A bang,
a hiss,
and a sigh.

Composing with the
rhythms and sounds of work

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Abstract

This thesis examines the rhythms and sounds of embodied work processes by composing with field recordings. It attempts to give an overview on the basic discourse about the use of field recordings. Several difficulties of defining the field are pointed out and representational problems are discussed. In order to derive a concept of the sounds of work processes, the soundscape of the industrialized world is described. The practical part concerns a case study in the Port of Rotterdam.

Keywords: contextualization, contact points, drones, the everyday, field recording, machine sound, manual work, modification, time-and-motion studies, rhythmanalysis, representation

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A bang, a hiss and a sigh – Composing with the rhythms and sounds of work.

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1 Introduction

... denn du bist wild und laut und tosend,
deine Brandung, in deine Wellenberge lausch ich,
und aus den höchsten Wellen, aus den Brechern,
brechen dann die tausend Stimmen,
meine, die von gestern, die ich nicht kannte,
die sonst flüstern und alle andern auch.
Einstürzende Neubauten 'Die Wellen'

Every sound that we encounter in everyday life has the potential to become music. It only depends on our listening to them. The majority of everyday sounds are to be understood as unintentional byproducts of movements of either humans or lifeless objects. They usually slip our attention, yet they are meaningful. If these sounds are played back, an audience might become aware of a realm that is usually below their perceptual threshold.

This thesis takes field recording as a method to explore everyday sounds and attempts to make use of them for compositions. Although not every movement makes a sound, the act of recording is a way to capture certain audible qualities of movements, allowing to listen to and later modify the fragments. What seems random at a first glance thereby becomes repeatable and accessible for analysis or creative use. Such field recordings function as a switch, enabling the composer to make a leap from capturing unintentional sounds to developing compositional material with timbres and temporal structures she might not have conceived of in the first place. But it is not only the richness of the material which attracts composers, also acoustic features of a place might be embedded in a recording, as well as information about the way our environment is organized. Typically, field recordists wish to elucidate such aspects of reality – at least this is their high hope.

Acknowledging field recording as a specific method to derive material, the second chapter attempts to embed the proposal in the discourse on sound art. Also, this might answer the question of what becomes audible in a piece that is based on such material. Field recording is a relatively young area of discourse which emerged during the last decade when – apart from being portable – recording devices also became affordable. At the same time, the term refers to the neo-romantic idea of preserving folk traditions which started around the turn of the 19th to the 20th century. In the latter sense it is an ethnographic technique, in the former sense it comprises a multitude of different approaches to make artworks. In the recent understanding of the term, field recording covers many interests. On a theoretical level, this makes the

current discourse not satisfactory to the extent that it contains incoherent theories and lacks a general concept. Not only does the patchwork structure of the discourse preclude an overall description, but also, one notices an attitude of intellectual denial among researchers.

Descriptions of how music is understood often refer to ideas of cultural relativism (Pinheiro 2012, 76, Konstantinidou 2011, 17). Although every human being has a cultural background, I do not believe that such conceptions are helpful in order to clarify what a listener can perceive in a field recording. Relativism leads to weak theories. And even if communication sometimes fails, that does not mean that one has to avoid trying. I attempt to detect and discuss general categories of understanding what a field recording in an artwork can or cannot convey. This discussion will be for the sake of searching for a way to solve the fundamental discrepancy of understanding concrete sounds: Environmental sounds are loaded with meaning when we listen to them in their original context. Yet a simple recording of the same environment is not loaded with the same meaning, certainly not for a listener who has no knowledge of the recording site. So, although the durations and spectra of both phenomena match, the listening experiences do not correspond completely. If a field recordist wants to convey the original experience, how can she infuse the recordings with meanings? The sober answer comes from composers related to *musique concrète* claiming that sounds should be treated as nothing but themselves (Schaeffer 2006) and that any preconception beyond reduced listening should better be avoided. In this regard, the question how to convey another level of meaning is simply inapplicable. Opposed to this, the optimistic answer is more common to sound artists who claim to integrate their memories and feelings in the processing of the recordings, yet they remain silent about the details of such a process. The truth lies somewhere in between. Finally, I will propose deliberate contextualization and modification as necessary features of presenting field recordings. The issues discussed above will form an important background for the practical part of this report.

By using field recordings, I want to compose with the rhythms and sounds of everyday life. While sound artists tend to avoid calling their artistic results music, my field of research clearly shows musical characteristics: The particular interest in work processes originates in a phenomenon which I will call pre-musical behaviour. So far, field recordists have barely acknowledged the tremendous musical potential in this area of everyday sound. In chapter three, I will exemplify their richness by providing a brief cultural history of the rhythm of work, starting from anthropological theories about music making and ending with the sounds

of the industrialized world. The musicality of everyday life becomes most obvious when considering repetitive movements. Long before the invention of recording devices people have taken the natural rhythm of work processes as a source for making music. Such music developed rather naturally out of certain actions, it did not require any musical education and did not stem from deliberate decisions of a composer. It was needed in order to coordinate processes and sometimes to synchronize the workers with each other. In its origins, the folkloristic genre of work song features a significant simultaneity of the rhythms of human body, music and activity. This will be the focus of the third chapter. But the rhythm of work is not only to be found in folk music, its cultural relevance reaches much further. Asking how simultaneity could be shifted to making music in relation to the industrialized world, this concept will be further developed to a general idea of embodied rhythms of work which are comprised in sound.

The notions of industrialization range from optimistically embracing the new sounds (Russolo 2000) to deeply worried accounts of noise (Schafer 1994). Considering on the one hand the richness of the material and on the other hand, negative effects of noise on hearing and communication, both angles are understandable. Yet these accounts are very much concerned about timbre and amplitudes rather than the new temporality which industrialization introduced: First, parallels will be drawn to the re-discovery of rhythm in the The Gilbreths' time-and-motion studies on manual work. Second, these studies will be compared to Raaijmakers' view on machines in order to derive an overall concept of the sound of work. Such a general description is sought because a recording device does not distinguish between machines and humans, they both inhabit the same sonic realm. They are treated by the medium in the same way. This sonic realm has certain characteristics concerning its temporal structure. It will be concluded that the rhythms of work span rather distinct sonic phenomena of human work and machine work, but also hybrid forms. Later a special case where rhythms and sounds are deliberately imposed on workers will be introduced by the example of music in industry. In the 1940s, the British Broadcasting Company and the record company Muzak designed music specially to make work in factories more pleasant and as an important consequence, more productive. It is necessary to understand better how all these rhythms interfere with one another. Therefore, a general concept of embodied work rhythms implies ecological considerations, too.

