



UNIVERSITY OF GOTHENBURG



*Illustration 1: The weekly visit of Sunday school kids viewing and playing with the water drop sequencer*

# From engineering to fine arts

*3D, Sound installations, frequencies and projects made so far*

Mårten Bergkvist

Master of Fine Arts Thesis with specialization in Digital Media

Report number: 2011:067

ISSN number: 1651-4769

---

University of Gothenburg  
Department of Applied Information Technology  
Gothenburg, Sweden, May 2010

# From engineering to fine arts

*3D, Sound installations, frequencies and projects made so far*

Mårten Bergkvist

## Summary

To begin with I am writing about my technical background. Mainly how 3D have become my most important tool from my technical education and work as an engineer. I also write about my interest in music that led to studies in sound engineering and my interest and knowledge in photography and video.

My influences and inspiration mainly came from music before beginning my studies at C:Art:Media. From here on I begin to find out more about contemporary artists within my field of interest. I have chosen a few to write about here and how they relate to my art practice.

During my last term in C:Art:Media I started to make interesting findings about sound and specific frequencies. I first stumbled over a scientific field called Cymatics that researches how sound affect matter. After finding out about Cymatics I started to find other frequencies, both through internet research and personal experiences, that I choose to use as a framework for my master exhibition.

Ending the thesis I will write about the projects I have worked with during my time in the C:Art:Media programme, from my first project to the master exhibition, but also about some projects outside this context.

## Keywords

3D, Blender, video, music, sound engineering, sound installation, Cymatics, 136.1Hz, yoga

# Table of content

Introduction	3
My technical background	5
Engineering and 3D	5
Open source and Blender	6
Sound engineering	7
Photography and video	7
Influences and inspiration	8
Music and visuals	8
Andreas Oldörp	8
Brian Eno	9
John Cage	11
Sound, frequency and matter	12
Cymatics	12
Finding 136.1 Hz	14
Yoga, sound and music	14
The Projects	16
My first project, The Cube	16
Tone Bender 1.0	18
The water drop sequencer	22
<i>The Prototype</i>	23
<i>The Staircase</i>	23
<i>Pixelache and the idea for a future installation</i>	25
The Master exhibition	26
<i>The space</i>	26
<i>The frequencies used in the staircase</i>	28
<i>The Critique</i>	29
<i>The live performance</i>	31
Se&Hör	33
Way Out West	41
Experimental Pop	42
The Guest House	43
Conclusion	45
List of Figures	45
Bibliography	46

# Introduction

When I was introduced to C:Art:Media by a friend I realized it was the perfect program for me. A master program in fine arts focusing on digital media that were accepting people either with a bachelor of fine art or a bachelor of science. I come from the technical background with a bachelor of science in design engineering from the university of Skövde, but my deepest interest have always been towards music and media. In the beginning of this thesis I will write about the technical skills I have with me from technical engineering, sound engineering and skills regarding my interest for photo and video. The main tool from engineering being 3D, both for construction and visualizing purposes. I will also write a bit about Blender, a very competent open source program that is very close to the capabilities of commercial 3D software that are out of economical reach for most artists. As a result of my interest in music I took a break from my consultant job to study sound engineering which is something I have great use of in my work with both sound installations, video and my own music. I also write a bit about my interest in photography and video and my visions around that.

Before C:Art:Media my influences and experience of contemporary art was connected to the music scene both being a musician and a big music consumer. When beginning my studies I started to learn more about contemporary art and artists. In this paper I will write a bit more about Andreas Oldörp, Brian Eno and John Cage that have several references to my own art practice. Andreas Oldörp is making very interesting sound installations that in many cases explores the space in a very interesting way. Brian Eno is a musician and multi artist that have a very broad repertoire that is very appealing to me. John Cage was an experimental sound artist, composer and musician that I learned more about during the summer course Experimental Pop in 2010.

In the last year of C:Art:Media I started making discoveries regarding sound that caught my interest. First I found out about Cymatics that is a science that explore how sound affect matter. today this is done with modern equipment, and this is basically done by exciting a metal plate with specific frequencies and see how different patterns emerge in different materials. This have given birth to philosophical and religious ideas about sound possibly being a more important part of the creation myth then we might think. There is also connections between the vibrations and letters of ancient languages. The more I have read, the more sceptic I get, but there is a lot of interesting theories and lots of cross references to keep this a very interesting subject. Some frequencies I have found during this research have been the framework for my master exhibition.

The last chapter is about my projects. Both the ones I have worked with during C:Art:Media, but also in parallel and afterwards. My first project, the Cube, felt like a bit of a failure from an artistic point of view, but it was a great learning project and my first steps into the art sphere. Tone Bender 1.0 was my first big sound installation that was the mother and father to my following installations. It is a kind of percussive instrument, or interactive sound installation, that allows a user to strike hanging metal bars and sinking them into water, thus bending the tone. From this installation The Water Drop Sequencer was born. Instead of striking the bars, sound is created by water drops falling on them. The audience can interact by moving the bottles that generate the water drops to different positions and then hitting different tones. It is also possible to control the speed of the water drops. The master exhibition was a twist on the water drop sequencer. I choose to make it not interactive. I made the installation in a staircase with two tones at each floor on three floors. I implemented specific frequencies that I had found during my sound research. At the finissage I also made a live performance based on the frequency 136.1Hz and using the technique live-looping. During the time the exhibition was up, I went to Sandnes, Norway, to participate in the group exhibition Se&Hör. I installed the water drop sequencer here to, but this time I went back to the concept of interactivity. This was a fantastic experience and

my first exhibition on my own outside the school. In the music festival *Way Out West* I exhibited two years in a row (2009 and 2010). The first year I build up the *Tone Bender 1.0* and the second year I made a experimental and abstract video in cooperation with two friends I learned to know at the summer course *Experimental Pop*. We used time lapse photography as the concept for the video. For the sound we used binaural audio recordings and did an experimental sound/music recording on top using the set up we had made during the summer course. As a result of putting up a video on Vimeo of my water drop sequencer I was discovered by Fernando Melo, a choreographer and dancer at the Gothenburg operas ballet. This led to me working as a sound designer and composer for the modern ballet production *The Guest house*.

Photographs and images in this paper are mostly my own. All other images are assumed copyrighted by their respective owners. These were obtained via screen shots from online videos or as downloadable images and are reproduced in the spirit of fair use and within the context of an academic and non-commercial project.

# My technical background

Life led me to an engineering career and the story leading up to my choices is too long to be told here. In short I was choosing between a set of options and pretty much going for the least painful and future-proof option. There have been good and bad experiences during my engineering years, and now I am leaving that sector and slowly moving into the cultural sector. I am interested in the combination between the two worlds and my technical skills have proven to be a great asset in my art practice.

## Engineering and 3D

I see myself as a generalist and that this is a strength. This development towards a broader set of skills instead of being specialized already began at my first university education at the Design engineering programme in Skövde. This was the first education of its kind in Sweden in combining classical engineering with design and human oriented subjects like design, human machine interaction, and cognitive science. The idea was to create a person that could understand both sides of the production process and function as a link between those. After finishing my bachelor in 1998 I moved to Gothenburg and started to work in a consultant firm that mainly worked with technical construction. This was where CAD (Computer Aided Design) became my main tool and for many years I worked in different construction and product development projects.

When I first came in contact with 3D during the design engineer program, 3D-software were still quite simple compared to today. For me the combination of exact control over the geometry and imaginary freedom of what to create was perfect. Remembering my impatience with hand drawing as a kid when I could throw a sketch away after just a few strokes because I thought I could see that it was not perfect. Fortunately I eventually learned it does not work quite like that and that you need to be patient to see the end result evolve. If some one would have told me that back then when I was a kid, maybe I would have more drawings from that time. Whether that had anything to do with it or not, in 3D I had full control over all steps in the creation process. Another important thing that got me hooked on 3D was something that started to emerge and get better during these years, and this was the possibility of photo realistic rendering. This early on even the most advanced rendering really was not that photo-realistic, but nonetheless it was incredibly fascinating.

The use of 3D in the technical construction context is quite dry when it comes to the aesthetics and it is pretty much all about functionality and creating detailed drawings and plans for manufacturing. The main tool for this was Pro/Engineer (now Creo Elements/Pro<sup>1</sup>) which is one of the big CAD softwares out there. It was first in 2005 when starting up the company *Industriromantik AB*<sup>2</sup> with two friends from the design engineering program that I started to use 3D for aesthetic visuals. The main line of work was to create photo realistic images for architecture agencies.

For this Maya<sup>3</sup> was used for modelling and Maxwell Render<sup>4</sup> for generating the images from the

---

1 " PTC – Creo Elements/Pro formerly Pro/ENGINEER Wildfire 5.0 – 3D CAD Software – Design" .

2 " Industriromantik" .

3 " Maya - 3D Animation, Visual Effects & Compositing Software - Autodesk" .

4 " Maxwell Render :: The next generation in rendering technology capable of simulating light exactly as it behaves in the real world."

3D-geometry. We also used the Adobe Production suite<sup>5</sup> for editing images, animations and creating online and offline presentations and applications in Flash.

When beginning C:Art:Media I thought I would use my 3D skills in combination with photo and video productions, but my direction changed. In my new direction of making sound installations it turned out I got tremendous use for my 3D skills in a different way. I mainly used it for sketching up ideas, presenting ideas, planning for the installation process and for detailing the construction of my structures. Pretty much what I had been using 3D for in my previous work. From my experience I think installation artists, and also curators, would benefit a lot from learning how to use basic 3D.



*Illustration 2: The last visualization job I worked with at Industriromantik AB*

## Open source and Blender

One problem with most 3D software like Pro/Engineer, Catia, Maya and 3D studio Max and many more is that they are very expensive. For artists to afford and use these tools in their practice they should have a company and make commercial work for either advertising agencies, the movie industry, game industry or architectural companies. This is where the beauty of open source software come into play. Open source software is free for the public to use, even commercially. Blender<sup>6</sup> is the most amazing open source program I have come across so far. It is being developed on a very professional level and come very close to the commercial 3D softwares out there. When first hearing about Blender I found the interface too strange to learn fast despite my background knowledge in 3D, so in order to be effective I used the software I had experience of during the education. In the last year, with version 2.5x, Blender have undergone huge changes and improvements of the interface making it much more user friendliness. In 2010 I decided it was time to convert my Maya knowledge to Blender. I started to watch lots of tutorials when I had a chance, like at breakfast or evening supper. Only watching is not very effective learning though and in 2011 I got the opportunity to work with Terence Gower helping him with construction drawings and visualization for an art exhibition he was in charge of at MUSAC, Contemporary Art Museum of Castilla in Barcelona. This was the perfect project that

---

5 " Video production editing | Adobe Creative Suite 5.5 Production Premium" .

6 " blender.org - Home" .

forced me get into production details with Blender and also getting a better work flow. For the detailed construction drawings though I had to work with a CAD program since Blender do not have that type of parametric functionality.

After both using 3D as a great tool in my own artist practice and seeing how it could be of great use to other artists, and at the same time having experienced how 3D was taught to art students at C:Art:Media, I thought that I had found a interesting hole to fill. If I would create some sort of course material or online tutorial in the future, the huge challenge would be how to scale down a huge and complex piece of software to something that someone without prior 3D experience could actually start to use it without the initial frustration pushing them away. What I think would make this possible is that in order to use Blender as a sketch pad for ideas and being able to make simple renders (image output) for presentation and planning purposes, you only need to learn a small part of Blenders whole production capability. When you get the basics right, then it is much easier to pick up on more advanced techniques if that would be interesting. One important thing I think was missing in the lectures at the IT university was the simplest things like learning how to navigate the 3d-space and doing the most basic operations to 3d-geometry and allowing a bit of time to get comfortable with this. The problem was that there was no time, and a very interesting tool got lost for many students. If you have an idea, simple or complex, and you do not know your way around the basic operations of the interface you will most likely end your 3D career before even giving it a fair chance.

## Sound engineering

When I had worked with construction for about two years I decided to take a break in 2000 and study something with music and possibly art in a folk school context. I finally ended up in Haparanda that was one of the few folk schools in Sweden that had both music and art under the same roof. The first six months I took courses very freely combining studies in studio engineering, digital graphics, web page creation and some clay throwing. Though I wanted to develop my skills in music, and there was a music/jazz program in the school, it was the studio engineering that caught my interest. I think this was because I felt a bigger musical freedom if I knew how to work with recording and editing sound. I ended up studying a complete year at the sound engineering program. After the studies I came back to Gothenburg and my life as a consultant. Since then I have been investing in my own studio gear and instruments. During the years I have done productions spanning from demo recordings for various types of bands to the recording of a church choir. Mostly I used it for productions with the band, Miosis, I was in for many years. Now this knowledge is very useful to have both in my art and music practice.

## Photography and video

An interest that I picked up more seriously in 2008 was photography. My focus then was manly understanding the camera, getting a hang on using the manual settings for full control and using it as a tool for documentation. One interest I have had all along is to combine my music with photo and video. After my studies at C:Art:Media and working with sound installations, my ideas for how to use photo and video have widened. I find it very interesting when video is an element of a performance or installation without taking over or being the main focus. There is also many different areas of video that I am interested in exploring, from nature to architecture, dance and documentary. Where to start will be a natural choice depending on opportunities and contacts. After working with the Gothenburg operas ballet I have a very good contact with Fernando Melo, choreographer and dancer, who is working with dance video production. I am also going to attend a summer course in 2011 that will document the *Åhsnabben* boats on the canal using



audio and video. My personal music projects is always an ongoing process.

