruments in the 21st Century* Sarah-Indriyati Hardjowirogo (2017) explains how this technical development has blurred the 'boundaries between something we are prone to call "instruments" and other categories such as "medium", "system", "configuration",

“machine”’ (10). Instead of speaking of instruments, it has become commonplace to speak about interphases, as observed in the phrase ‘New Interphases for Musical Expressions’ promoted by the NIME conference (Tanaka 2009: 224). This shift has encouraged many academics to move beyond defining musical instruments merely based on their material construction, instead understanding them as complex cultural objects that gain significance from the context of their appliance. Hardjowirogo (2017: 10) therefore underlines that musical instruments are recognized as such because they are used in a musical context. Musical instruments are not an object per se, but become such an object through their use.

In order to better accommodate this new framework for analyzing musical instruments, Paul Théberge applies Deleuze and Guattari’s term ‘Assemblage’. This is helpful for approaching musical instruments when one wants to look beyond their purely technically construction and also include how they are constituted ‘in variable sets of musical practices, genres, institutional settings, social ideologies and discourses’ (2017: 60). An electric guitar is, for example, not only the sum of its wood and metal parts, but also of its use in combination with amplifiers and effects such as delay and distortion.

An approach similar to Théberge’s is suggested by Eliot Bates. He draws on Bruno Latour’s Actor Network Theory (2005) to explain how different domains interpreted instruments differently. With the invention and marketing of musical instruments, it is clear that many actors play a role in reinterpreting the meaning of the musical instrument, altering its use between that intended by its developers and that of the world of different musical genres (2018: 44). As a consequence, there are always different conceptualizations of the workings of a musical instrument between the ones designing it, the performers and the listeners; there are always multiple instruments (Bates 2018: 46). A musical instrument is therefore not a stable, given entity that produces that same meaning in relation to any given actor; it is always understood differently.

This new academic approach to musical instruments as a category of complex cultural objects points to the fact that it can encompass a range of entities, and that these can be understood very differently depending on whether one is a designer, a performer or an audience. When focusing on how the audience experiences a musical instrument, it turns out that in addition to being used in a musical performance, it must also comply to a range of ideological and cultural ideals. In my opinion, it is not only the specific use that turns something into a musical instrument. For an instrument to be appreciated as such by an audience, it also needs to comply to their expectation of a musical instrument. This is of course most evident if we look at traditional classical instruments, where the audience perceives them in relation to an established historic context. A good illustration of this is the manufacturing of an instrument like the violin. By interviewing violin makers, Karin Bijsterveld and Marten Schulp showed that it is not only the sound of the instrument that is important, but also how it looks. It was crucial that the manufacturer stayed true to the ‘iconography’ of that instrument. Several possible improvements on the sound could be achieved through changing its material and shape, but for it to gain acceptance among musicians and audiences it had to retain the color and materials associated with the violins (Bijsterveld and Schulp 2004: 657–58). This points to the fact that this is not simply a question of complying to what is understood as a musical sound, but is just as much about physical appearance.

Beyond the realm of classical music, the attitude to new instruments might be less restrained by tradition. Audiences and musicians might easily accept new colors and materials, but it is often important that the instruments are still performed in a traditional way. For new musical

instruments to be commercially successful, they must often position themselves within established performance practice, often with a practical improvement compared to existing instruments (Théberge 1997: 31; Brend 2012: 17–21). The electric guitar was of course louder than its acoustic counterpart, and the Hammond organ was cheaper and more practical than a traditional church organ. Even a product like the Moog synthesizer became successful only when it was marketed as a keyboard instrument once the Minimoog was introduced (Pinch and Trocco 2002: 41; 217–21). But even if the success of new musical instruments is often dependent on how they comply to established norms in music, it is not always the case. There are musical instruments that 'succeed' even without conforming to an established tradition. Mundane objects like spoons and washboards have managed the transition into the musical realm. Among the later and more significant of such transformations is of course the use of the turntable at the hands of the DJ (Théberge 2017: 60 and Shapiro 2002: 164). This is also the case in much of contemporary electronic music. The computer is in itself a tool that was developed for information processing and office work, and much of the software and hardware tools developed today are far from what is traditionally defined as a musical instrument. My work with *Sound of Silence* helped me realize that this was an aspect often overlooked in academic discussions. My interest became how the introduction of new or repurposed technology into the realm of music was understood by the audience.