I will present rhythmanalysis (Bachelard 1950, Lefebvre 2007) as an important source of inspiration in order to describe how sound can be interpreted in regard to durations. Rhythmanalysis is a concept that aims to explore the multiple rhythms of everyday life with respect to their interferences. But rhythmanalysis is not watertight. Logical problems in the theory will be pointed out but they can be neglected for the sake of the artistic reading of Lefebvre's description.

Finally, the considerations above were applied in a case study which I will roughly describe. The particular interest in recording the sound of work was preceded by research on work songs. Speculating where the work song went in the industrial world, I became interested in recording the sounds of work directly. This practical part of the thesis concerns the work processes in the Port of Rotterdam. During the past two years I made recordings in factories and the harbour area in general, and had conversations with workers. As expected, these pre-musical elements proved to be much looser in their temporal structure than work songs. That is why the field recordings were modified and interweaved in search for a musically expressive description of work. Initially, the Port of Rotterdam was chosen because I felt intrigued by the fact that an industrial area with a size bigger than The Hague is so unfamiliar to the inhabitants of a harbour city. It is unexplored terrain, especially sound-wise. The harbour proved to be very rich in producing sounds. But unfortunately, two facts biased the full exploration of it: First, the size of the industrial area in question extended my time frame. Second, recording in larger companies appeared to be impossible, due to very strict security guidelines. Attempts to ask for permission always ended in front of the gate. Hence, this artistic case study is by no means representational, nor documentary – but hopefully, it can give a glimpse on the various palpitory rates in the logistic heart of Europe. The pieces are bound together in the form of an imaginary journey from the door of my house to the artificial beach at the end of the industrial area. On the way there, several forms of work are encountered. Accompanied by visual references, this journey involves sound collages and songs.
It is meant to be performed. In the discussion of the practical part, I will focus only on a few pieces which to my understanding demonstrate best how the considerations about the sounds of work and field recording were treated in practice. The knowledge about processing and acoustics which I was able to extend during the time of my studies played a crucial role for modifying the initial recordings. This will be touched upon in the description of the pieces.

I hope that this thesis marks just the beginning of the fieldwork which I hope to carry further. If a reader manages to share only a little bit of the fascination I felt during the artistic research, these pages will have achieved their goal.

2 What is Field Recording?

2.1 Introduction

In the recent discourse on sound art, field recording is about capturing unintentional sound with the help of a recording device. First and foremost, field recording refers to the *act* of recording. At the same time, also the physical result of having captured sound is called a field recording. In this case the term describes the origins of the *material* that a sound artist works with. A third possible meaning has been introduced during the last ten years: Often field recording is presented as a *discipline* of sound art in its own right. Following this conception means 'making the technique become a discipline of art' (Riek[1] 2011, own translation) and is synonymous with the likewise young area of phonography, a term revived from the beginning of the last century. This is confusing. The book *The Art of Field Recording* (Carlyle and Lane 2013) contains a lot of terminological blurriness. The title suggests field recording is a *discipline*, while on the cover it is written that the subject of the collected interviews is how the artists deal with the *material*. The artists interviewed have manifold approaches to presenting their work. Summing up the fundamental difficulty, it is hard to classify a work of sound art as a field recording by only judging from how it is presented or what its sonic content is. That is also because purist approaches are rare, i.e. field recordings are often processed in one way or another. Sound artists who work with field recordings derive inspiration from many different sources. In this regard, field recording has the advantage of being relatively easy to access from numerous angles; still it is prone to producing a confusing, if not contradictory discourse. It is worth questioning how applicable field recording as a discipline really is. I will name a few problematic cases. Sound artists as Francisco López sometimes process their material to the extent that the original sounds can hardly be traced back. Others apply collage-like montage techniques and use recordings from

1 Riek is a German composer and sound artist, who runs the record label Gruenrekorder together with Daniel Knef. Gruenrekorder publishes only unprocessed field recordings.

several places at the same time in order to tell a story, such as Sara Pinheiro. In the first case a listener cannot distinguish between environmental sound and artificial sound. In the latter case the result is a fictional sequence of events. There is no all-embracing aesthetics to field recording as a discipline.[2]

However, there is a discussion whether or not to consider the act of recording a part of composition (Riek 2009) because there seem to be artistic choices involved in the use of microphones, objects to record or even moving while recording. Perhaps this led to considering field recording as a discipline. Admittedly, the first steps of making such an artwork are similar because they are about capturing sound of the environment. Nevertheless the result of the creative process is not determined by the first steps in any way, just as the use of a typewriter does not determine the kind of book which is written on it. There is more to it. And typically, when talking about an artwork, people do not talk about the way the material was captured but rather about the perceivable features of it. I suggest to abolish the term field recordings to describe a discipline and instead call the artistic results that employ field recordings just sound art and in some cases composition.

This thesis is about field recording only to the extent that it uses sound material which was recorded in a specific area. The way these sounds are processed is a different topic, as well as their montage. Still as an attempt to shed light on the ongoing discourse about field recording, I shall discuss the most prominent issues. Some points may appear overstated but this is mostly in favour of starting a critical discussion in the midst of the artistic confusion.