As I got into photography on the digital side it has been natural to start working in Photoshop. Right now my favourite editing program for photo though is Lightroom<sup>7</sup> which pretty much would be the digital version of the analogue darkroom, hence the name. Photoshop allows much more manipulation, distortion and layering of images while Lightroom is more about working with the image itself and enhancing that. I find both ways of working interesting though. When I was in Haparanda I actually took a weekend course in analogue film development. That was quite interesting and it has a very different feel to it, and the results can be amazing. My father has an old Hasselblad camera lying around somewhere and at some point I hope to brush of the dust and use it, but for now I am a digital guy and happy with that.

## Influences and inspiration

My interests and practice I would say mainly comes from not so conscious influences that I have been subjected to through the years like all kinds of music, media, my social background and nature. First after beginning my studies at C:Art:Media I have been made more aware about various contemporary artists, both famous and unknown, that are very interesting and inspiring. I have picked a few references that I feel have the most to do with where I am now and where I am going. My projects that I mention in this chapter will be more closely described under the chapter The Projects.

### Music and visuals

My interest for visual expression through digital media have probably come mostly from music experiences. The amazing feeling during a live concert when music, performance and visuals come together and become something much more and different than the separate parts. To mention some of the bands that gave me experiences like this would be Mew, Tool, Jonsi, Massive Attack and Fever Ray. The most famous signed bands of course have good budgets to make the music and media show come together and there are often big teams behind their productions. What I find more interesting than that is how a band or artist without a huge budget can achieve the same kind of emotional experience in a smaller scale. What artistic level and experience for the audience can I reach with the means I have available? A Gothenburg band that I find does this quite well is Echo Deck. They are a three person band where one girl is the dedicated video artist playing with the visual content from one video projector and one slide projector. The vision I have for working with sound, music and video is to give all parts equal importance and let the different parts influence each other in no given order. The live concepts I have in mind for this range from solo performance to band and collective performances.

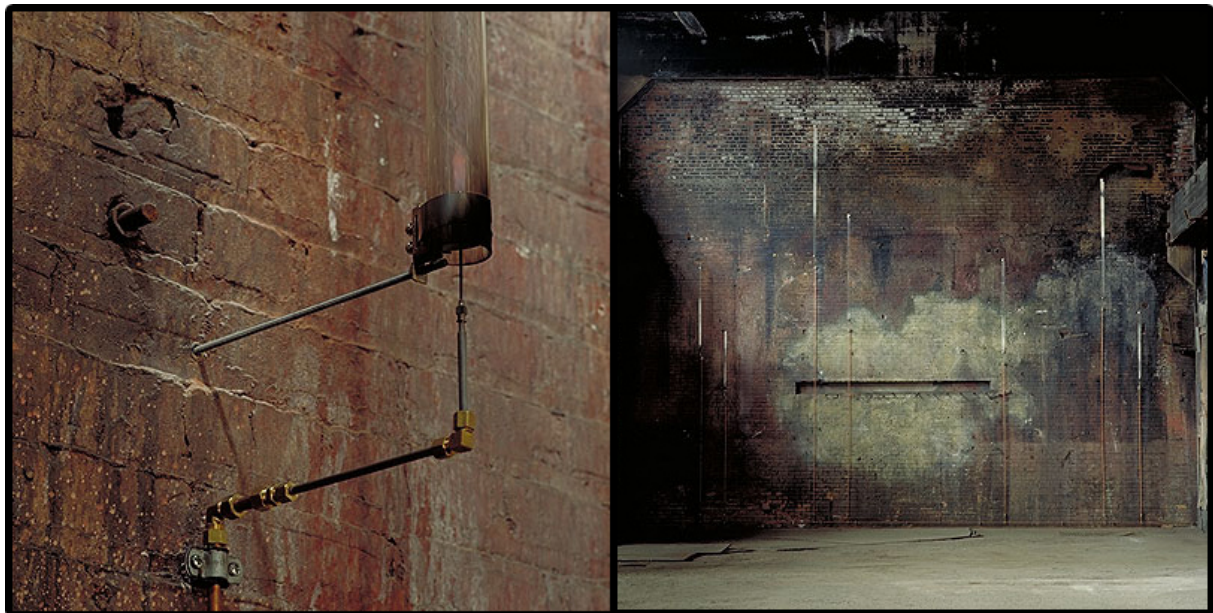
### Andreas Oldörp

Andreas Oldörp is a sound installation artist that since 1985 explores the interaction between sound and space. The first one of Oldörps many installations that caught my attention and fascination was the Le Nénuphar installation made in 2000. There are several things that really makes me love this installation, but there is also one aspect I am not so fond of. The installation consists of long glass tubes mounted on a wall. At the bottom of the glass tubes is a device that

---

<sup>7</sup> " program för bildhantering | Adobe Photoshop Lightroom 3" .

emits gas. When the gas is lit, it heats up the air that runs up the tube creating a tone in similarity with compressed air running through an organ pipe. The tubes are quite tall and thus creating quite low and beautiful tones. This particular installation I saw was made in a huge abandoned industrial building with brick walls and huge windows. The visual aspect of the space and the installation itself left me with a strong impression just watching it on a tiny and bad quality video online<sup>8</sup>. It would no doubt have been nothing short of amazing to experience this live. The only negative thing about the installation, in my mind, is that after a while the sound gets less and less pleasant. When watching the video you see a person, probably Oldörp, climbing up a ladder and lighting the tubes one after another. It is great to see the gas catch fire, and then hear the first sharp sound that quickly fades into the low tone that stay constant as long as the flame is burning. The first tones are beautiful in combination, but when all the tubes are lit, there is a constant roar that reminds me very much of an aeroplane engine. Many sound artists today work with noise and soundscapes that are meant to be all but pleasant, and I find many of these to be interesting. I especially think they work very well as time limited performances. I would have loved to see a more ear pleasing version of Oldörps installation. A thought would be if the lighting process of the gas could have been controlled. An on and off solution with random time control would create a more dynamic experience and in the same time a more musical one. There are several similarities between Oldörps installation and my water drop installations. We both have a nature element that creates the sound. We are using a big space with good ceiling height for the physical aspects of the installation. A large room also have sound characteristics that add further to the sonic experience and the visual aspects of the architecture adds to the whole experience.



*Illustration 3: Andreas Oldörps installation Le Nénuphar*

## Brian Eno

Brian Eno is a very interesting artist that have done successful work within several different areas. He likes to erase borders between art, music, philosophy and science. He has inspired artists and musicians for many decades. He is a musician, producer, video artist, painter, generic artist and curator. He is very well spoken and can express his thoughts in a very clear way and often with a

---

8 " Andreas Oldörp" .

nice kind of dry humour. Often he mention things that I am struggling with or have been thinking about. For example my situation with all my studio gear and software I have been buying since 2001 to work with my musical ideas. When I finally sit down I am overwhelmed by all the possibilities and it can be more intimidating than inspiring. In one interview Eno talks about when he started out as a musician. Back then you could go into a studio and say “let’s try all the stuff out and see what comes out of it”. This would take about half a day. When working today Eno says that having the same approach would end you up about 400 years in the studio. His work today instead is more about taking away possibilities and find a small area of interest to work with.

I first heard about Eno as the producer of U2:s epic album, The Joshua Tree. This was many years ago, but it was first about one year ago that I started to really check out Enos own music. I ended up listening a lot to his ambient debut album, Music for Airports. Later I learned that Eno actually is the person said to have invented the whole ambient music genre. When I learned how the album came about in his mind, I found a difference between our creation processes that I find interesting. Where I am almost always very intuitive in my creation process, Eno needs to have an intellectual approach. When Eno was still in art school he had a lot of records and after a while he noticed that the records changed mood a lot which made him very annoyed. One fast track, then a ballad, then a dance track and so on. He and a friend started to make mix tapes with only one kind of mood in them. His friend made a beautiful tape only with the slow movements from Haydens late quartets and, as Eno said, none of the frantic allegro stuff. At one point Eno was sitting in the Köln air port waiting for his plane to arrive. He was struck by the beautiful architecture that was very airy with lots of glass and high ceilings. He felt that they had thought of everything when it came to the space, but they were playing this really annoying and sleazy pop music. Here he saw an unsolved problem and he started to think about what kind of music should be played in airports and what characteristics it would need to have. He realized by the time the aeroplane arrived that he had thought of a whole album that he wanted to do. This became Ambient 1, Music for Airports. When he talks about creating music he is very clear that he always have to work from a theoretical position, never intuitive. The important thing about theoretical positions he argues, are that they lead you to decisions you would not have taken otherwise. None of this have to be exhibited in the music itself though. I do think Eno has a good point here. I am going down the middle road though, both seeing the benefit of a theoretical standpoint, but also believing intuition and chance continue to be important factors in my creation process.

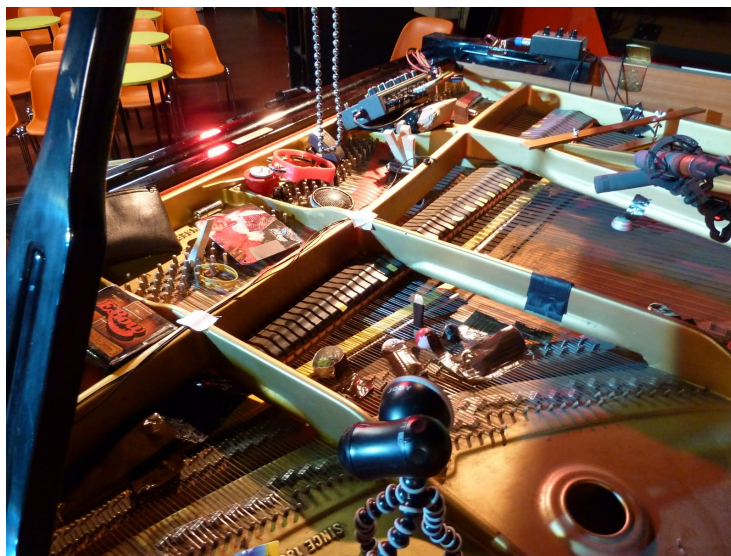
Finally a thing that inspires me a lot about Eno is the width he has in his work and that he is not afraid of stepping over traditional boundaries. This crossing over between different fields is something he also works with as a curator. He gives the example that historically art has developed linear from one key artist of the time to the next. In modern art this is not the case with a huge variety of different fields like photography, ceramics, performance, painting, sculpture, music, sound art and so on. Eno thinks curators of today weave threads through this field and create patterns and new stories of our culture. Eno have created the term *senious* as compared to *genious*. This is situations and scenes where people, artists and resources come together and create good outcome rather than individual geniuses.



*Illustration 4: Video installation by Eno in Sydney. Eno was also the curator for this exhibition*

## John Cage

much can be written about John Cage as a sound artist, composer and musician but I will only touch those parts that we share and that have influenced me. I started to know a bit more about Cage during the summer course, Experimental Pop, in 2010. Since we did a lot of sound experiments and preparing and altering instruments to find new sounds, Cage was an obvious parallel and inspiration. One of the things Cage is famous for is his compositions for prepared piano. The first time he did it was actually a last minute solution since he had written a percussive piece, but there was only a piano available on the stage. By putting objects on and between the strings he created a percussive orchestra out of the piano. This is not his invention though. The tradition is dating back to the late 19<sup>th</sup> and early 20<sup>th</sup> century French composer Eric Satie. A modern artist that is exploring this technique and successfully combining chamber music with pop, rock and electronic music is Hauschka, who I was fortunate enough to see performing live. Both for the experimental pop course and a project I did for the Gothenburg Operas ballet, I worked with preparing pianos.



*Illustration 5: Prepared piano by Hauschka*

When I have read about Cage I get the impression that Brian Eno is very inspired by him. In one interview Eno speaks about artists that find extreme positions and defend them. He says that he does not want to be in those extremes himself, but it is good to know about those things. It is liberating. I agree with Eno on this reflection and I think Cage was one of those artists he was thinking about.

Cage liked to use elements that added chance and randomness to his performances. He was also in love with all kinds of sounds, no exceptions. He could as an example put a microphone outside the performance building to pick up the traffic outside and make it a part of the performance and give it equal importance. I have personally become very fond of randomness in music and my sound installations. My water drop sequencer installation is a good example. During my project at the Gothenburg opera I also experimented with several different tempos within the same piece which creates a kind of poly rhythmic chaos with an underlying structure.

When I started to think about and construct my Tone Bender 1.0 installation, I did a lot of research on internet to find similar installations and instruments that was lowered into water in order to affect the tone. I was surprised that I only found very few examples, and none really taking the bending effect of the tone into account the way I was thinking of. Time past and probably between half a year and a year after my installation a good friend and composer asked me if I knew that John Cage had a similar instrument like mine he called The Water Gong. I said no, and was a bit surprised how I could have missed this when I did the research, and directly checked it out on internet. It turned out Cage had a special fondness to the water gong and had inserted it into several of his pieces. I have not yet succeeded in finding any documentation over the water gong, or even better a sound recording or a video. It would be very interesting to get the chance to compare our instruments.