Much inspired by my work on *Sound of Silence,* in my PhD project I introduced a distinction between musical instrument and a category I defined as 'sonic tools' (Barlindhaug 2019: 24–27). Both of these categories could of course be covered by a broad definition of musical instruments, but as I defined it, 'musical instrument' is used more specifically to describe what conforms to the expectations of a musical instrument in the perspective of an audience, especially when focusing on the material construction and performance practice. The 'sonic tool', on the other hand, is the instrument that emerges from outside this tradition. This is, of course, a very fluent definition in which sonic tools over time can become a part of musical tradition and turn into a musical instrument. In addition, some instruments might be somewhere in between, partly a traditional instrument, but with new and added features taking them more in the direction of a 'sonic tool'.

What the introduction of the concept 'sonic tool' does is to pinpoint a crucial aspect within present-day reality concerning musical instruments. If we are to use the concept of assemblage or actor network theory, we have to acknowledge that connections and influences flow in all directions. The introduction of new technology as musical instruments cannot only be explained as altering the use of technology, but also needs to include questions about how this alters our conceptualization of music and sonic aesthetics. With regard to the ontology of musical instruments, while Hardjowirogo asks what makes something a musical *instrument,* attempting to draw a line between instrument and non-instrument (2017: 10), I would rather focus on the adjective and ask what it means when something is not *musical.* From an audience perspective, the use of unfamiliar and sometimes un-musical technology can play a significant part in shaping their aesthetic experience of the performance and the sounds they hear.

How audience experience can be shaped by the type of instruments used in the performance is especially important in relation to more experimental situations like the use of sensor-based technology. Much of this technology is so new that, from an audience perspective, it has not yet entered the domain of musical traditions, and therefore lacked what Tanaka defined as a shared performative language (2000: 404). The concept of 'sonic tools' does cover a range of more historical practices in the field of sound art and music, including the work of Cage and Schaeffer.

Since the 1960s there has been a growing trend for artists to manipulate and even destroy mundane technological objects with the purpose of creating new sounds, a practice that Caleb Kelly (2009) labeled ‘Cracked Media’. With the proliferation of digital technology, there came an increasing interest in exploring the sound of these types of tools. Harnessing the clicks and glitches that came as an unintended by-product of the malfunction in digital sound processing became a key ingredient in much electronic music at the turn of the millennium (Cascone 2002).