2.2 A very brief history of field recording

Field recording as an activity dates back to the end of the 19th century when it became possible to capture human voice on a phonograph. Not only did the fascination come from the invention of a new medium, but also the fact that the phonograph was portable contributed to its success. Soon it became desirable to travel with the phonograph and preserve folk music traditions and local dialects on wax cylinders. This discipline is called *phonography*, even though the term nowadays is not anymore linked to a particular recording device. Questions about the objectivity of these recordings and whether a phonograph can capture sound as it was perceived by our ears would hardly be asked, the mere fact of being able to capture

2 Of course, artworks exist that use unprocessed field recordings, and therefore a listener might even identify certain sound sources. This would be sound art where the emphasis is on the material itself. The re-contextualization of the material plays a crucial role in order to classify it as art, just like a readymade of Duchamp does.

voices and music seemed sufficient. The recordings would be respected as witnesses of their time in a certain place, they would become archived and not be modified. Notwithstanding neo-romantic tendencies, phonography clearly has its roots in ethnological research and aims at preserving a folklore heritage. With strong educational tendencies, Alan Lomax describes this type of field recording as an urgent act of capturing traditions before it is too late, also with political implications:

> We [the folklorists], who speak for the folk in the market place here, have obligations to the people whom we represent. […] So, I think, that we have to work in behalf of the folk, the people. We have to defend them, to interpret them, to interpret to them what is going on in the world which they do not make, but which begins to move in upon them and to crush their culture. (Lomax, 2003, position 2461 of 8738)

However over-ambitious these lines may sound, in the 1960's Lomax' recordings had strong influence on American politically-conscious songwriters, such as Bob Dylan, Woodie Guthrie and Pete Seegers. Nevertheless, artistic use of those recordings was made in a fashion which would be based on their content, not at all on the medium itself. Despite political awareness, Lomax (2003) also points to a fascination which is common among all field recordists, namely that of being in a place and record the events linked to it. Getting acquainted to people of various social backgrounds and getting to know their customs, surely played an important role. At great lengths Lomax contextualizes the recordings he made by describing the people, their activity and their environment. Ethnological endeavours in field recording persisted throughout the introduction of records, tape and digital media up until today[3]. And although most field recordist capture sounds instead of songs, Lomax' ideas still seem to be present in ecological accounts on concrete sound which strive to preserve acoustic environments in nature.

The media-specific use of field recordings took off from a different angle. It started with the invention of sound-on-film techniques. Taking into account that this medium stems from the context of filming, it is no surprise that the earliest artistic usage of recorded everyday sound was made by a film-maker, namely Walther Ruttmann. His piece *Wochenende* (1930) was intended to be cinema for the ears. Sound-on-film is recorded on celluloid on the same film roll as the image, right next to it. A circuit consisting of a photovoltaic cell connected to an amplifier and a loudspeaker is responsible for converting the changes of light on the audio

3 E.g. one can find a recording of a church service in Zambia online on Radio Aporee simply by clicking on the world map on aporee.org/maps.

track into sound. Celluloid is a material which makes it possible to cut and glue as one wishes, plus, it endures more playbacks than wax cylinders do. With sound-on-film montage entered the stage of sound art. Around the same time, in Russia Dziga Vertov established an experimental use of playback equipment for his documentary *Symphony of the Donbas*, also called *Enthusiasm* (1931). The scarce amount of available sources makes it difficult to tell which equipment was used exactly but it is certain that Vertov used early forms of modifying the sounds he had recorded on-location.

Admittedly, in the context of radio art everyday sounds have been playing an important role since the very beginning of the radio, when *Hörspiel* was supposed to be cinema for the blind (Kahn and Whitehead 1994). Also the world of popular movie making knows an artistic use of sound in terms of an interplay of sound and image. In both cases sound mostly obeys a pre-constructed plot and scarcely to its inherent properties, i.e. ideas of montage and editing stem from realms other than sound art or composition. It has to be mentioned that also, an experimental branch of Hörspiel exists which searches for purely sound-based narration, but this is a tradition in German-speaking radio with only marginal influence. In the case of sound for film, cuts on the visual level often get reflected in sound, which means that an underlying general concept of rhythm might be applied, yet this fact cannot be considered to be evidence that field recordings are treated exclusively relating to their sonic nature, but rather that these sounds are subordinate to other concepts.

It is Pierre Schaeffer who earns the credit of having developed a new category of music. His pieces and his writing, most famously his *Treatise On Musical Objects* (original: *Traité des objets musicaux*, in Dutch translation: *Traktaat van de muzikale objecten* 2006) proposed listening to sounds freed from any preconceptions other than that of reduced listening, i.e. perceiving sounds as if they were the objects themselves. In this regard he suggests an objectified listening mode when dealing with concrete sound. But still, besides such modernist approaches to listening, one can also find a rather intuitive use of field recordings in popular music, e.g. they are used as a material to extend the virtual acoustic space by creating atmospheres. Also, often being part of an eclectic use of musical material, among other sources, recordings can get rigidly sampled to fit a rhythmic grid, or be of use to integrate vernacular music in a composition. As a discussion of the diverse approaches in popular music would exceed the scope of this thesis, I decide to neglect it here.

Taking into account the the informative side of sound, yet another use of field recordings

is made in science, in particular in biology, where they would provide evidence for theories of marine biologists, zoologists, and others. Taking as their subjects the acoustic phenomena beyond the boundaries of unaided perception, the study of infrasonic and ultrasonic phenomena also involves concrete vibrations, most importantly in seismographic studies of geology. A third branch of science that uses field recordings in order to study their matters are humanities. They were influenced by the research of the World Soundscape Project from the 1970s and especially in the ecological questions evolving from it. Sociology and architecture have begun to employ recording devices in order to explore urban life. To different degrees, all of these examples affect the field of sound art where artists strive to deploy scientific methods or re-contextualize their professional recording devices[4].

2.3 Communicating an experience?

In the discourse on field recording it is striking how often subjective listening experience is emphasized. This experience is often called enhanced listening and is a personal experience of a recordist. It is the moment when a recordist perceives reality in a way she would not otherwise. A perceptual shift takes place that underlines elements in the sounding environment. Between pressing the record and stop buttons on a recording device, the sound events of the environment become framed. Monitoring a recording with the help of headphones might even reinforce the immersive experience because the device creates a certain perceptual intimacy of sound and recordist, also through amplification. In the words of Lasse-Marc Riek (2013, personal communication[5], my translation), this experience is crucial for what happens to the recordings later: 'I think that the experience at the recording site [*Klangort*] subjectively slips in at the moment of editing, mastering, mix-down and that it determines the selection of recordings.' It is important to note that here it is not the act of recording itself which is important but the whole experience of being in a place. So there seems to be a realm that exceeds the scope of what has been captured by the device – that makes enhanced listening only one aspect of this multi-sensory phenomenon. Moreover, this implies again that the *act* of recording has to be distinguished from the *result*. How can a sound artist account for a multi-sensory experience when her profession is only one of the senses? Most descriptions of that step in the artistic process remain obscure, claiming to incorporate memory and emotions without providing systematic descriptions. This is especially the case where recordists are