## Sound, frequency and matter

When I was in my late teens I developed a more focused interest for music. I started to play the guitar and early on I found it more interesting to create my own little songs than playing others music. Looking back I can see that I early found that the sound itself was important. When I started to play with others I could find myself tweaking the sound of the speakers long after everybody else thought it sounded good. I never reflected over this other than being aware that the sound quality itself was important to me. When starting to play with effects on my electric guitar I often found that it was the sound itself that was boosting my creativity. When I dropped out of the band I had been playing with for many years in 2008 I had a feeling music was drifting away from me. Music had always been very central to me and often being a comfort and valve for sadness and anger, but now I started to question why I was playing and investing in my studio. It was during this time that I started to find things about the sound itself that gave me back a sense of motivation and interest. Since then my general love for all kinds of music have returned which I am very thankful for. The first field I found that altered my interest in sound itself was Cymatics.

## Cymatics

In short, Cymatics is a field that explores how sound affects matter. How this works practically is that sound is visualized through putting various substances, most commonly salt or sand, on a membrane or metal plate that is excited with different frequencies. Depending on frequency, different and very distinct patterns emerge. This is something that sound artists and musicians have used in performances and installations in modern time after tapping into this field. So far

Cymatics have only been a portal for me to more information about how sound can affect mind and matter. If I will actually use this technique in an installation I doubt. It feels like this have been done by others, and there is currently a constellation here in Gothenburg, by the name Sönderbyggd, that is using the method of Cymatics in their live performances.

It was Hans Jenny<sup>9</sup> (1904-1972), a Swizz medical doctor, that coined the expression Cymatics and made it what it is today. The method of watching matter form patterns on a membrane is much older though. It is said to have occurred over 1000 years ago when African tribes used drums as membranes in shamanistic ceremonies. In more recent history Leonardo Da Vinci noticed how dust on a table surface formed in different patterns when the table was struck in different areas. The man who got famous though for exploring this phenomena closer was Ernst Chladni<sup>10</sup> (1756-1827). The most common instrument used in Cymatics bare his name, The Chladni Plate. Chladni is sometimes refereed to as “the father of acoustics”. His book *Discoveries in the theory of sound* in 1787 is still regarded as a milestone for launching the science of acoustics. By using the Cladni plate, a metal plate on a stick that is played with a bow, he was able to create very distinct patterns for different frequencies. These are known as the Chladni figures.

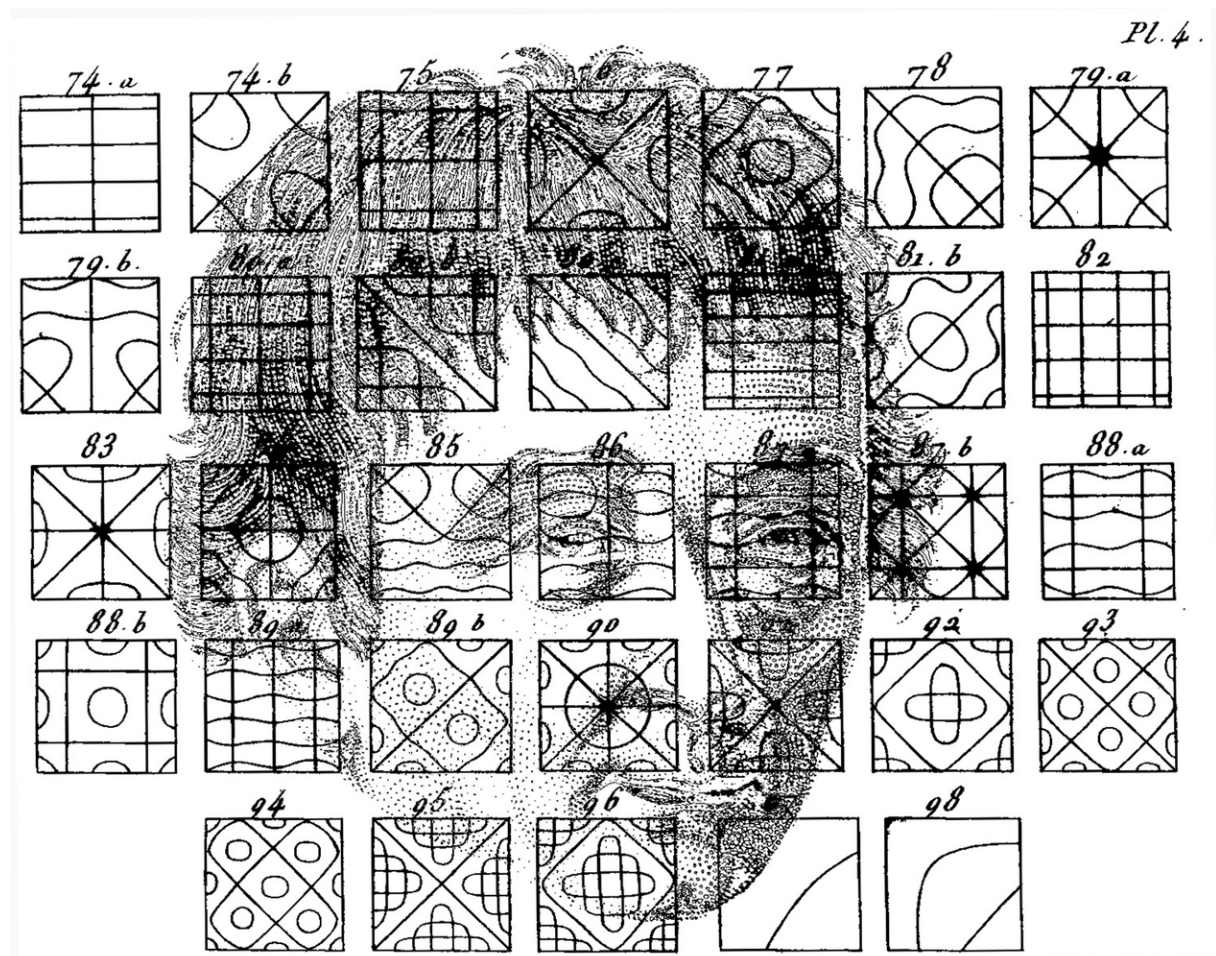


Illustration 6: Some of Chladni's figures for different frequencies

Hans Jenny pretty much did what Chladni did, but with modern equipment. He documented and published his results in photography and video. Today John Stewart Reid among many others are continuing the Cymatic research. The difference between Reid and Jenny is that Reid is looking

9 " Hans Jenny (cymatics) - Wikipedia, the free encyclopedia" .

10 " Ernst Chladni - Wikipedia, the free encyclopedia" .

for applications and is using Cymatics to investigate a variety of fields<sup>11</sup>. Unfortunately this also results in a variety of commercial products<sup>12</sup> that in my mind is damaging an interesting field.

## Finding 136.1 Hz

For as long as I can remember I was a sleep walker and I regularly had nasty nightmares and because of that I hardly ever got a good nights sleep. In 2000 my body had enough and I started to get physical symptoms and a chronic fatigue. I started searching for help both in western medicine, trying nature medicine and homoeopathy, but nothing seemed to help. In 2007, after many disappointments but without giving up and accepting my condition, I finally went to a energy healer near my home town that had a very good reputation. This turned out to be a lucky decision in several regards. When I got there I had a good portion of healthy scepticism and knew that placebo was said to be able to hold its grip for about three months. After all things I had tried I kept an as open mind as possible. After the three treatments that I received, my sleep walking and my nightmares were more or less completely removed. I am still free from nightmares and sleepwalking almost two years later. I got a very good contact with this lady and we have kept in touch since then. It turned out that she was also very interested in sound and the effects it can have on us. When I was done with the third and last session she told me that I could look up the frequency 136.1Hz. I checked it out, and just as with the Cymatic research this led me to many interesting findings and cross references that deepened my belief that there is something more to sound than I was aware of before. This was one of the frequencies I used during my master exhibition.

## Yoga, sound and music

The winter of 2009, after the first year in C:Art:Media, I attended a two week Yoga retreat in Håå. At that time I had one or two of the treatments from the energy healing lady and I was very determined to get myself straightened out what ever it would take. Just before going to this yoga retreat I had found out about Cymatics and I was thrilled to find references to this field and other interesting things about sound and music during the retreat. Different frequencies of sound are said to correspond to different chakras (energy centres) in the body. There is also a specific kind of yoga called Nada yoga that focuses on sound in a very interesting way and is commonly used by Indian musicians to increase their sensitivity to sound. Scandinavian yoga, that is running the retreat in Håå, is also the publisher of a magazine called Bindu. Bindu focuses mainly on the practice and history of yoga, but also try to cover scientific findings about this field and its effects on the human health. It was this magazine that I found myself reading in between the yoga and meditation classes and finding interesting articles about sound and music.

The English Bindu nr10<sup>13</sup> focuses on sound. There are two short articles on Cymatics that mainly talk about Dr Hans Jennys research with an interesting connection to the yoga tradition. It is here said that a yogi that correctly could pronounce the mantra *OM* and sang into Jennys Tonoscope could make the Sri Yantra, the symbol form of *OM*, appear on the membrane. The frequency corresponding to *OM* is also supposed to be 136.1Hz. The Tonoscope used by Jenny is a device that transfer the vibrations from the voice to a membrane with a material like sand on it that will form into different shapes depending on the vibrations received, just like the Chladni plate but driven by the voice.

---

11 " Research :: Cymascope.com" .

12 " Home :: Cymascope.com" .

13 " Bindu 10 / Issues of Bindu / Articles - Scandinavian Yoga and Meditation School" .

If all this would be true it is very interesting to think about that the ancient people knew about the connection between sound and matter. When I soon after the retreat kept looking into Cymatics more research came up claiming connection like this. Hans Jenny claimed to have created letters of ancient languages when they were spoken into the Tonoscope. John Steward Reid claims to have created hieroglyph like symbols during an experiment 1997 in the kings chamber of the great pyramid. The experiment was conducted by stretching a rubber membrane over the sarcophagus, sprinkling quartz sand over it and applying various frequencies through speakers created with an oscillator. These connections to language are very interesting and Jenny would also show to the various forms created on the membranes that can be found in nature. This gives an interesting twist to the creation myths found in many religions. “In the beginning was the Word, and the Word was with God, and the Word was God”. Maybe there is more to the myth than we would think today. The image evidence I have seen so far for all this does not prove much though, as could be expected. It is very hard to find credible sources. There is a web page, Sri yantra research, that flat out say that a voice or vibration of OM creating the sri yantra is an urban legend. You can get beautiful patterns though in Cymatics that with some imagination comes close to the Sri yantra. Still many interesting references unfold when reading about this field even if it leans more towards faith and mystics, than science.



Illustration 7: Bindu Cover. Cymatic water image. Sri Yantra.

In Bindu nr10 and the chapter about Nada Yoga, outer and inner, there is an interesting comment by the Indian musician and Sitar player Roop Verma. He tells us that 1000 years ago in India there were no concerts and public performances. The music was played instrumental in the temples. One effect was that it was therapeutic and healing. Another that it focused the mind to onepointedness. When foreign powers invaded India, they liked the music so much, the musicians were invited to the courts. What this did on one hand was to bring the music to the king and to the people that had earlier only been for those that came to the temples. This could in one sense be seen as a good thing. On the other hand, prior to this happening, the musicians did not have



to prove anything since they were playing before god, and god is supposed to know everything. But the King did not know everything, so the music became intellectual, and then the ego came along. The music started to come from the left brain instead of the right, and therefore it changed. Verma says that when the inner feelings change so does the art, expression changes. From here on two schools developed, one commercial and one for spiritual development.

I find it interesting to think about this in the climate of the modern music industry where profit is the strong driving force and there is not much spiritual expression (not meaning religious). Just as Roop Verma, who studied both the commercial and spiritual path, I think there is a middle way that is interesting to follow with both music and sound. Commercial music is of course not always bad, but I find the reasons, motivation and business behind it not appealing. When I think about my creation process I have always relied on my right brain. I have, maybe unfortunately, always been really bad at practising technique and intellectually knowing and defining what I do with my music. When I for example create music in odd signatures it is not because I did the maths, but because it felt right to me and the form came to me in the moment. I try to find and express feelings rather than relying on technique and thought out forms. At the same time it is hard to break free from the way society think about and teach music since we are constantly subjected to it, conscious or not conscious. I will probably never be close to the skill of a professional musician, spiritual or non spiritual, but I will keep relying on my right brain when creating music and hopefully be satisfied outcome.

## The Projects

My first studio talk ever was the one factor that totally changed what I had in mind working with when I started C:Art:Media. Among other things that I talked about with this person was that I was very interested in musical expression and combining this with 3D and video. I probably mentioned that I was playing in a band at the time to. The answer I got regarding this was that music videos are commercial and that we actually are in a school of fine arts. A combination of things made me put my video dreams on the shelf that day. If I would have had a more clear idea of what I actually wanted to do with this vague vision (which was certainly not making commercial music videos) and a stronger self confidence, I might have stood my ground. Looking back on these two years and the projects I ended up doing I can not say any thing else than that I am happy about how it turned out. My experiences have given me a better insight to what I want to do with my artist practice and I have build up a stronger self confidence. This is now leading me back to my original ideas about video and music that I can develop and work with besides, and in combination with, my interest for sound installations.

### My first project, The Cube

The first course that we had as C:Art:Media students was the CMI course (Computer Mediated Installations). This was my first contact with micro controllers that are used to control both hardware and software trough various input methods like buttons and different types of sensors.

I had quite a lot of project ideas that ended up to be either to complex questionable for other reasons. As time went along I had to come up with a project I could finish within the deadline, and I came up with The Cube installation.