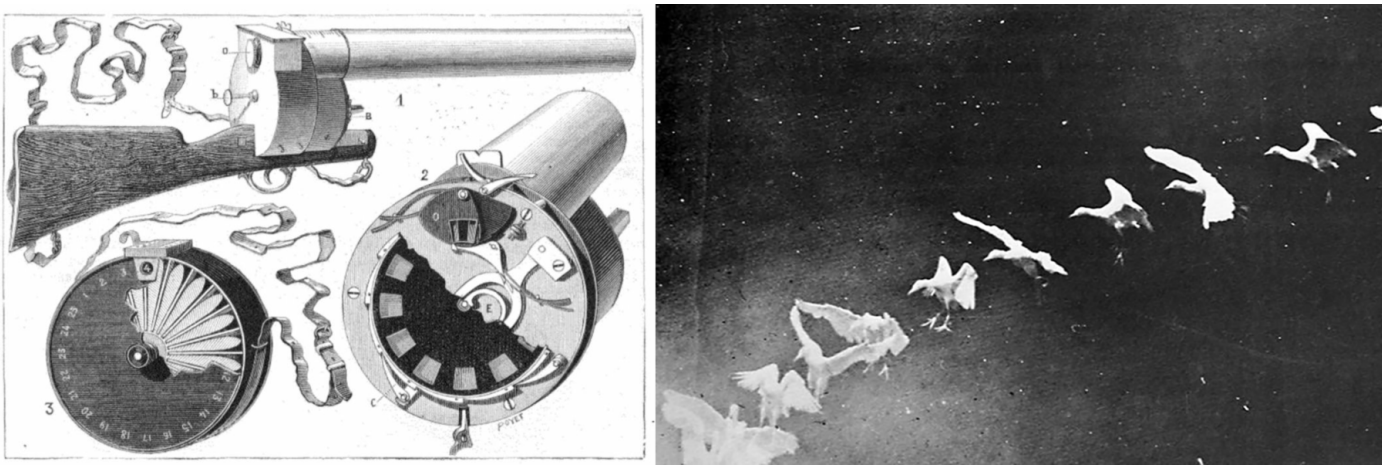
Even though the concept of ‘sonic tools’ covers a range of prior and contemporary praxis within music and art, it still is a concept that brings something new to the table. As mentioned earlier, the idea is that technology from outside the domain of music in some way must influence how audiences experience sound and music. In addition, this is not just about exploring the dichotomy between musical and non-musical, but rather enabling us to introduce a more precise terminology into the description of how our aesthetic experience of sound can be changed. The concept of the ‘sonic tool’ enables a more nuanced discussion about how the technology in itself plays a role for the audience experiencing sound in a performance. The way the concept of the ‘sonic tool’ was used in our creative process of *Sound of Silence* provides a good illustration of how this can be achieved.

A crucial point in our design of the Looping Camera was using cultural references from outside the musical domain to steer the audience’s experience in the desired direction, establishing a visual iconography that somehow underscored the situation of ‘Schizophonia’. Repurposing an old Super 8 camera became in this case a key choice. The film camera has a unique position in relation to our visual culture. Throughout the twentieth century the camera was often understood as a means for objective documentation of visual reality. As stated by the filmmaker André Bazin, while earlier visual art was a result of the artist’s subjective interpretation, the invention of the chemical photo process was understood as an objective imprint of reality (Bazin 1960). Similar analyses of the technology also inspired Roland Barthes to emphasize photography’s unique quality as a historical document (2000: 4). By applying these references to the act of recording sound, we wanted to invite the audience to question the relationship between an objective documentation and the result they as an audience perceive. While a camera might record the image of what one sees, it becomes clear that the Looping Camera records sounds that are somewhat different to what might be expected. Through amplification overlaying, human voices, sounds from body movements, and the ruffling of hair become a lush and enigmatic soundscape, sometimes only partially resembling the actions taken by the dancers. Recording new parts and gradually changing the soundscape throughout the choreography, the connection and disembodiment of sounds becomes thematized. The Looping Camera was designed to work as an ‘understandable’ instrument—a technological tool under the operation of the dancer—that illustrated the act of recording and manipulation done by the performer. Instead of designing a tool that was all-out new and unfamiliar to the audience, the camera was chosen based on our assumption that the technology’s connotations for the audience, beyond the domain of sound and music, could help shape their aesthetic comprehension of the sound. The idea was to use the discrepancy between the conception of an objective recording technology exemplified by the camera, and the unfamiliar sounds the audience hear, to establish the state of ‘Schizophonia’ we wanted to achieve.

As mentioned, loop machines do of course exist, and most audiences would be aware of such a device. Possibly, they do not know its detailed workings, but at least they have some familiarity with its ability to record and replay small chunks of sound. What is, however, mostly the case with

such devices is that they are used in combination with traditional instruments, for instance a guitar. The device, in such cases, becomes a part of what Théberge would call an ‘assemblage’ that makes up a musical instrument: a device that is used in combination with a traditional instrumental performance. The manufacturing and marketing of loop machines is traditionally done based on how they can be used as an added feature in such performances. In the case of *Sound of Silence,* the artistic circumstances were very different since the use of recording and looping sounds was to happen in the realm of a dance performance. The construction of a device based on repurposing a film camera was therefore crucial in drawing the audience’s attention away from the workings of recording technology in the traditional musical setting. We wanted to establish its purpose in relation to the experience of sounds, body, and movement, and not as an ‘aid’ in a musical performance.