4 Only to mention one example, hydrophones were first used to record underwater life.
5 Email to the author.

related to fine arts. Admittedly, it would be weird to defend the standpoint that artists should reveal their secrets, yet, as soon as they are part of a discourse, they owe an explanation how they want to convey what they claim. Enhanced listening might be crucial for the person who records in order to make artworks but artistic results rarely enhance the perception of a listener in the same way. Often a listener can neither tell what the sound source is nor if all audible sounds were really present during the act of recording or added later. A listener is simply not in the place where something was recorded.[6] Consequently, the success of a composition based on field recordings points to a shift of experience that must have taken place.[7]

2.4 Representing space?

2.4.1 The character of place

From an acousmatic composer's perspective the only thing to grasp from a field recording is the timbral character of the sound-objects and their spatio-temporal articulations, and therefore, she would strive to not be biased by subjective perceptions. Nevertheless, describing her recordings of Peru, Natasha Barrett emphasizes that a recording site has a specific sound. For an unexperienced listener this might not be evident. Her work as a composer is to select the most significant sonic material. About her fieldwork of Peru she takes on a modern phonographic approach, being sensitive to sound but not folk music.

> As background preparation for future compositions, from this archive I have selected sonic features and curiosities and made small studies in sound. These studies are not intended as sound walks, nor compositions or collages, but instead to capture the character of the place in question. The mixes involve simple editing to cut and highlight sounds, progressions, spaces and environments. (Barrett 2013)

Is it really possible to depict the character of a place by sound? The recordings could have been made elsewhere in the world and get their meaning only by the context Barrett provides. Such contextualization seems to be necessary for any phonographic undertaking and might have been a reason for Alan Lomax to deliver also photographs and drawings to the archive.

6 An exception is a soundwalk that incorporates sounds from the site itself and where the audience experiences the actual recording site.

7 A dry approach to addressing the problem would be to simply wait before listening back to the recording in order to avoid the bias of subjectivity to some extent and concentrate on mere sonic features. An acousmatic composer might opt for this but in such a case, there would be no aim of incorporating the experience while recording, which apparently play an important role in sound art.

The strong connection between the sounds and the specific experience of the recordist cannot be conveyed by pure sound. Two reasons support this. First, there is no perfect mimesis by electro-acoustic means. The propagation of sound waves in nature cannot be mimicked completely by loudspeakers. Up to this point in the history of sound engineering, all attempts to approximate natural propagation of sound waves are insufficient to some extent. Often, trained listeners experience the loudspeakers to be the sound sources rather than imagining the propagation of sound sources as in nature; plus, the sound events appear to be less dense than in nature. Hearing a sound move between loudspeakers still makes it difficult to imagine real moving objects, the sounds always stay detached to some extent. In contrast, in real-world listening situations sound is pervasive in time and in space, making anybody who is willing to listen immediately immersed. Despite the fact that using a microphone to record already limits any later experiences[8], it might be that even elaborate dispersion systems such as Wave Field Synthesis often do not account for multiple reflections in real spaces.[9] Whether this lack of persuasive power is also due to the position of a human body in space, i.e. a listener's awareness that a concert space is different from the recording site, might be a topic for further research.

One might claim that the character of a recording site can be re-created with loudspeakers by mimicking the position of sound sources in nature. Nevertheless, any com-poser who claims to convey the character of a site, should be able to clarify how that con-nection should be achieved. In other words, calling something a character of the recording site implies a certain objectivity to be perceived by other individuals. But combining some-thing essential taken from reality with an overemphasis on own experience causes a con-ceptual problem. The mimesis of sound-events could be one of the few objective approaches to overcome this, yet until this point this proves to be technologically problematic.

Second, a general problem of representation occurs whenever pure sound is supposed to convey the character of a place. Although an experience is a singular event, a site needs to be distinguished from the specific character of an instrumental composition; the first contains a rather loose structure which makes it hard to identify anything by pure listening, whereas the latter may be identified as a certain piece of music. It is the loose structure of everyday sound which makes it hard to assert 'This is a recording of John Cage's *4'33''* ' without the frame-

8 Characteristics of microphones determine which aspect of the sonic realm gets captured. They are selective in a different way than our ears, yet this fact can become artistically meaningful.
9 Diemer de Vries on April 10, 2013 (Symposium Composing Spaces, Royal Conservatoire The Hague) also pointed out that virtual reflections from ceiling arrays are necessary, which are often missing in WFS systems.

work of a concert situation. An unequivocal recording though would have to be of the kind that a listener states 'This is Peru', only by pure listening and without knowing any linguistic or semantic content. Such identifying assertions are only possible in the very few cases where places have characteristic earcons that a listener is familiar with. So, by providing context, composers exceed the field of formalist approaches to composition, stating implicitly that music is not only music, but rather involves other disciplines. Several field recording artists do take such a multi-disciplinary approach to composition, e.g. by pointing to the field of fine arts. Analogies span calling sound a material to sculpture with or draw on a parallel with surrealism in painting (Konstantinidou 2011, Wishart 1996). Confusing as the applied analogies might be, they indicate a lack of proper terminology to describe what sound art is that incorporates field recordings. As an awkward escape route out of topics that concern reality, numerous artists employ highly subjective viewpoints on the matter, as I showed earlier in this chapter. Subjective perspectives can be very fruitful in order to make artworks but they hardly serve as representations of a specific place.

To conclude, it is not possible to represent the character of a space in a composition. Perhaps the use of the word character is merely a language game from the field of art, pointing towards sonic characteristics without explicitly calling them sonic.