The installation was basically a wood cube with a speaker element hanging from the ceiling and with a switch in the form of a string hanging below that the audience could pull to play back one of several tracks from a play list. On top was two clay figures, one black and one white. The black

one sitting on the edge and the white one hovering over the cube. The figures was attached to each other with a golden chain symbolizing some sort of unity between two opposites. At the time I was not feeling to well and by the two sculptures and the music I composed I intended to say something about my sad and my hopeful side, yin and yang, and so on. When thinking about it afterwards, the clay models I made and the symbols I used just made the whole thing too obvious, and I think therefore uninteresting. I even got one feedback from a teacher that it felt like kitsch, which was very far from what I had intended. The critique was not as hard though as I expect it could have been, maybe because this was the warming up round. I guess this was one of the projects that was neither good or bad. A few people actually said they liked it, but this is certainly not an installation that will be remembered by any one but by me, and then only for the learning process involved which was great.



*Illustration 8: The Cube*

I think the microcontroller technology is very interesting used in the right way. It is fairly inexpensive and it gives the artist lots of creative possibilities. In the CMI course we worked with the Arduino. In order to get audio playback from the Arduino I used a Wave shield which is a sort of extension board you plug in on top of the Arduino. I ordered this as a kit and it was a very good learning experience to solder it together.

One thing that I also learned was that I will passionately avoid programming these things in the future. If it had not been for the programming help I got from the assisting teacher, Linus Nilsson, I would never have got my playback function working in time for the opening. What fascinated me the most was that my function was so ridiculously simple, and the code needed so complex. I simply wanted a track in a play list to start playing and stop before the next track when a button was triggered. I have no prior coding experience except from some basic coding and copy and pasting in Flash for web and application design. I imagined that the code for the Arduino would be a few rows like; when X is triggered, play next track, then stop. Of course with the correct logical operators and syntax which differs between different coding languages. The truth was something completely different and the code was closer to two A4 pages long and very complex. When ever I need coding help, I will contact some one that have the knowledge.

I decided quite early that I was going to compose and record my own music to get the right feeling for the installation. Time ran away working with construction and programming and instead of the week I hoped to be able to focus on the sound and music, I ended up recording a bunch of tracks on my guitar the day before the exhibition. Instead of composing all new music and record and use field sounds, I used ideas I already had to speed up the process and kept it instrumental. The sound and music became something quite different than what I had in mind from the beginning, but in a way I am satisfied. The feeling of sadness and hope I wanted to get along was there. It did not however save the limping project.

## Tone Bender 1.0

This is my most complex and work-intense installation up to date and the predecessor to my water drop sequencer. With this project I finally found something that I really enjoy working with. The idea to build an instrument first came to me watching Barrie James Sutcliffes installation “The small within the great”<sup>14</sup>. Sutcliffes installation contains of strings with different lengths and thickness mounted on a wall that are being played by motors who derive their speed from the data read from the decay of a radio active material. Barrie used the Arduino to read the data from the radio active material and forward the data to the motors. Barries focus was not to create an instrument, but the installation very much triggered my thoughts in that direction.

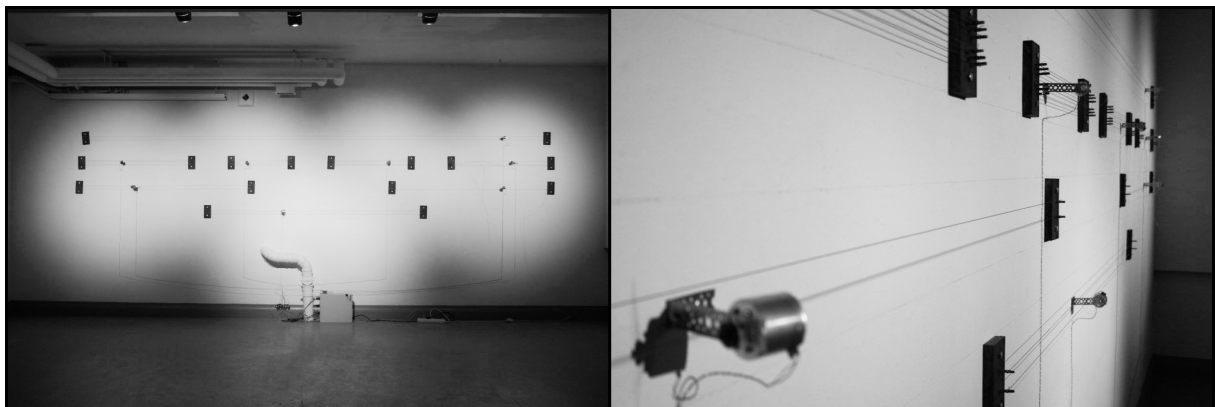


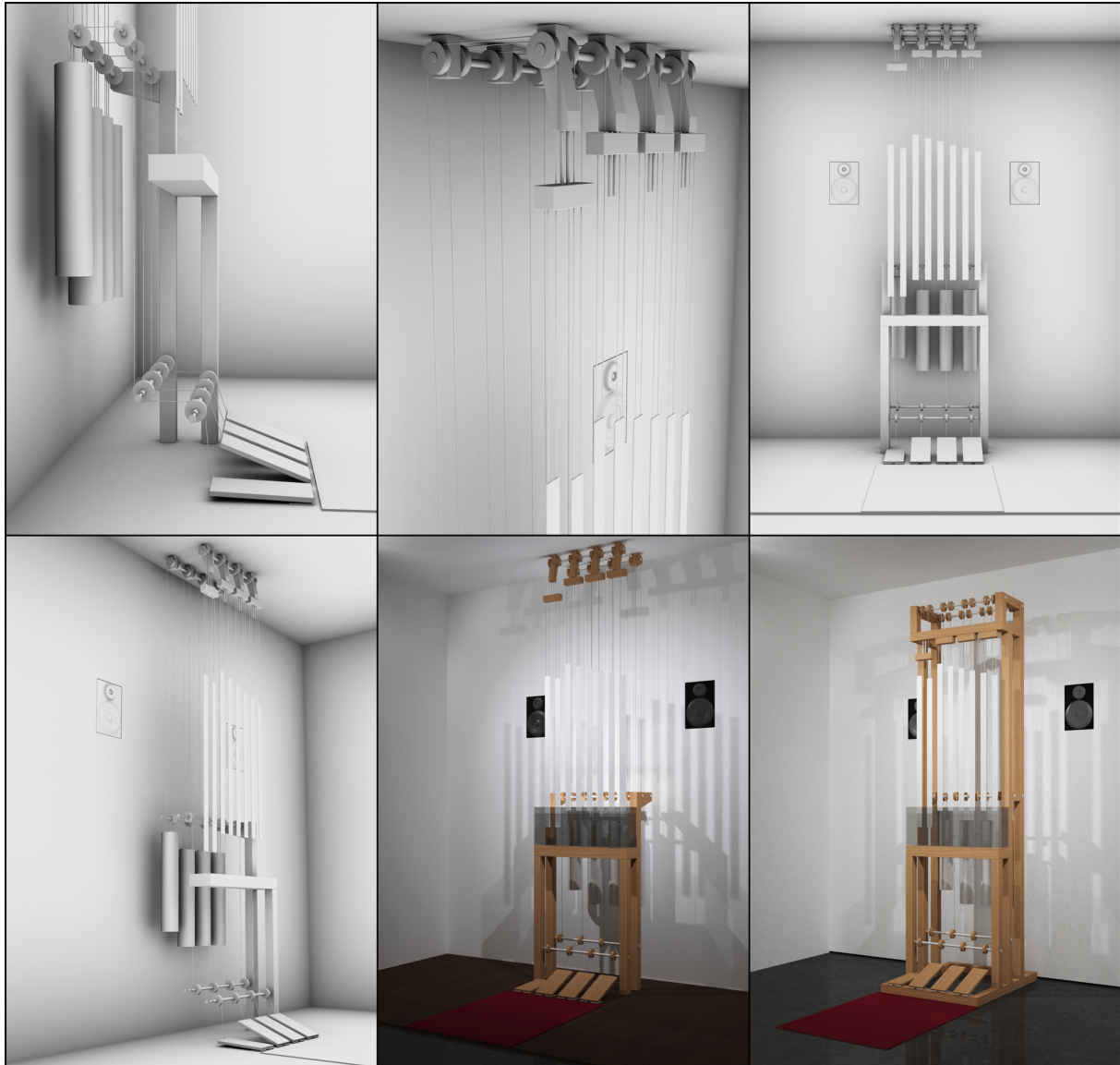
Illustration 9: Barrie James Sutcliffes installation “The small within the great”.

Since I recently had worked with the Arduino I started to imagine an instrument controlled some how by user input with the Arduino. The more I thought of building a instrument I came to the conclusion that I wanted it to be simple, playable and inviting to interact with. I realized, or rather guessed, before even trying it out that having some sort of physical input to the Arduino, sending information to a motor or solenoid valve, striking a object to make sound and bring this to a PA would result in a high latency. Latency would be the delay between user input to the sound coming out of the speakers and hitting your ears. If the latency becomes to big it will feel very strange to play an instrument, at least if you try to play it musically or in a musical context. Another thought was that the Arduino and some sort of input device would take the focus away from the instrument and the sound itself and make it unnecessary complex. This led me to think in the direction of percussive instruments where you hit something and it sounds instantly. Very primal and self explanatory. I had a youtube clip in my mind by Gavin Harrison, the drummer in Porcupine tree, performing what he calls the “Cymbal song”<sup>15</sup>. In this video he builds up a percussive song by playing different cymbals with his hands. In one part of the performance he hits a cymbal and lower it into water to get a bending effect of the sound. This some how stuck

14 " Barrie James Sutcliffe: Information Reformation Technologies / You Are Dissolved" .

15 Gavin Harrison - Rythmic Horizon - Cymbal Song.

in my mind and it came back to me during my thoughts about my instrument construction. Wanting a harmonic sound my early sketches started to include the principal of a xylophone with hanging bars and how to be able to lower the bars into water still playing on them. When the idea started to take more concrete form I did what I always do and transferred my ideas into 3D. My first vision of the installation was to integrate it in a room using both the floor and the roof to mount the parts. Practical and mobility reasons soon got me to transfer the mechanical principals into a stand alone version.



*Illustration 10: 3D sketches for Tone Bender 1.0*

Working with CAD was invaluable in this project. I could never have finished in time and within budget only with hand made sketches and trial and error during the building of the instrument. One great thing working with a CAD program is that you make most of your mistakes there instead of making them in real life. Also when changing one part you instantly see the chain reactions it creates on the other parts, and if you thought things through from the beginning you can get the parts effected by the change to update automatically. This saves both time and money for lost material due to mistakes. Another great thing with CAD as a construction aid is when you need to communicate your construction, like in my case with a carpenter. Being able to show

detailed drawings makes the production process very efficient. I went to my good friend, Erik Andersson in Hjo, who has a wood workshop of his own to get help. After showing him my drawings he gave me input on how to modularize the construction. Thanks to the CAD, changing the layout of the parts and the dimensions of the wood material was quickly done and saved me a lot of headache.