The visual iconography of the film camera was also reflected in the choreography. The Looping Camera was used in a duet between the two dancers. A starting point for the choreography was that the dancers in part would recreate something that resembled an interview situation: one dancer directing questions and then recording/filming the answers from the other. While the interviewer records herself talking backwards then reversing the sound to uncover the sounds’ linguistic meaning, the dancer answering is silent, only attempting to express herself through movements and strange gesticulations. Turning the duet into an unexpected and incomprehensible dialogue commented upon the relations we expect between sound and meaning.



Marey´s Photographic Gun and one of the pictures taken by the device. The purpose of the invention was to capture the flight of birds to uncover the movements enabling them to fly.

The Looping Camera as an assemblage was also intended to question how technology shapes our understanding of reality and how it plays into power relations. The film camera, as we came to know it in the twentieth century, was in part a result of a scientific preoccupation with uncovering the secrets in the natural world that human eyesight could not perceive. One important predecessor to the film camera was Marey’s Photographic Gun. This was a camera shaped as a rifle that could take sequences of images. Its purpose was to document the flight of birds and the movement of their wings. This device underscores the fact that the film medium was in part a result of a cultural desire to control and quantify nature, a development driven by a positivistic scientific world view (Väliaho 2014). We played on this concept through the amplification of more or less inaudible sounds like heart beats, eye lids, and hair. This changed

the proportions of volume expected to come from certain actions, rendering the sounds new and even unrealistic. Another aspect of camera technology that is often discussed is its connection to weapon technology. The photographic gun is of course a clear case of one such connection, but it has also been a theme in the writings of Paul Virilio, who emphasized how imaging technology has been developed for military purposes (1989). A handheld microphone might symbolize one's voice being heard, both literally and metaphorically; concealing it in a camera, however, gives a different cultural connotation. Even if a person is not familiar with the writings of Virilio or Bazin, camera technology is often associated with privilege. Wielding a camera puts one in control of what to document and preserve. Either one is deciding who will be rendered immortal on the silver screen or is using the tool for more scientific purposes, drawing attention to details in nature we usually do not notice. In addition, contemporary society uses cameras extensively as a means for surveillance, turning them into a symbol of control and the exercise of power.

Developing the performance

As mentioned, during the first workshop we established a set of technical configurations regarding microphone placements and usage; in addition, we built prototypes for the Looping Camera and the jacket with the contact microphone in the lining. This established a backbone for the rest of the work for the performance. In this latter part of the development phase, showing parts of the performance for a test audience with a subsequent artist talk was important. Through such informal conversations with test audiences, we invited them, often without much prior explanation of what we wanted to explore, to come with their interpretation of what they saw. This gave us a very unfiltered and subjective response on our performance, unbiased by much of the more theoretical foundations me and the dancers constructed during our workshop. Some of this feedback furthered development of our performance in very specific directions.

The main purpose of this period became to further develop each part of the performance, working on the choreography and programming stable technical solutions for the recording and manipulation of sound. We used a computer running Ableton Live, with different Max For Live patches, as a basis for the whole performance. In the two parts where we used the condenser microphones on stage, the Max patches mostly recorded and processed that sound automatically, with few interactions from me controlling the sound. The contact microphones were also controlled in much the same way. The Looping Camera and the jacket, however, had to be used more as standalone devices being fully controlled by the dancers.

At an early stage of developing the performance, we showed the dancers using the Looping Camera to a test audience, eager to hear how they understood this part of the performance. What, however, became clear was that they had problems understanding that it was the dancer who was recording and manipulating the sound herself with the Looping Camera. The reason was apparently that they noticed me sitting beside the stage with the laptop. Most of the audience thought it was me with the computer who was controlling and manipulating sound, a conclusion that maybe illustrated how accustomed audiences have become to relating the use of computers to the creation of sound. To underscore that it actually was the dancer on stage who controlled the sound, we needed to show that there was no-one using the computer. Consequently, we redid the whole scenography of the performance making all the technology visible on stage. Computer, cable, soundcards, amplifiers, microphones, and even light controllers were all placed centrally on the stage, contrasted against a white dance floor. In the final performances, the audience was sitting on the same levels as we were, surrounding our stage in proximity on three sides. It also

became important for us to move me away from the computer, making it even more apparent that it was not me, but the dancers themselves controlling the sounds.