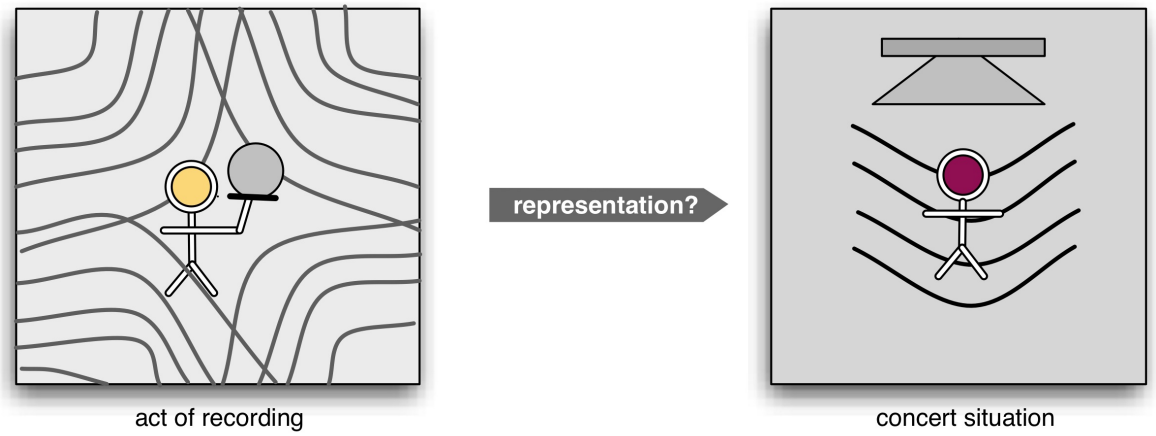

Figure 1. A very simplified scheme of the representational problem in field recording.

It is widely accepted that from the spectral information contained in a recording, two things can be derived: the material of a sound source and its specific spatiality, pointing to room acoustics. The former is timbre and the latter reverberation. Due to geological, social and architectural facts, the constellation of objects which make sound might differ from one recording site to another. This fact concerns the mere existence of sound-emitting objects and

makes it possible to identify sources. Spatial information is contained in a two-folded way – the onset of a sound makes us localize the source due to interaural time-differences, and its behaviour after excitement by an impulse reveals the effects of its surroundings on the frequency spectrum. Think of an impulse-like sound and the way it propagates through space. This propagation depends on the physical surroundings which produce reflexions, resonances and sometimes echoes. Still, from the spectrum of the impulse response only, it is not possible to make specific assertions about the objects in the space. One can tell neither what nor where the objects exactly are in space.

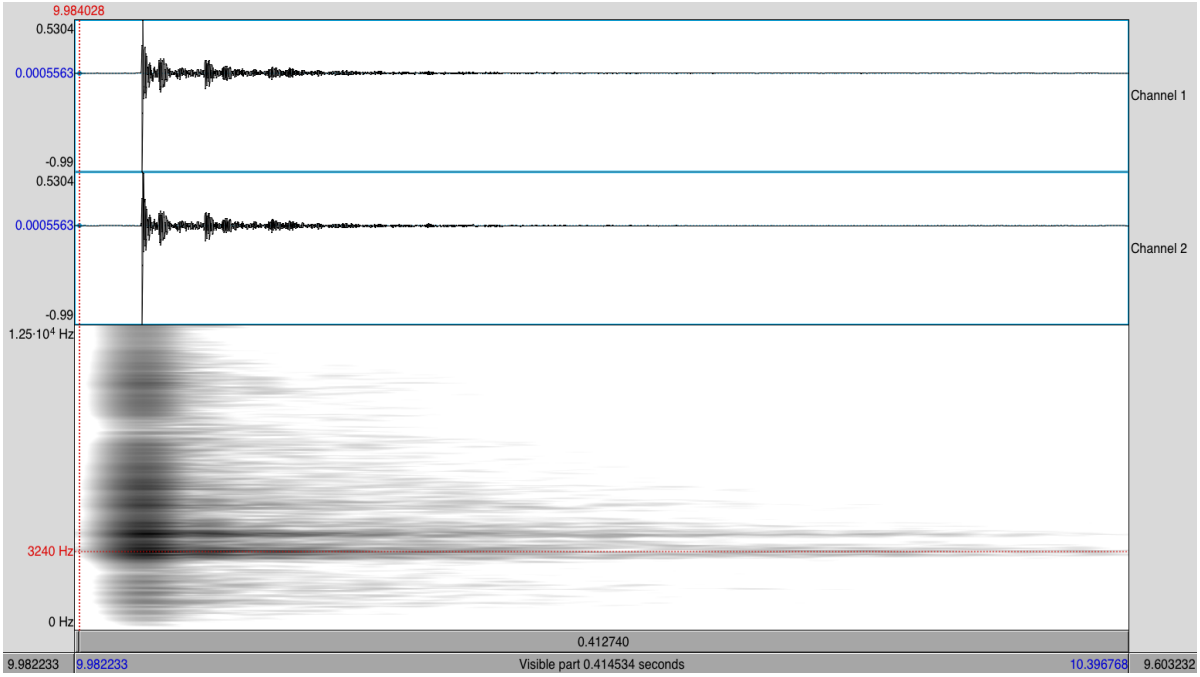

Figure 2. Example of an impulse response measurement indicating long reverberation times for certain frequencies.

However, the most famous use of room acoustics for a composition is Alvin Lucier's piece *I am sitting in a room*, where recorded speech is repeatedly played back through a loudspeaker and recorded again. In the end result the acoustic properties of the room itself take on a fascinating reverberant musical shape, but they become mingled with other acoustic phenomena, e.g. also the characteristic frequency response of the loudspeaker becomes reinforced by the process.