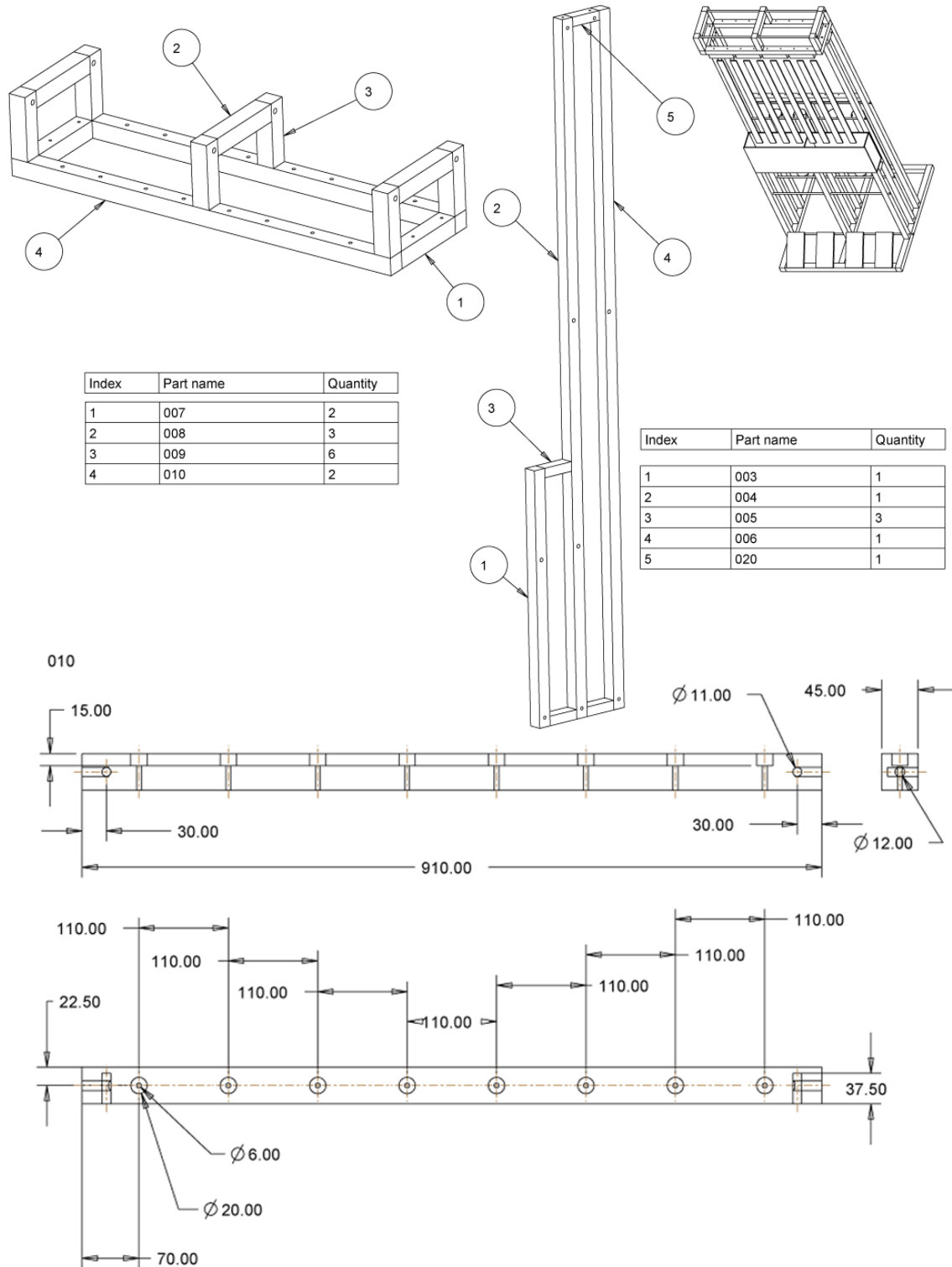
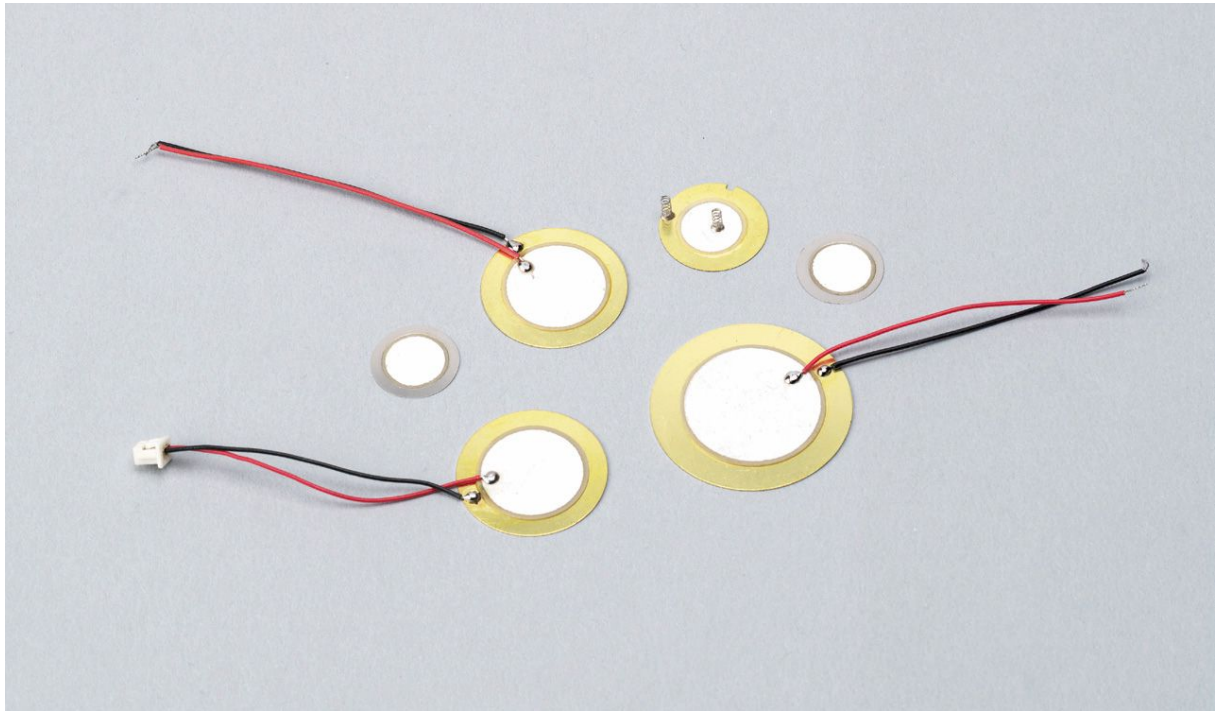


Illustration 11: Some of the CAD drawings for Tone Bender 1.0

When starting to think about how to amplify the sound from the metal bars I was introduced to gods gift to the sound installation artists, the piezo element! This is a cheap type of contact microphone that picks up the vibrations from the material it is attached to. When trying it out I was very pleased with the sound it generated, and it is very easy and cheap to create these microphones if you know how to solder. This gave me the possibility to send the sound from each bar individually to a mixer and have full control over the sound. Most of the time I choose to not alter the original sound character of the metal bars since I found it quite interesting. Adding electronic effects can definitely be useful in some cases though when for example the natural acoustic is very flat. I could also go crazy with effects for a more psychedelic approach if I wanted to.



*Illustration 12: Piezo elements in different sizes*

When I sit down in front of a piano I love to press down the sustain pedal and only play around with the white keys, so I decided to work with eight tones that would resemble the full notes of an octave. With bending the tone in water my thought was that I could also reach the spectrum of notes between the full notes, i.e. the black keys, and everything in between. This turned out to work quite well and in the final construction I could continuously bend the full tone one whole step.

I wanted to tune the bars into the exact frequencies of the full notes for musical reasons, but here I ran into a hard solved technical problem. At first I thought I could use a regular chromatic tuner that is used for tuning string instruments, but due to the richness of overtones in a metal bar a chromatic tuner can not give a correct reading. This have to be done with something that is called a spectrum analyser that measure the tone over a interval of time giving you graphical feedback of the lowest tone and all its overtones. After getting in contact with a few professional marimba builders I understood that for this project I did not have nor the time or money needed to tune my bars correctly. The solution was to tune them roughly by ear. This led to a sound that was very rich but hard to define as a specific note. I would say that this gave the Tone Benders a push over towards being a interactive sound installation more than an instrument. I like the blurred line here between instrument and installation. It is the context and the experience and expectations of the audience that decides what it is.

The Tone Bender 1.0 was exhibited the first time at the spring exhibition in Valand in 2009. It was placed in one of the staircases which was perfect with a great sounding acoustic. Add to this that the sound from the bars without any effects applied is very similar to church bells. Probably this was why some spectators commented on a feeling similar of being in a church. Some also thought that the structure of the Tone Bender resembled a church organ. These were not at all attributes I had thought of when making the construction. I am okay with people making what ever associations they want, and I do see the church parallel myself. Even if I am not a practising Christian I enjoy the feeling when entering a church or a cathedral both for the slightly mysterious feeling and of course the acoustics that adds to that feeling.

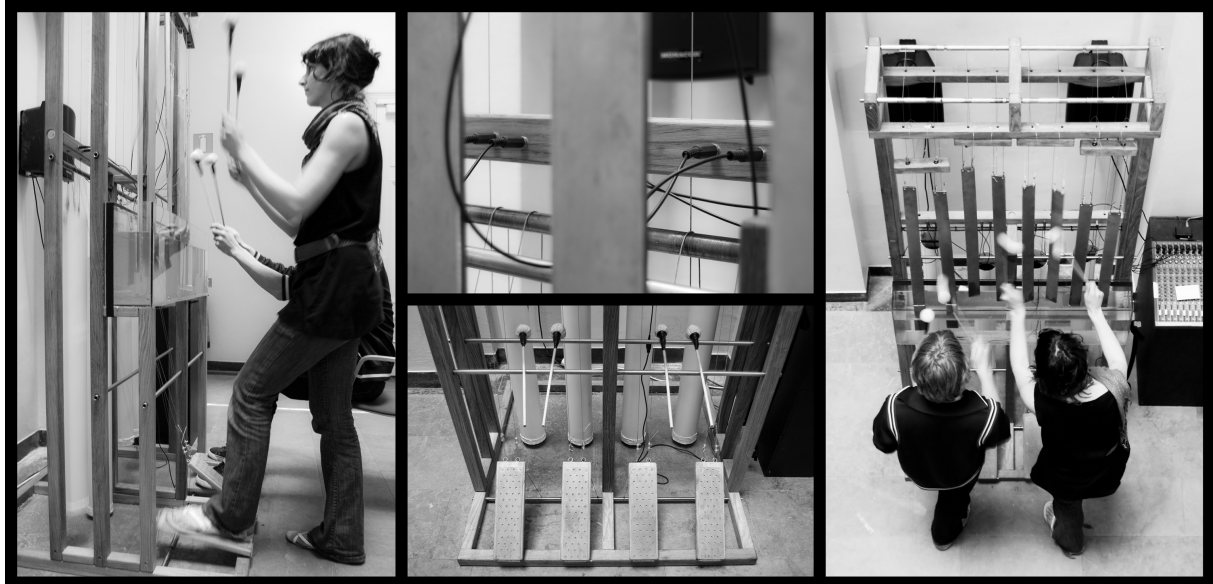


Illustration 13: Tone Bender 1.0

I am very happy with the fact that people were curious, played with it and enjoyed the experience. For some reason I really enjoy making my installations interactive. Maybe it is a reflection of myself wanting to touch and play with installations, which you are usually not allowed to in a gallery context. It probably also have something to do with my joy of playing instruments.

I would like to to create a small mobile version of the 'Tone Bender in the future that is easy to transport and assemble for live performance purposes. I used a single bar version of the Tone Bender in my final performance at the finissage and I found that it worked very well for what I intended.

## The water drop sequencer

The idea for this installation came to me during the Installation course with Marika Orenius. I started out the course with ideas of two different video installations thinking I would finally work with video. During the last group meeting, where we were supposed to decide on the final idea to go forward with, I got the vision of water drops falling and creating sound hitting the bars I had used previous in the Tone Bender installation. We were sitting in a building, the Glass house, that has a cubic and very open architecture with all glass walls and three open levels. I was looking around, enjoying the space and thinking of how it would be possible to make use of the architecture. What gave me the ideas for the water drops, I am not sure. Probably thoughts of hanging something from the ceiling, making use of gravity, and possibly that I already had a connection to water in my previous installation.

## *The Prototype*

After having the principal idea of water drops falling on my Tone Bender bars, ideas of the actual installation started to take form. It was probably during thinking about how to be able to control the water drops that I came up with the concept of the sequencer. A sequencer in electronic music is a way to play notes repeatedly in a specific sequence. Usually you have a row or matrix of buttons that you use to activate or deactivate notes. This row acts like a looped time line that reads from left to right in a tempo defined by the user. I found a very simple way to generate and control the speed of the water drops. I simply put bottles upside down in holes making a hole in the lid and putting a rubber tube through it that I could open and close with a screw. I could define what notes I wanted to play by moving the bottles to different holes that was aligned over the metal bars, I could define how many bottles or tones I wanted to use, and finally I had control over the speed of the drops. Of course this is a mechanically very rough and imprecise version of a sequencer, but the basic concept is the same. I really enjoy the randomness and imperfection of the water drop sequencer in comparison to the electronic one. I have played with the thought of being able to control the water drops electronically and there by making it possible to create a very defined composition. That is something different though, but possibly an interesting future project. Just as with the Tone Bender, this installation could be seen and used both as a instrument and a sound installation. Something I like a lot about the water drop sequencer is that a spectator can choose to interact with it, but it also works as a passive sound installation.

It was a very rough installation with extremely simple components and materials. From a sound aspect the glass house was quite interesting. The cubic body of the building acted like a kind of speaker cabinet that started to resonate, so the sound could be heard quite a bit around the glass house. Using transparent nylon strings to hang the metal bars gave them a nice hovering effect and a light airy feel to the installation that I liked.

## *The Staircase*

The two following installations I made of The Water Drop Sequencer was in the big staircase inside Valand. The reason for the first installation was that I succeeded to loose the only visual documentation I had from the prototype installation. The second time I was asked to exhibit during an open house exhibition. The first installation I kept quite rough with the original materials only to be able to shoot a new video of it in action. The resulting video I put up on Vimeo and I was very surprised over the positive feedback that I got. In just a few days several thousand persons had viewed the video and in the writing moment over six thousand persons have viewed it which I find both a bit strange and very nice. It was this video that Fernando Melo at the Gothenburg Opera saw and that made him contact me. More about the resulting project with the Ballet in the chapter The Guest House.

The second installation I changed a bit visually. Instead of having it creatively messy with rough materials I build some pedestals for the mixer and speaker cabinets where I could hide electricity cables and audio cables. I also painted everything white to strengthen the light airy feeling. Some people liked the original simple and rough installation better. Personally I liked putting some more effort into making it looking more clean. The problematic thing here I guess is trying to reach a great visual level and not quite succeeding. Because of tools, resources and money even my tidy installation was still a bit rough, and then that roughness is more conceived as a failure because people see that something else was intended. I am still personally more happy with the second installation any way even if I understand the criticism.





*Illustration 14: The first Water Drop Sequencer installation in the staircase*



*Illustration 15: The second Water Drop Sequencer installation in the staircase*

A nice side effect I discovered when having the installation up for a longer amount of time was that the bars started to rust, a lot. This was due to the fact that I used the most common and cheap kind of metal. One reason for my material choice was the price and another was that I actually liked the sound better than in for example the much more expensive stainless steel. My first reaction when I saw the rust growing and dripping was that I was staining the old stone floor and that the bars might lose their tone. After a little while of thought I realized that it was also beautiful, and in the same sense that the sound was random the patterns on the different bars came out unique. The stains did come off the floor and the sound was not changed in a negative way. In the installations I have done after the staircase I actually sand blasted the bars for two reasons. It gave the bars an initial nice matte surface and it got extremely sensitive to rust. After just a few hours with drops falling on the bars rust patterns start to emerge.