The type of setup we used for the computer and sound during the first audience tests, giving the impression that I was in control of all the sound. Tallin 2016.

Trying out the scenography, leaving cable, lights and microphones visible for the audience.

When putting together the performance, designing the chronology of the different parts of the performance also put a focus on ways to underpin that the dancers themselves were creating the sounds. As mentioned, I was the first person to enter the stage, turning off the sound that had been building up by recording and re-recording the sound of the audiences entering the room. It would therefore be natural that I would sit down by the computer placed on the floor. What then followed were probably the most basic parts. First the dancers moving across the floor while gradually substituting the sounds picked up by the contact microphone. The second part was based around the sounds of the dancers hitting the floor. In both these parts there was some need for me to manually control some functions, so I needed to sit on the floor by the computer. In our perspective, we hoped that these two rather basic concepts of recording and manipulation

sound would introduce to the audience the concept of severing sound from its original source. The following part was the part with the Looping Camera. In this part I moved away from the computer, hoping that this would place more emphasis on the dancers' actions in creating the sound we heard. At this point, instead of sitting at the edge of the stage, I was moving the spotlight following the dancers in their choreography. After the duet with the camera, we moved into the part with the previously mentioned jacket with contact microphone inside. At this point we also wanted to move the attention away from the laptop on stage, to accentuate the actual dancers' part in creating the sounds. However, we also reasoned that it was not only my interaction with the laptop that had given the first test audience the notion that I was the person in control of the sound; it might also have something to do with gender. It might be that cultural expectations would interpret controlling technology as a masculine trait, and dancing as a more feminine domain. We therefore wanted to put me, as a man, in an even more passive situation. The result was that we decided that for this part, I would be seated passively as a mere spectator in the chair on stage, while the second dancer would take up the role of controlling the spotlight. From one perspective, my sudden role as a spectator could of course awaken the concept of the male gaze, but we hoped to defuse this within the setting of the performance. First, I was suddenly the object of the audience gaze, surrounded by them on three sides. Second, while for the rest of the performance we were all working—either dancing or controlling sound and light—this was the only time when someone was passive.

Segments from *Sound of Silence*, showing how the sound from the dancers was automatically recorded and manipulated by the computer. The concept was to use different distinct sounds, the dancers made with their bodies, and record, replay and manipulate them. Then the dancers accompanied these sounds with new movement, establishing and breaking connections between sound and movement. Tromsø 2020. Dancers: Mari Bø and Åsne Storli. Camera: Erik Nicolai Heim and Sondre Sanbakken.

This focus on underpinning the functionality of the technology through visualization also became the premise for the further development of the Looping Camera. At the beginning, we did consider remaking it into a wireless device, but instead went in a different direction, keeping the cables on the prototype and even adding more as we added more functions to the camera. The camera became equipped with an XLR connection for the microphone. In addition, jack connections on the housing were used to relay the control signals from the buttons of the camera. The cables worked, in my opinion, to underscore a connection to that of sound technology. Through this we gave the original camera a clear indication of a repurposing and retrofitting, hopefully underscoring some idea of intentional functionality for the audience. It would be apparent that it was the dancer's interaction with the 'sonic tool' that created the sound being heard. The connection between what one sees and hears can of course also be established through tight choreography, but to create a truly meaningful aesthetic interaction, it has to be

apparent for the audience that this is not the case. The raw and often accidental sound picked up by the microphone in the camera, together with the clear visual signs of retrofitting, would underscore for the audience that what was being heard was the actual result of the dancer handling the ‘sonic tool’. While Tanaka used the duration of the performance to establish a performance language for the audience, the use of the Looping Camera as a ‘sonic tool’ establishes such a language through the visible design.