2.4.2 Raising auditory spatial awareness

In field recording artists often claim to raise spatial awareness. What do they mean? Common sense defines space as the total amount of physical objects surrounding us within perceivable range and how they are related among each other. Sounds that raise spatial awareness have to carry information about space which one might otherwise not be aware of. In their book *Spaces speak, are you listening?* Blesser and Salter (2007) provide a descriptive perspective of auditory spatial awareness:

> A complex amalgam of spatial attributes, auditory perception, personal history, and cultural values, auditory spatial awareness manifests itself in at least four different ways. First, it influences our social behaviour Some spaces emphasize aural privacy or aggravate loneliness; others reinforce social cohesion. Second, it allows us to orient in, and navigate through, a space. Hearing acoustic objects and surfaces supplements vision or, in the case of darkness or visual disability, actually replaces vision. Third, it affects our aesthetic sense of a space. […] Fourth, auditory spatial awareness enhances our experience of music and voice. (Blesser and Salter 2007, 11)

This conception presents social, navigational, aesthetic and musical categories as phenomena on the same ontological level in order to establish a discourse called aural architecture. This cross-disciplinary approach strives to combine acoustics and social science, and draws its vocabulary from the field of human experience. Blesser and Salter succeed in finding a description that matches the criteria of common sense; aural architecture's discourse is indeed close to the auditory experience of space. But it is the discourse itself and not sound which raises awareness here. From a scientific point of view, an underlying cause precedes any such experience. Given localization of sound plus reverberation, two of the main ingredients for a sonic concept of space seem to exist. Any social, aesthetic or musical concepts of spatial auditory perception are mere interpretations of acoustic characteristics of a space. For their part, scientific acoustics make this point evident by formalizing and providing measures for perceptual categories such as speech intelligibility and acoustic intimacy. However, in order for localization and reverberation to be capable of raising one's awareness, it has to be validated empirically that a certain use of sound increases awareness to a significant amount. Moreover, it remains unclear what awareness is supposed to mean exactly. The human cognitive apparatus already employs spatial information naturally when perceiving its environment, although one might not always use it consciously. Several blind people are

even said to orient in space by pure echolocation. What would be the effect of raising spatial awareness in healthy individuals? One might argue that playing sounds through a system of multiple loudspeakers and enhancing the impression of moving sounds by panning could train a general perceptual category of space. Only empirical research can prove this point.

2.4.3 The hidden space vibrates

Another aspect to access space by sound concerns vibrations. When assuming a Bergsonian concept of reality which takes objects to be vibrations of a different kind than the directly perceivable, then even space itself becomes a matter in constant change. Related to this, one might argue that objects which do not move potentially reveal themselves in sound. It is only that not all of these vibrations are audible in the first place, because their durations or amplitudes are often beyond discernible range. Therefore, in addition to the spatial information that is contained in localization and reverberation, a sound might also represent an object in space which was *translated* into sound. This translation process is closely related to *sonification* but, in contrast to the scientific use of the term (Volmar 2012), this translation process takes place for aesthetic reasons exclusively. Sound artists as Toshyia Tsunoda thereby tap into an unperceived aspect of reality by looking for vibrations, for instance in metal fences or inside pipes. Tsunoda questions the boundaries of field recording: If sophisticated microphones and transducers enable one to make unperceived vibrations audible, then where do these phenomena end? Tsunoda is optimistic about the potential of his recordings: 'By fixing the vibration on a tape, I can make a catalog of phenomena that transmit the actual space.' (Tsunoda 2011, 40)
In my own work I prefer to stick to phenomena within perceivable range, even though the fascination for sounds below the perceptual threshold cannot be denied. As a result of experimenting with contact microphones, the aesthetics of such sound-hunting entered my thinking and several times led to surprising results, such as the recording of wind blowing through the blade of grass. Although these amplified phenomena expand the range of the perception towards hyperrealism, they are not capable of representing space more than other sounds. So just by including more sonic aspects of reality, our general understanding of place does not improve – unless context is provided.

2.4.4 A broader picture? Architectural space and proportions

Perhaps my previous search for place within field recordings has been ill-defined. Slightly getting side-tracked by touching on compositional matters, I wish to discuss whether the field

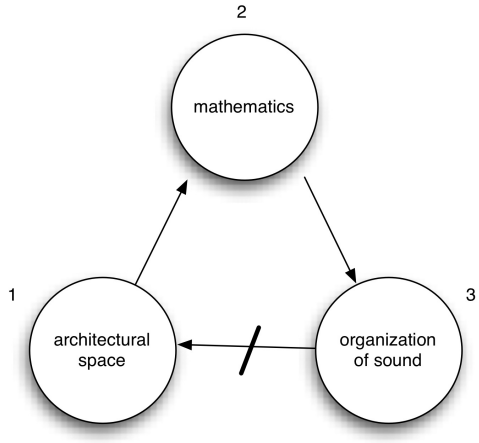

Figure 3. Why composing with proportions cannot represent space.

of proportions might be more suitable to represent space than direct phenomena.

In the field of architecture, one might also strive to derive geometrical proportions from the construction plans of buildings to derive compositional features (Arranz, 2013). It has to be doubted whether such compositions can make one aware of architectural space, because here, the organization of sound refers to the field of mathematics. Mathematics are not part of empirical data as our experience of space typically is. It seems to be an error to state that, by making a detour via mathematical concepts, space is represented by sound. To illustrate this, an analogy argument should be introduced. A brave composer might want to write a piece based on the principle of baking. Given a recipe for baking a cake, the amount of ingredients may be expressed as proportions. Taking this step of abstraction, already one leaves the realm of objects to a certain extent; 300 g of flour and 600 g of sugar become a proportion of 1 : 2. The imaginary composer might use this proportion to derive a very simple concept of time for her composition and state that the result refers to baking, whereas it reflects merely a proportion. Another representational problem arises when coincidentally, the proportions of architectural space parallel the organization of sounds and, at the same time, the organization of sound represents recipe for a cake at the same time (if A → B and B → C, then A → C). One would have to state that the recipe for a cake represents architectural space, which is nonsense. Taking proportions of architecture as inspiration for composition is a fruitful approach to create music but a one-way road that leads to compo-sitions reflecting on proportions and not on space. Such reductionist endeavours claim mathematics to be the profound structure behind empirical phenomena and head towards

a similar logical problem as the philosophers of the Vienna Circle did when they strived to unify science. Expressing space by composing with proportions of constructions does not work.

2.5 Listening to the source?

In order for an audience to understand the extra-sonic content of a field recording, it is crucial to make assertions about the sound's source. But do compositions made of field recordings tell

us something about the real world only by themselves? In other words, is there an equivalent relationship between an object and its sound? If such a relationship exists, in my case not only the sentence 'The sound of work offers a rich source of musical material' would be valid, but also its equivalent 'The musical material that is used tells us something about the sound of work.' If the latter is true, then it might function as a precious source of documentary character that portrays certain work processes of our times.