*Illustration 16: The rust pattern on one of the bars*

## *Pixelache and the idea for a future installation*

C:Art:Media was invited to Pixelache in Helsinki, Finland, and got a space where the students could show their work. The ceiling height was around three meters, so I decided to make the water drop sequencer installation non interactive. From the start I have been very fond of the idea that the audience can interact with my installations. It was interesting for me to see if the audience would appreciate the installation only for its visual and sonic content and if I would feel that I would like to do the installation non interactive sometime again in the future. Personally I think the installation worked quite well visually, and the sound was good to even if I was initially worried for what the ceiling height would do for the signal to noise ratio. The longer the water drops can fall and get more force when hitting the bars, the less you have to amplify the sound which can get very noisy depending on the gear. People did gather around the installation and stayed for a while contemplating which I took as a positive sign. I have never been the kind of artist wanting to talk with the audience to give them my thoughts around the installation and get feedback. I prefer to watch from a distance and let the audience have their own thoughts and make up their own impressions.



*Illustration 17: The non interactive Pixelache installation*

The combination of my experience making my water drop installation non interactive with my sound research have given birth to an idea of an installation I would very much like to do in the future. Instead of metal bars I would like to use Tibetan singing bowls. This would both be very nice visual and amazing sound wise. It would also connect to my sound research in an interesting way. I would like to create a space for relaxation and even meditation if the audience would wish for a longer and deeper experience. Both the use of light in the space and how the audience could sit or lie down would be very important considerations. I would also like to exchange the simple plastic bottles I have been using for the water drops for clay funnels that I would model myself. Maybe I would also work with symbolic sculptures on these water containers to add yet another visual aspect and meaning to the installation. As writing this I have actually started to rent a space in a throwing studio to finally develop my life long interest in sculpting and working with clay. It would be very nice to see those ideas come together when the right time and place presents it self.

## The Master exhibition

When I started to think about what I wanted to work with for the master exhibition it was at first tempting to try to use my concept around the water drop sequencer. It was definitely a safe card to play. At the same time I felt that there was really not so much more I could do with it, and I also got that feedback from our teacher Marika Orenius, that maybe I should try something new since I had a lot of other ideas. I presented ideas of two audio visual installations and a kinetic sculpture that initially was very inspiring, but after working with the concepts for a while I either did not find the meaning behind the idea, or felt that I did not have time or resources to finish within the deadline. In parallel with this work I kept reading about Cymatics and interesting frequencies. Slowly I started to realize that one thing I always had wanted to with the bars was having control over the tuning, and now I had a set of interesting frequencies that gave me a nice concept to base the work on. Earlier I had tuned the metal bars roughly by ear and left it at that. Even if this new approach was not going to change the installation in a drastic way, I now had a new framework that I could work within that gave it a new purpose. My water drop installation now became more to me than just playing the safe card.

### *The space*

One thing that makes a huge impact on my water drop installation is the space. The sound characteristics as well as the visual aspect is important. In my mind I prefer a large space with rich acoustics that gives the sound life. I also like the feeling large spaces like that gives me. A feeling I can not quite put words on but probably most people experience when entering a church, cathedral or a large cave. I find the sounds my installation creates very fitting for spaces like that. People might draw parallels to church bells or Tibetan singing bowls and there for connect it to the space, but I would like to think it is because of the qualities of the sound regardless of those parallels.

The master exhibition was held at Rödå Sten in an old industrial brick building that has been transformed into an exhibition space. It is a very interesting space that still have quite a bit of the old industrial feel to it. It also have a huge room called The Cathedral. A soon as I had decided that I was going to work with my water drop installation I went over to Rödå Sten to check out the space. I found two interesting placements for my installation. The Cathedral and the staircase that was spanning four floors. The Cathedral had all of the space and sound criteria that I would usually look for and wish for, but there was one issue with it, and that was the fact that it was a group exhibition with other students. I felt that my installation would take over the space and intrude on the other students art works. I did not even care to bring it up with the other students since the curator was of the same opinion. Luckily enough there was factors that I found made the staircase equally interesting and there was no other students claiming that space. What I liked the most with the staircase was the possibility to have sound generated at several different levels and that people would be moving up and down getting a continuously different experience and mix of the tones. Due to the six tone scale I choose to work with I placed two tones on each of three levels in the staircase.



*Illustration 18: Images taken with my mobile phone checking out the space*

The acoustics of the staircase came as a bit of a surprise to me. I had the idea that the sound would be bouncing around quite a bit in the space, but it turned out that there was hardly any echo or natural reverb at all. Usually I would be able to solve this with adding an electronic reverb and maybe a touch of delay and modulation to the sound since I would be sending each tone through a mixer. This time though, because of the space between the elements in the installation, I choose to work with a small single amplifier for each tone sending it directly to the speaker. Due to this I could not add electronic effects. Not having a mixer led to another thing affecting the sound too. With a mixer I could change the equalization of the sound cutting some high end frequencies and boosting some low end frequencies giving it a much more pleasant sound. Not having the possibility to add effects, or affect the frequencies, led me to the decision to add a new sound source to fill up the missing low frequency spectrum in the staircase and at the same time create something that would tie the total sound together. Low frequency waves travels longer than high frequency waves without weakening so fast, so I placed a pair of good speakers in the middle of the staircase with the effect of getting low frequencies in the whole space without the

need to play it to loud at that specific staircase level. I picked the frequency I found to be most interesting out of the six tone scale I used for the bars and created a one hour loop of pitched down random synthesized pads based on that frequency. The low frequency sound worked well with the high frequent tones from the metal bars as I had hoped and also fitted the space very well.

The rawness of the space was the second factor that I really liked with the staircase. I felt that my installation melted into the atmosphere and materials of the space. Especially the rusting metal bars I found fitted right into the feel of the space of an old industry building in decay. This perfect chameleon like melting into the environment actually led to a problem that I did not foresee. At the opening of the exhibition quite a lot of people was moving up and down the staircase. When avoiding to bump into each other they did not always see my bars hanging there close to the wall. Fortunately the bars and piezo elements could take the beating, but I had to run up and down the stairs the whole opening lifting back bars when they were knocked down. This accidental knocking down of the bars I had full understanding for. What I was very surprised over to see was mothers letting their kids banging on the bars, even with umbrellas, and at one point even using them as swings. An old lady were simply banging on a bar until a friend of mine told her it was maybe not such a good idea. One person had even spat on a bar. As creative as that was, I am really happy it stayed at spitting. Not having any exhibiting experience prior to the C:Art:Media programme this was definitely a very valuable experience that I have and will keep taking with me into future exhibitions.

### *The frequencies used in the staircase*

I was introduced to the frequency 136.1 Hz by a dear friend and from there cross references on internet led me to the next interesting set of frequencies, the ancient Solfeggio scale. This contains, in its original form, six tones that are said to have specific effects on the human body and mind.

- |        |        |  |
|--------|--------|--|
| 1. UT  | 396 Hz | Liberating guilt and fear                  |
| 2. RE  | 417 Hz | Undoing situations and facilitating change |
| 3. MI  | 528 Hz | Transformation and miracles (DNA repair)   |
| 4. FA  | 639 Hz | Connecting/relationships                   |
| 5. SOL | 741 Hz | Awakening intuition                        |
| 6. LA  | 852 Hz | Returning to spiritual order               |

It is quite a lot of entertaining reading around these frequencies and there is lots of cross references to other interesting fields and mysteries. As expected these claims are very hard to find credible sources for, and to get a good grip of what actually goes on here would require a lot deeper research than I have had the time and resources to undertake. One interesting modern field that could perhaps give light to some of the claimed effects in a laboratory environment would be quantum physics. This field it self is balancing between science and new age though. The Solfeggio tones exists as tuning forks that are used as tools for healing purposes and there are a lot of cd-records out there for relaxation and meditation purposes. Maybe not very surprising some people are making quite a buck here and taking advantage of people that are desperately searching for help with problems the western medicine is having problems with defining. I can totally relate to that situation with my own experiences. I am sure some people really feel that they are helped by this which leads to other interesting questions like placebo and

the power of intention and the mind. What are the factors that makes us feel good, or bad, when listening to specific music and sounds? Does the well-being almost every human experiences when singing come from the vibrations created in the body, some other physical muscular or organ effect, changed breathing, the social aspect or maybe the combination of all those things? And what goes on in the minds of the people earning money on this practice that are fakes, and when their practice actually work, what are the factors making that happen? I do believe there are genuine healers as well as fake healers. I find all of this very interesting and this is something that I might dive deeper into in my future research.

There is unfortunately a darker side to the use of sound affecting our bodies than some alleged healers tricking people in order to earn a buck. There is weaponized use of sound both to inflict nausea, pain and even death. This is both being researched and has already been used in action. Another context for negative use of sound I have heard about from several directions is artists either that made, or thinking about making, installations inflicting some sort of negative feeling or reaction on the audience. When I hear this I ask myself why? Of course there are artists out there that hate humanity and have lost all hope in this chaotic, evil and confusing world we live in. I get very sceptic about the approach though. If I see an installation that makes the audience feel physically or psychically bad but actually wake people up and start a positive change of mind and consciousness, I will totally buy it. Writing this I never thought that my installation would succeed in producing any of the positive reactions claimed on the visitors, not even if it would have been possible for me tune the bars exactly to the correct frequencies including all the over tones. What I can say though is that I like to create installations and performances that have a good intention and that hopefully creates a positive feeling and maybe a curiosity in the viewer. I got a very nice comment in the blog for my Vimeo video showing the water drop sequencer. Andy Preston wrote, "It's fantastic to hear a sonic installation that's melodic. These days, "sound" often means "noise" but this is so different."

### *The Critique*

As a whole the critique went well. There is always answers and formulations that come to you the next day, and this verbal exam was no exception. There is mainly two things I think about now that I would have liked to said something more about.

The first was the question why I picked the staircase and not the Cathedral. I think my answer at the point was that I did find the staircase interesting and that I did not want to have the issue of arguing with other students and the curator about placing the installation and making allot of compromises. To this I could have added that I feel it is important to know that I am able to finish within the deadline. I prefer to make simplifications and know I have something working in the end than aiming for the magnificent knowing there is a big chance of not making it in time. My first Tone Bender installation was a very stressful experience and though working through several nights I was in need of help from others to make the final installation in time, and I went over the time with almost an hour if I remember it correctly. In a way the final assembly turned into a performance which kind of worked for that exhibition. In a professional context this would of course not acceptable.

The second question I remember wanting to say more about was if I was happy with the installation. I quickly thought that I have to stand up for my installation and just said, yes. I was happy though, but there was also things that I definitely would have done different if I had the chance that I did not mention. One critique I got was that when examining the installation more closely it was not as clean and simple as one would think at a first glance. Amplifiers were showing and there were quite a lot of cables, even if they were routed as good as possible. My very first ideas for the installation actually would have been very minimalistic. The idea was to power the installation with car batteries which would cut away the need for an outlet and

electrical cables. I would have the battery in a box on the floor between the two bars and I could also hide the amplifier in this box. The battery solution would also make it possible for me to have the installation in a context without electricity, for example in the woods or a cave, which was kind of an interesting idea. What made me leave this idea for the master exhibition was mainly the inconvenience of having to charge the batteries, probably every day or every second day during quite a long period of time.



*Illustration 19: 3D sketch of the early idea with a car battery powering amplifier and speaker*

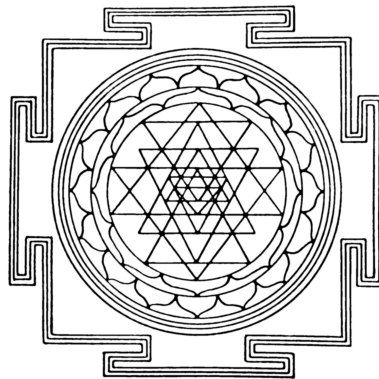
I early on made a choice for the installation that I would have done differently in a remake. Something I wanted to have from the beginning, and always had in my prior installations, was a mixer to have control over the sound and volume levels in a simple way. Due to cable routing from the bars to a mixer and from the mixer to the speakers, the cost for this would have been high and I did not have a big budget. Instead I used six small amplifiers that I had since earlier in my studio. This made routing easier, even if not prettier, and kept down cable cost since I could use cables from my studio that would not have been possible with the mixer solution. The bad outcome of this choice was an installation that could have been visually more clean and I lost control over certain aspects of the sound. On the opening day something happened that I did not foresee. The sound level of people moving up and down the staircase was quite loud and my small amplifiers were not strong enough for this situation. You could still hear the sound, but you had to be aware there was a sound installation in the space. Other than during the crowded opening the sound level was fine. With a mixer it would have been so easy to crank up all the speakers with the main fader to adjust to the current situation. I also could not equalize the sound or add effects. As mentioned before this led me to adding another sound source which actually turned out to be a good thing for the over all experience.

## *The live performance*

At the finissage I decided to make a live performance that tied my previous sound installations together with my interest for music and my frequency findings. I had during the last term found the music and sound performing technique called live-looping that caught my interest. The technique basically allows the performer to record sound loops in real time and in layers with the possibility to control the sound on these layers to a certain extent like speed and reverse effects. A week before the finissage I build a computer based loop station using the open source loop software Mobeus and the free beta version of Plouges Bidule that allows you to connect your hardware and software together in a node based interface. After buying a second hand midi foot pedal interface originally intended as controller for a digital effect unit, the technical part of the performance was solved.