Mari Bø dancing while wearing the jacket with the wireless contact microphone inside. Tromsø 2020. Camera: Erik Nicolai Heim and Sondre Sanbakken.

The final design of the Looping Camera with its cable and numerous connections was, however, contrasted in the performance with the design of the jacket. In the early prototypes this also needed a cable to transmit the sounds from the contact microphone in its lining. It was however apparent from the start that this would hinder the dancer in her movement, so we changed it into a wireless connection. As a result, while the Looping Camera had clear visual references to its functionality, the jacket was without any visual reference to how the sound was created. In relation to the connection between the sound and its cause, this part become more enigmatic, a topic that later returned in our conversation with the audience of the final performances.

Another important reason for visualizing all technology used in the performance came out of another comment we got from a test audience. After seeing an early version of nearly the whole performance, one professional dancer we had invited said: ‘I am not sure if I get it, what is it about?’. What was clear was that she was looking for some narratives in the performance. Based on this we also wanted to use the visualization of microphones, computer and lighting as a way of stripping away any ideas of illusions. What you were seeing as an audience was here and now, not a part of a fictional narrative space. They were to experience us exploring sound and movements, not so much us telling a story. This also inspired us to place perhaps the most traditional part of the performance last—the part where the computer would record and loop the sounds of the dancers brushing and clapping on the floor. As mentioned, the sound continued as the dancers changed their movements, developing into a set choreography.

Mari Bø and Åsne Storli performing with the Looping Camera. Tromsø 2020. Camera: Erik Nicolai Heim and Sondre Sanbakken. This and the other movie clips were recorded without an audience during the

corona lockdown. This was done for the purpose of making a version of the performance that could be streamed as part of the Soundance festival 2020. The close proximity we otherwise would establish with the audience surrounding the dancefloor was not achievable in this version.

The final result: how was the performance and the Looping Camera understood?

The first performance of *Sound of Silence* was in summer of 2019 at True Northern Arts Festival. For that show we had written a short program text explaining how the sounds heard in the performance were all made by the dancers on stage, without going into any deeper theoretical explanations of what we hoped to explore with the performance. Unfortunately, we did not have the opportunity to hold an artist talk at these performances but had some informal discussions with artist colleges that attended. One comment in particular, gave us the impression that we had at least partly succeeded with our intention, expressing the feeling of being invited into a laboratory watching us experimenting with sounds. The questions regarding how the sounds were made, were of course what caught the attention of several people. In particular, the small sounds we managed to amplify using the Looping Camera fascinated many, since what you heard sounded so far away from what one would expect. In this respect we clearly managed to get the audience to reconsider some assumptions about the cause of the sounds, and experience the relation between what they saw and heard in new ways. However, we got one rather critical review of our premiere that very much exemplifies how difficult it actually is to gauge how an audience will understand different cultural connotations of any kinds. The audience is a heterogenous entity with diverse experiences and knowledge, and the reviewer read the name of the performance as a reference to a Simon and Garfunkel song and was disappointed that she could not find any narrative plot in the performance. In part this echoed the earlier comment we had been given regarding the lack of narrative in the performance. She did understand, and in part appreciate the experiments with dislocating sounds from their original source, but would maybe have focused more of her attention on this if she had taken our reference in the title as it was intended.

For the shows to follow, we changed the title from English to Norwegian, to make the title a direct reference to sound, rather than a song title, and made a program text that emphasized the experimental aspect of the performance in favor of any narrative plots. But as for many others, all further plans for the performance were severely affected by the Covid pandemic. In the end, we only managed to have two more live performances as well as filming one version for the purpose of streaming.

Collecting the feedback we gained through the artist talks for the two additional performances gave some additional indications on how the audiences responded to our performance. These sessions were open conversation without us coming up with any direct questions. With this, we hoped to receive a subjective and personal response, without them giving us the answers they perhaps felt we wanted. The problem was of course it sometimes could be difficult to steer the conversation towards topics we were interested in.