I will attempt to address the problem introducing an example. Can a simple recorded sound of a ringing microwave represent the term microwave? Yes, a listener familiar with such a sound would identify it. This is due to the fact that sound takes place in time, meaning that whatever happens in a recording will be identified as a proposition of the form *Fa*. Here the logical *F* stands for what is being conveyed by the sound. The predicate *F* is the way in which a specific *a*, in this case the ringing, sounds. Although perceiving *F* can lead to the conclusion 'This is a microwave', this is not a necessary cognitive step for the listener to take. Having formalised a sound event in terms of predicate logic enables me to illustrate what listeners hear in a field recording. According to the example introduced above there are several propositions that a listener could state.

1) This ringing comes from a microwave.
coming from a microwave (ringing)

2) A ringing is there.
being there (ringing)

3) This ringing has a certain sonic quality.
having a certain sonic quality (ringing)

4) This ringing whets my appetite.
whetting my appetite (ringing)

All three propositions take the form *Fa* but only the first one identifies the bearer, the three-dimensional object that originally emitted sound *a*. The latter statements ignore this referential object, either because a listener is not capable of identifying the source or due to a certain trained listening mode. An assertion of the second type 'The sound is there′ I would call the *peripheral* listening mode, which can be neglected here as it stays below a reflective cognitive level, yet might serve as the starting point for an assertion of the other two categories. The latter type is a special type of peripheral listening that evokes other desires than

intellectual. It is not about understanding sounds but about triggering instincts. Reflection sets in only if type 1) or 3) are employed by a listener. But type 3) is problematic when talking about the sources of sound.

A listener who asserts 'The ringing is of such and such quality' concentrates solely on the sonic qualities of a sound event and perceives only *F*, the way that something is ringing.[10] It tends to abstract from identifying *a* in such a way that only interrelationships between qualities of the type *F* are being perceived. Hence, a semantic shift takes place: Predicates become the points of reference themselves. So here it is not a direct reference to a three-dimensional object in the real world which leads to speculations about sources, but rather the sonic aspects themselves are made the points of reference, e.g. 'This ringing has a timbral character which differs from a church bell'. On the other hand, this mode also allows for reduced listening, which means that no extrinsic content is refereed to at all, it is pure sound. So if sounds can be understood on a level of their articulation in time, then the point of reference is not necessarily the sound source having emitted such sound. It may also be a pure sonic quality which points to a predicate and not the bearer. Nevertheless in case this mode does not involve reduced listening, a listener may still recognize predicates. Predicates may be just as recognizable as the sources. To illustrate this point, another example could be a trembling sound. It is not necessary to identify it as the tremolo of a violin or the wind blowing through a flag. In both cases the association might be just 'trembling'. Hence, although in such a case, the source is not recognised as an object, there is still a reference to the real world which a listener makes because she relates it to the experience of listening to things trembling. A listener identifies a sonic quality of the real world.[11] The assertions 'ringing' or 'trembling' can be detached from the objects which caused them. A composer working with field recordings or with words should keep this in mind because this is a difficulty that arises when sonic metaphors are intended to be identified by recognising sources.

10 It is important to note that statements of this kind do not include the predicate 'having the sonic quality of being a microwave', since 'being a microwave' is a semantic concept that comes from a different realm than auditory perception.

11 This is not the same mode as reduced listening as Schaeffer proposed it because here, the sound is perceived as signifying something extrinsic. Yet this mode does have the potential to refer to pure sound-objects. But the latter is usually not what field recordists intend.

2.6 Sound as metaphor?

Not only concrete sound may be the topic of composing with field recordings, but also, due to its natural ambiguity, recorded sound might evoke other imaginations than referring to reality. This is made use of when sound artists speak about metaphors and the imaginary. I will demonstrate that this conception presupposes assumptions other than sound.

Metaphors stem from the world of language and take the form *Fa*, where *F* is a referential entity of the first type (see above). Within the context of metaphors there is always something just not right about the proposition *Fa*. The reason for this might be either because the inherent connection between both entities is disturbed, e.g. as in 'black milk' or because the proposition makes no sense in a certain framework, such as talking of 'slow trains' while commenting on a football match. This incoherence makes metaphors point beyond their semantic content and establish new content through similarity with other phenomena. In any case, in order for a metaphor to be perceived as such, a referential object has to be assumed a priori, otherwise no abstraction by similarity is possible. This also holds for the world of sound. One has to assume that a listener identifies the sound source that produced a, which as I showed above is not always the case.

When Trevor Wishart (1996) writes about transformation and gestures of sounds being key to understanding the interrelationships of sound-images[12] as metaphor, he suggests a kind of composition which is on the fringes of literature. It is by understanding these interrelationships that a myth unfolds − in the words of Lévi-Strauss (2010, 7): 'And when we are confronted with phenomena too complex to be reduced to phenomena of a lower order, then we can only approach them by looking to their relationships, that is, by trying to understand what kind of original system they make up.' Although Wishart along with Lévi-Strauss rejects the possibility of fully translating a myth into language, his concept very much relies on semantics, i.e. in order to understand the interrelationships between sound-images, a listener needs to identify sound-sources which lie outside of the musical context. If one is willing to accept such non-formalist approach to composition, no harm is done. However, another difficulty occurs. If the transformation of sounds is to express the kind of interrelationship between them, then their gestural content needs to be understood, too. Again, a guarantee for this connection is not embedded in the sounds themselves, it exceeds them.

12 Sound-images evoke clear and distinct associations with an object of reality.

Speaking of the reception of recorded pure sound events, it seems the only thing we can expect listeners to perceive with certainty are the sonic characteristics. This implies that the sentence 'The musical material that is used tells us something about the characteristics of sound.' is true and at the same time all the composer can hope for. Pushing this assertion further, one ends up with a tautology of the kind 'What can be heard is sound.' But in case a composer prefers listeners to think about further implications – in my case expanding the first sentence by the words 'sound of work', there should be a way to exclude ambiguity to some extent. It has to be loaded with meaning from outside the sonic world. This is what I aimed to demonstrate in the previous sections by pointing out the difficulties of assigning meaning to a field recording. In the next section I shall discuss how such a shift of experience can be achieved.