I choose to base the whole performance on 136.1 Hz that was the first frequency I came in contact with and the one that after my following research I felt was the most interesting, and believable do to the historical records and research made. Just the day before the finissage I decided that I wanted to have a simple slide show with text playing on a screen during the performance so that the audience would get a bit more understanding for what I based it on. Below is the content in the order played back during the 8-9 minutes long performance.

1. 136.1Hz, 32nd octave of the earth year C#3 -31.4 cents
2. In India this tone is the keynote of sitar and tambura music and is called "sadjā" which also means "Father of the others". The sacred syllable "OM" is tuned to this tone like mostly all the religious temple music. Many bells and other instruments are tuned to this tone.
3. In 1978 Hans Cousto, a Swiss mathematician and musicologist discovered the natural law of the "Cosmic Octave" as the link between different kinds of periodically occurring natural phenomena. The law of the octave is this principle where mathematics and music equally partake. This law makes it possible to combine astronomical and musical formulas.
4. The ancient Indians arrived at this tone through meditation, it was given to them intuitively and contemplatively. We have to calculate it with mathematics and physics. When examining old bells and instruments, divergences very often appear to be far less than 1 Hz.
5. Not only the instruments, but also the musicians and the audience are being attuned during the "alapa" (the tuning before the concert) to the everlasting tone, the sadjy. According to Indian tradition, the sadjy, or "sa" for short, is the everlasting, never ceasing tone (expressed through the syllable "OM").
6. In the Yoga tradition there are certain mantras (sound syllables) and yantras (forms to meditate on) which belong together. The form which belongs to the mantra Om is said to be Sri Yantra, and vice versa.



*Illustration 20: Sri Yantra*



7. We are not human beings trying to attain a spiritual experience, but, rather, we are spiritual beings having a human experience [Pierre Teilhard de Chardin, priest and scientist].

Text, except for quote, is taken from:

[www.planetware.de](http://www.planetware.de)

[www.yogameditation.com/articles/issues\\_of\\_bindu/bindu\\_10/about\\_sound\\_and\\_form](http://www.yogameditation.com/articles/issues_of_bindu/bindu_10/about_sound_and_form)

The sound part of the performance was structured and carried out in the following way. Within Bidule I had a sample player with a constant tone at 136.1 Hz that I simply pressed start for and faded into the speakers. Over this I had programmed two different evolving pad sounds in the sequencer program Record/Reason by Propeller Heads that I could use within Bidule and that played back to midi information I had programmed in advance. When this was creating a sound backdrop around the 136.1 Hz I had a one metal bar water drop sequencer installation on stage that I activated at this point. The only tricky part here was to find a good tempo for the water drops considering the bottle was hanging just within my reach, the screw controlling the speed of the drops was tiny, and my hands was a bit shaky out of being nervous. After a short while, that felt like an eternity, the speed of the drops was fine. Now I used another metal bar the same way as in my Tone bender installation. I had a glass bucket filled with water and I lowered a metal bar that I had struck into the water while recording the bending sound in the loop software. When I had a phrase recorded I could create a sequence where the loop at points would play back in reverse adding variation and a mystic feeling to the sound. Both bars was tuned to 136.1Hz. To the sound landscape I had created so far I decided to play the guitar on top to give it a bit more musical touch and variation. I created two loop phrases with the guitar. One plucked part and one melody part. When this was done I had reached the peak of sound intensity, and from here I started to take away the sounds one by one that I had build up. A very simple strategy that I decided to stick with because of preparation time and also the time limit I had set for the performance. In the future, and very possibly in cooperation with others, it would be interesting to build up more complex compositions.

This performance took place in the Cathedral which I think was the perfect space for it. Since I had put my main sound installation in the staircase to avoid problems with disturbing other installations it was nice to experience what it could have sounded like if it would have been possible to crank up the volume. This was my first solo performance and my first live looping experience. I liked the way it worked out using elements of my prior installations in this context. I also like the combination of random and chaotic sound with something structured like in this case my guitar.

The defence of the exhibition was done before the finissage so I never got any feedback from teachers and opponents on my live performance. The feedback from the audience was positive, but of course not very critical which would have been good to hear.



*Illustration 21: The live set up for the finissage performance*

## Se&Hör

Se&Hör was a sound art group exhibition that was arranged by Sandnes Art Association. This was my first exhibition outside the safety of school and a wonderful experience. I was actually paid to be a part of the exhibition. I was also paid for all extra material needed to build my construction, which turned out to be quite a lot. I had professional help by a carpenter from start to finish and when it was time to paint the construction and time was running out several people from Sandnes art association turned up giving me a hand. I was invited to stay at a private house for free and the people were lovely and very helpful all the time. I am not sure it can get any better, at least for a fresh artist like myself. I was in Sandnes, Norway, for a week working before the opening day and it was long, hard and great week.

When I was accepted to the exhibition I had applied with my water drop sequencer. I had prior made this installation in two different configurations. One interactive and one non interactive. It was decided that they wanted me to build the interactive one. If interaction is going to take place it is necessary for the audience to be able to access the bottles in a safe way. So far I always had a staircase or a building with an open floor solution that made this possible. The problem I was presented with here was that there were no staircase or open floor solution in the gallery space. The ceiling height was between three and four meters and I realized that I would have to build some sort of platform in order to get enough height for the bottles to give the water drops enough impact force on the metal bars and get the audience up to the bottles in a safe and comfortable way. Once again my 3d came in handy and I started to send sketches to the carpenter for possible solutions.

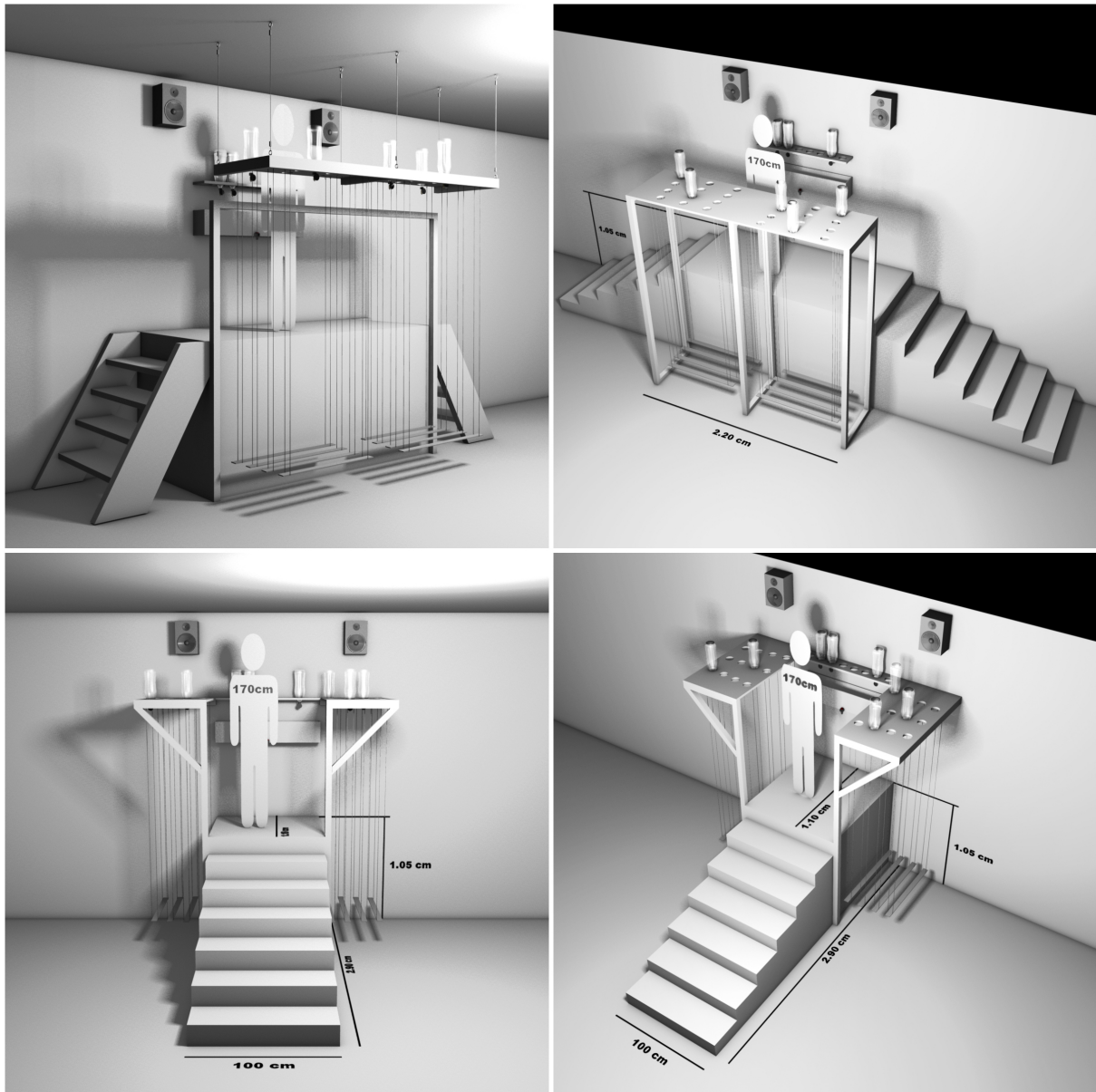


Illustration 22: 3D sketches of some of the ideas for the installation in Sandnes

This is the installation I like the most from the ones I have build so far. I like how the final construction finally fitted into the architecture. Another thing was the practical solution I figured out with containers at the sides of the structure to catch water drops from bottles not in use and with taps in these containers making it possible to refill the bottles on location. The basic idea behind that being able to fill up the containers prior to the exhibition opens taking away the need to go with the bottles to a sink every time they run out of water. The platform design also made it easy for the audience to go up and down the platform, even when it is fairly crowded. The simplicity of my original installation were by many considered to be the thing about the installation that made it so great. I also liked the simplicity, but I also like building a structure like this and solving problems regarding space, function and appearance. Maybe it is the engineering part of me that finds joy in this process. Below is a series of images showing the different stages during the construction of the installation.



*Illustration 23: Building in Sandnes 1*



*Illustration 24: Building in Sandnes 2*



Illustration 25: Building in Sandnes 3



Illustration 26: Building in Sandnes 4



*Illustration 27: Building in Sandnes 5*



*Illustration 28: Building in Sandnes 6*



*Illustration 29: Building in Sandnes 7*



*Illustration 30: Building in Sandnes 8*



*Illustration 31: Building in Sandnes 9*



*Illustration 32: Building in Sandnes 10*





*Illustration 33: Building in Sandnes 11*



*Illustration 34: Building in Sandnes 12*

One great experience I had, and probably the nicest feedback I ever got from one of my installations, was when I attended when a school class of young kids visited the exhibition. Every Sunday Sandnes art association invited school children to experience the exhibition. The opening was on Saturday and I was leaving for home on Sunday. Luckily the train left after lunch, so I had the opportunity to take some images when the kids played with the water drop installation. I had to leave during the visit so I did not get any verbal feedback, but it was nice to see the interest and curiosity in the children's eyes. I could not ask for a better good bye from my Sandnes experience.