Concerning the Looping Camera, it was clear that the design of this ‘sonic tool’ did play a part in the audience’s aesthetic experience of the performance and the sounds created. Adding cultural connotation through the visual design of the tool did in fact inform the audience significantly in their reception. The fact that it was a film camera made, as we hoped, many of the audiences interpret the ‘sonic tool’ in relation to concepts of examination and documentation. Once again, the audience was intrigued by how you could use the Looping Camera in very close proximity to an action and amplify the sound into something more or less unrecognizable. Another connotation that some audiences brought with them was that of a gun. Camera technology, has as mentioned, some technical and visual resemblance to a weapon, and did for some audiences evoke a level of tension and anxiety that influence their reception of both the sounds and the choreography. When one of the dancers pointed the camera at either herself or at the other dancer, some of the audience would interpret this with a degree of unease. The camera affected how the audience interpreted the dancers’ actions and subsequently framed the sounds they heard with a degree of suspense. To conclude about the use of the Looping Camera, it is clear that its design—that of repurposing an old Super 8 camera—gave many of the audience members a very different aesthetic experience of its use than if we had used a standard microphone and a commercially available controller unit. The design of the tool established an aesthetic connection between the dancers’ movements and action, and the sound heard. This finding underscores my conceptualization of the ‘sonic tool’, that adding cultural references from outside the musical domain when constructing a tool for making sound on stage, can steer the audience perception in specific directions. It must however be mentioned that one audience member clearly did not understand that it was we who had designed and built the Looping Camera. He thought it was something we had bought ‘off the shelf’ from one or another manufacturer, making the design even more puzzling, but for the wrong reasons. This once again illustrated how different people clearly interpret what they see and hear differently.

Our goal was in part to use the concept of ‘Schizophonia’ to move the audience’s attention away from the established dichotomy between musical and extramusical sounds. From the talks we had with the audience, it seems that we to a great extent succeeded with this. However, the part of the performance that many people seemed to find most interesting was that part that perhaps had the most musical connotations as well as broke the connection between movement and sound the most. This was the previously mentioned part with the wireless contact microphone in the bubble jacket. Here, the sound from the microphone passes through a vocoder giving the sound a new texture as well as a tonality. Both the texture and the melody evolved as the chorography increased in intensity. While the Looping Camera was designed to give the audience some references to how the sounds were made, as well as inviting them to question the sonic result, the wireless connections on the jacket made the relations between the dancers’ actions and the sound even more enigmatic. Many audiences described this part as poetic and especially expressive in terms of the relation between the sounds and the dancers’ movements. One explanation as to why this part of the performance seemed to capture the audience the most might be that the musicality in this part, together with the lack of any references to known

technology, is what many audiences expect in an experimental sound and dance performances. As I see it, this part of the performance uses new technology in a more traditional way, relying on creating some amazement among the audience about how the sounds and music are controlled by the dancer. Another explanation can also be that we as artists, as musician and dancers, are better trained at working with such musical materials. It might be that our skills and background make us more successful with some experiments than with others.

Gathering the input and responses we had received from the audience, we may conclude most people had a dual perspective on the performance. They were intrigued by the sounds and their connection to/disconnection from the dancers' movement, but at the same time much of their attention was directed against the expressiveness of the choreography. It can be said that we had hoped to connect these two aspects better, making the one merge more fully with other. The problem might be that experiencing the sonic aesthetics traditionally takes second place in a dance performance, and that many are trained to look for more narrative traits in such an artform. Experimenting with new forms of listening is maybe more challenge in the context of dance than we had hoped.

However, in sum, if we return to the focus of this text, the concept of the 'sonic tool', and the use of The Looping Camera, it is clear that it created a unique combined experience for the audience. It seemed that it was in this part that we were most successful in getting the audience to reapproach the sound they heard in integration with the choreography, as well as making them experience the sound heard in a new aesthetic realm. My hope is that the concept of creating 'sonic tools' can be inspiring for others, and can also be a way to gain better academic understanding of new experimental tools in music and sound art.

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