*Illustration 35: Children visit the exhibition 1*



*Illustration 36: Children visit the exhibition 2*



*Illustration 37: Children visit the exhibition 3*



*Illustration 38: Children visit the exhibition 4*

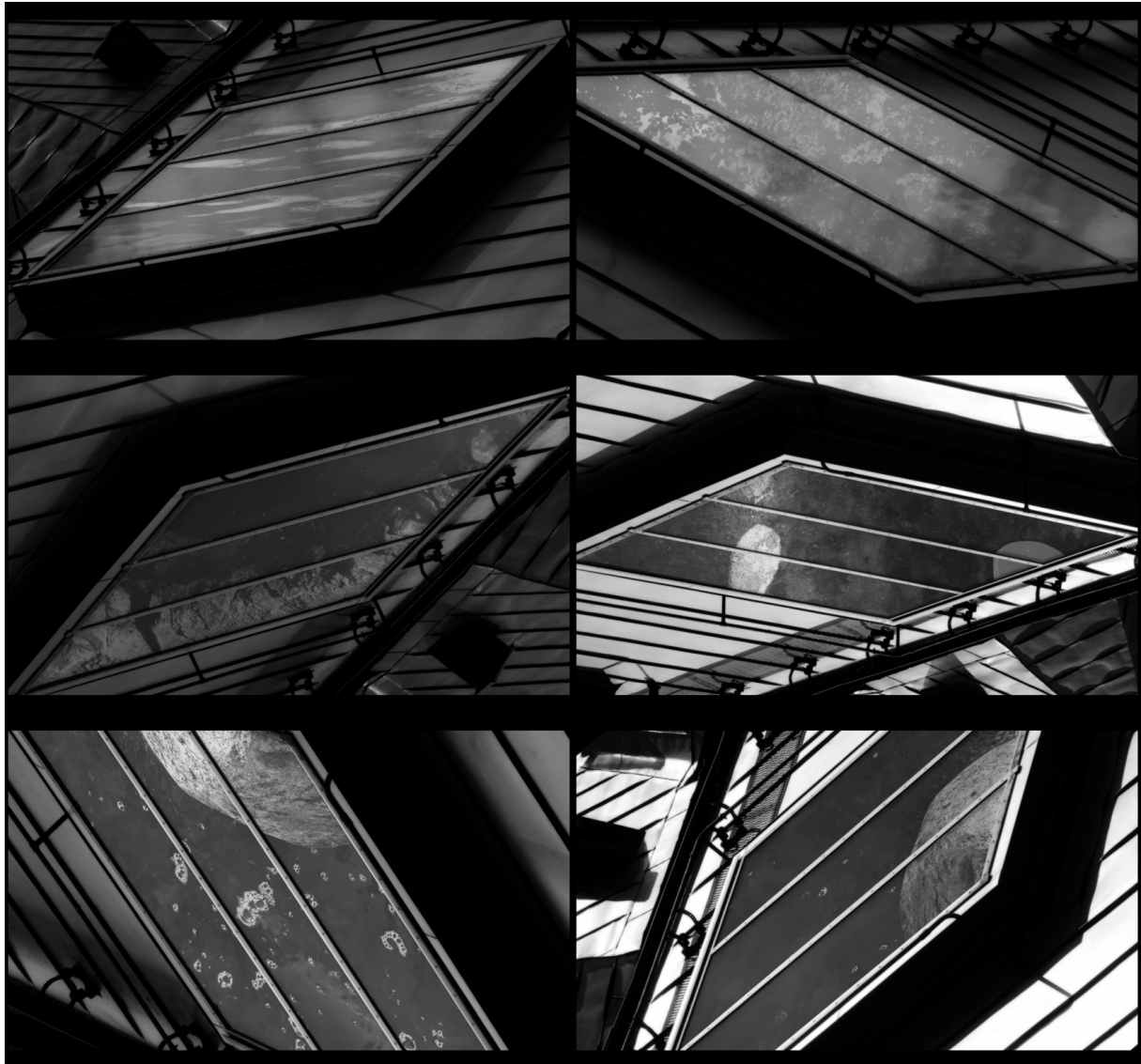
## Way Out West

Two years in a row, 2009 and 2010, I got the opportunity to exhibit in Valands tent at the music festival Way Out West. The first year I exhibited my Tone Bender 1.0 sound installation and the second year I made an experimental video with Ann Charlotte Rugfeldt Ferm and Gustav Lejelind that I met during the experimental pop summer course.

There is not much to say about the Tone Bender 1.0 installation other than that it was a crazy amount of work to get everything in place and working in time. Finally it did though after working through the night and finishing just before opening hour. I saw some people that enjoyed playing with it during the festival. I also saw quite drunk people playing to much with it I had to remove them before destroying it. A music festival is not a art gallery, so I guess I was prepared for the worst. Every thing thankfully made it through the festival without breaking.

After wanting to experiment with video, photo, music and sound for a long time I finally got this opportunity to make a video project. We decided to make a time-lapse video, a technique I had been interested in for quite a while which means that you take a series of images with a specific interval and later put these together in a video sequence. This allows for a slow event to be played back in a short sequence. We also worked with binaural sound to create the back ground sound for the video. Binaural sound is created by using two microphones in your ears. When played back in headphones this gives a very realistic experience of the space. On top of the binaural recording we put an improvised sound performance and we also used some improvised musical elements. We choose Röda Sten as the main area to shoot the time lapse and record the sounds. At this point the concept was more of a loose frame work for us to start gathering material within. We were also on a tight schedule. We used two mornings at Röda Sten for the basic photographic material. This was done in parallel with the experimental pop summer course, so we had a good studio set-up in Valand that we used for additional sound and also for the actual video editing. When at Valand I noticed that the roof tops of the school was quite interesting with lots of small clouds passing by and reflecting in a roof window and also creating interesting shadows. I decided to make a time lapse of that roof, and that came to be the last piece that tied our time lapse footage together. We used the shot of the roof window as the main image of the video. I used some layering and masking techniques and put the footage from Röda Sten as reflections in the window keeping the original reflections still visible and the clouds controlling the transparency of the layers. The window was slowly turned 360 degrees during the time of the video. This gave the idea for the name Perspektiv as the view was constantly changing. As additional sound on top of the environmental sounds from Röda Sten with the traffic going over Älvsborgsbron, we improvised on a draw bar organ, played a simple minimalistic figure on acoustic guitar, improvised on a prepared piano using an idea I got during the experimental pop course, and finally we just made one recording session creating noise from what ever we could find in the studio environment.

One thing that I enjoyed, afterwards, in this project was that the tight window of time we had to finish it forced a lot of decisions that we had to stick with. I know myself to be super picky about small details, and many times I know that all the extra time I spend no one but me can notice in the end result. I am aware about this, but it is still hard to break this behaviour and let go of control. In this project I had to! There are things that I know definitely could have benefited if I could have had another day or two, but at the same time something that turned out to be interesting maybe would have got lost in that extra editing process. It is a good feeling that I can lean back and be happy about the project and accept the small things that could have been better. A good experience. The video can be viewed at <http://vimeo.com/17261694>.



*Illustration 39: Frames from the video Perspektiv*

## Experimental Pop

The summer course led by sound artist Isak Eldh, who is a very interesting sound artist was good for me in many ways. It gave me new energy and ideas for my own music and I created some instruments and tweaks of things I had in my studio I would never had come up with outside this context. Maybe the best thing of all was that I made new great friends that I keep in touch with and probably will do projects with. The Perspektiv video being the first outside the frame of the course.

Isak Eldh was a great source of inspiration. He is a very humble and earthbound person and he is enormously generous with his own ideas. When performing he prefers to be unprepared and get surprised rather than doing the expected and getting bored. A very nice motto that I definitely, as a control freak, would benefit from implementing at least a bit of in my own practice. It takes a lot of courage!

During the course we did a bunch of improvised sound recordings both with instruments and with what ever we had dragged into the creative space to create noise and sounds with. It was

during one of these sessions that I came up with an idea that I used both for the final performance of the course and the Perspektiv video. In the studio space we had build up stood a piano that we used both for conventional and unconventional sounds. At one point Isak and one of the course members played with a piece of tape from an old sound cassette together with a contact microphone creating friction and tension. Beside them was the piano, and some how I got the idea to tie the sound tape to the strings of the piano. I am very glad I did this because it turned out to be a very nice way to interact with the piano. First of all I locked the sustain pedal down so that nothing was dampening the strings and they could ring out and affect each other. By stroking the tape and creating friction it was possible to get cello like sounds. By striking the tape as a string, a muted piccato like sound was created. This in combination with playing on the pianos keys them selves gave birth to very nice improvisation possibilities. For the final performance I teamed up with my friend Ludvig Sjöstrand, Isak Eldh and the guest teacher Magnus Haglund. The performance was done in cooperation with the experimental music club Koloni and was held in Gårda skolan. Luckily enough an old piano was standing in the performance room. I prepared the piano with eight tapes in an open chord. I Improvised on four of them and Ludvig on the other four. Isak Eldh was handling real time sound processing through a variety of effects in his set up. This backdrop of sound was accompanied by Magnus Haglund reading from a poetic real time chatt session with a lady friend on his cellphone.

One of my first idea was to make use of all the gear I had invested in during the years. I pretty much ended up in the situation Brian Eno was talking about with to many possibilities. Instead of using all my gear I created kind of an odd but interesting percussive instrument. I got the idea to put two brick stones on top of each other and to attach a contact microphone to them. I played the stones with a little hammer, and was able to also get nice sounds by grinding the stones against each other. I did get use of one of my old effect units that definitely had an important influence on the sound. It was interesting to start out with the idea of connecting all my fancy gear together and ending up playing on two brick stones.

## The Guest House

Thanks to my water drop sequencer and Vimeo, a great online video community, I got the amazing opportunity to work in a project with the Gothenburg Operas ballet. Fernando Melo, the choreographer of The Guest House and also a dancer at the ballet, had an idea of water drops falling on stage and making sound. He googled for water drops and sound, and one of the top hits was the video I had posted on Vimeo of my early prototype. Since I also was in Gothenburg, he decided to get in contact. The Opera arranged a meeting and after some budget discussions I was hired as a sound designer, and later also became a composer for the production. This work was done from February to September 2010.

The Opera was easily the most exciting place I have ever worked in. There is so many different work categories situated under the same roof which leads to a great mix of interesting and creative people. It is also a luxury to have great resources at your hands. All equipment is of high quality and everybody are very professional and helpful. I felt that in this context and in the position I was put in, my generalist background finally came to good use.

One great thing that turned out to expanded my work was that Fernando had an idea to use a self playing piano on stage. He first found a lovely old one that worked with pneumatics and stamped hole charts, but unfortunately it was to expensive to get it working. Luckily enough, through contacts, Yamaha decided to loan a self playing midi piano to the project. I got to be the programmer of the piano and as things went along I also got to compose the music for it. I composed three original pieces and one that was rearranging a piece by Chopin and adding a fair amount of chaos. I also prepared the piano with a contact microphone on a steel plate and

experimented with putting things to the strings. Not as extensively as John Cage, but definitely inspired by him. This allowed me to add and work with percussive elements in the compositions.



Illustration 40: The workspace and the stage.

When working with the self-playing piano I got more aware of something about the sound itself that I really enjoy and that I also can relate back to my metal bar installations. I have always enjoyed to sit down by a piano, press down the sustain pedal, and improvise only on the white keys. Of course you get a long ringing tone which is nice, but I realized that what makes me love this piano sound is the tones and over tones created by all the other strings that starts to resonate with each other. When I think back, this is why I always have been so disappointed when playing sampled pianos, how ever well sampled they were. When you play a sampled piano you play back a recorded sound. The first hardware samplers were actually tape machines that played back a tape loop with a recorded sound when pressing a key. These early samplers, like the Mellotron, have their own very specific charm though. today it is most common to use a computer and a software sampler. If you have a very well sampled piano it has been recorded in a good studio space with top notch microphones in several positions and at many different velocity levels for each note. What you get is a perfect sounding virtual piano. What you do not get is the chaos of tones and overtones by strings influencing each other that I find is much more interesting than the perfect reproduction of a clean tone. The sound becomes dead in a way in a digitally sampled piano. I am looking forward to work more with sound exploring and composition on a real piano, both prepared and unprepared.

At this point there is a video on Fernando Melos Vimeo page from the rehearsals that give a little insight to how the production turned out. <http://vimeo.com/16385083>. I will eventually put up a video on my Vimeo page that shows a bit more of the sound design work and composition.





*Illustration 41: Frames from video documenting the general repetition.*

## Conclusion

With my technical background, my sound and music interest, my experience of the fine arts and digital media within that context. Where do I go from here? How can I in the best way make use of my knowledge and explore my fields of interest?

I am getting more and more determined that the way to go for me as a generalist standing somewhere in between the two different worlds of art and engineering is to start up a company of my own. Doing this I hope that I will be able to find a good balance between my technical and artistic skills. Since I still do not have a solid portfolio or can show up a track record of residencies and exhibitions it is important that I create these opportunities for me to build up experience in that regard. I know that sound and music will keep playing a major role in what I will work with as an artist. If I get the chance to contribute to the art community showing and teaching the huge advantage to use 3D as a creative tool for sketching, planning and presenting installations I will most definitely take on that challenge. I feel that a very interesting time in my life is starting now and I hope that the things I have written about in this thesis and the experiences made will come of good use.

# List of Figures

Illustration 1: The weekly visit of Sunday school kids viewing and playing with the water drop sequencer	1
Illustration 2: The last visualization job I worked with at Industriromantik AB	6
Illustration 3: Andreas Oldörps installation Le Nénuphar	9
Illustration 4: Video installation by Eno in Sydney. Eno was also the curator for this exhibition	11
Illustration 5: Prepared piano by Hauschka	11
Illustration 6: Some of Chladnis figures for different frequencies	13
Illustration 7: Bindu Cover. Cymatic water image. Sri Yantra.	15
Illustration 8: The Cube	17
Illustration 9: Barrie James Sutcliffes installation “The small within the great”.	18
Illustration 10: 3D sketches for Tone Bender 1.0	19
Illustration 11: Some of the CAD drawings for Tone Bender 1.0	20
Illustration 12: Piezo elements in different sizes	21
Illustration 13: Tone Bender 1.0	22
Illustration 14: The first Water Drop Sequencer installation in the staircase	24
Illustration 15: The second Water Drop Sequencer installation in the staircase	24
Illustration 16: The rust pattern on one of the bars	24
Illustration 17: The non interactive Pixelache installation	25
Illustration 18: Images taken with my mobile phone checking out the space	27
Illustration 19: 3D scetch of the early idea with a car battery powering amplifier and speaker	30
Illustration 20: Sri Yantra	31
Illustration 21: The live set up for the finissage performance	33
Illustration 22: 3D sketches of some of the ideas for the installation in Sandnes	34
Illustration 23: Building in Sandnes 1	35
Illustration 24: Building in Sandnes 2	35
Illustration 25: Building in Sandnes 3	36
Illustration 26: Building in Sandnes 4	36
Illustration 27: Building in Sandnes 5	37
Illustration 28: Building in Sandnes 6	37
Illustration 29: Building in Sandnes 7	38
Illustration 30: Building in Sandnes 8	38
Illustration 31: Children visit the exhibition 1	39
Illustration 32: Children visit the exhibition 2	39
Illustration 33: Children visit the exhibition 3	40
Illustration 34: Children visit the exhibition 4	40
Illustration 35: Frames from the video Perspektiv	42
Illustration 36: The workspace and the stage.	44
Illustration 37: Frames from video documenting the general repetition.	45