2.7 Shifting the experience

2.7.1 Contextualization

If a field recording is to convey more than pure characteristics of sound, it has to be made sure that these associations are made by the listener. To illustrate this, take for instance two sound events whose spectra under certain conditions are very much alike, e.g. the sound of a steak being fried and the sound of heavy rain. It becomes obvious that the context is the only way to enable a listener to tell the difference between the two sound sources. Needless to say, foley design takes advantage of this ambiguity and re-contextualizes sound in order to create sonic illusions in a radio play or a film. But contextualization in sound art yields difficulties. First, as Drever (2002) remarks about soundscape compositions: '… [S]ounds' functioning within such work relies heavily on the environmental contexts from which they were originally extrapolated, making [...] the work a less musical one than it could have been otherwise.' These worries are shared by pure acousmatic approaches which will not be pursued here because the sound art as described here cares little about straight music. Second, contextualization bears the danger of becoming over-descriptive, i.e. overshadowing the listening experience for an audience, such as in Hildegard Westerkamp's *Kits Beach* (1989), where the verbal comments on the soundscape degrade the sounds to a backdrop. A little bit of guesswork needs to remain.

Sharpening the dependence on context towards irony, Lasse-Mark Riek and Christoph Korn released *Series Invisible Collection I* (2007). Having the format of a CD booklet, this body of work contains short descriptions of where a recording was made, when it was made,

what its duration is and being just as important, when it was deleted. So in fact, nothing can be heard, the reception of the soundscapes is broken down to its context and interestingly, still evokes associations sound-wise.

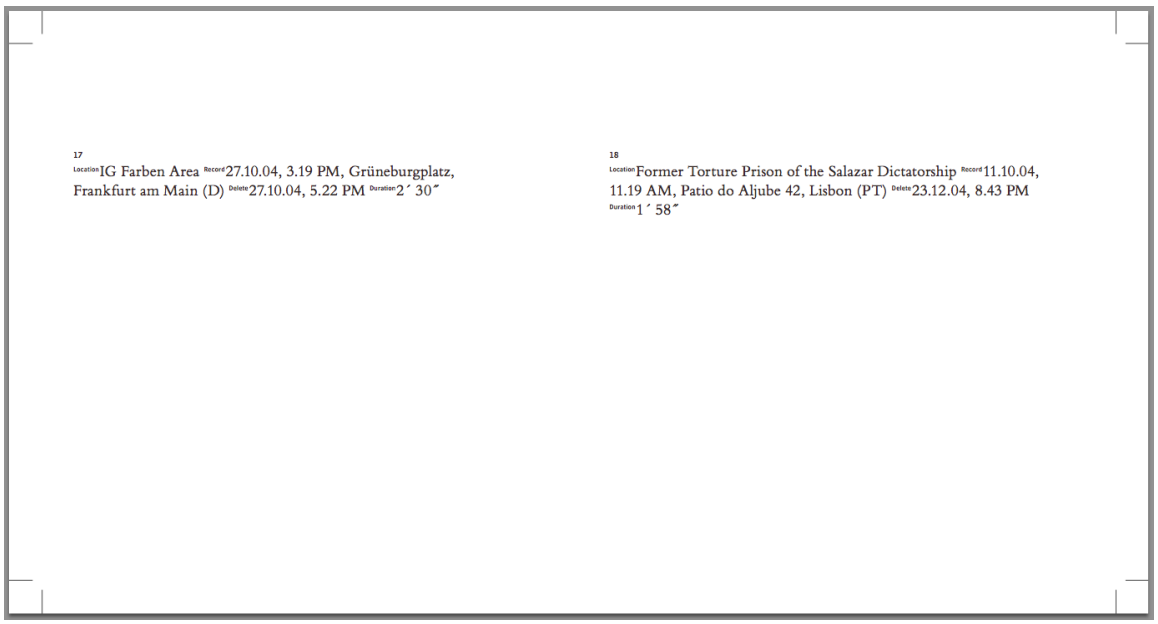

Figure 4. One page from Riek and Korn's Series Invisible Collection I.

However, it becomes clear that contextualization goes beyond the boundaries of formalist approaches to composition. This is where the territory of sound art begins. So unless an acousmatic listening to field recordings is desired, any other artwork that includes such material shares topics with sound art.

Contextualizing on the side of the composer or artist means to emphasise at least one extra-musical aspect of the associations which should be made by the listener. It is absolutely crucial to establish a connection between a sound and its framework in order to make such a piece be understood. If field recordists claim the multi-sensory experience of the recording site to be essential for composing, then they need to address this by involving other media or senses. There is no other way of successfully communicating a listening experience from the recording site or making a sound story be understood. One might object that contextualization could also be achieved exclusively on a sound level and that a sound artist has to stick to the sense of hearing. As an example, Trevor Wishart (1996) describes the use of *contextualizing cues* in order to make the sound of a book slammed be understood as such in his piece *Red Bird* (1977):

> In order to ensure the recognition of this sound (particularly in a context where it would be juxtaposed with slams from other sources) it was necessary to provide a contextualising cue, in this case the sound of the pages of a book being turned which has a much higher intrinsic recognisability.
> Contextualising cues may not only change our recognition of an aural image, but also our interpretation of the events we hear. (Wishart 1996, 151-152)

It is certainly true that intrinsic recognisability is key to understanding contextual cues. The cues are needed to establish the connection between sound events and a realm that lies outside them. What lies outside the sounds themselves is the source associated with them. The inter-relationships of these associations let the narrative evolve. Only to a certain extent *Red Bird* is effective in making this narrative happen. Although the recognition of birds, voices, a fly and a nocturnal soundscape is easy, their interconnections in time are not always clear, so the narrative gets perforated at times. That is to say, whenever the narrative fails, one applies an acousmatic listening mode. This fact also impedes with establishing metaphors, as I described earlier. However, it has to be noted that the use of contextualising cues in sound primarily makes a listener appreciate the narrative. That means that already here a composer leaves the scope of pure sound and involves another discipline, namely that of literature.

While Wishart is mainly concerned about the recognition of sources, the act of field recording teaches the lesson that the sources of many of the sounds captured remain obscured. They cannot be referred to. Especially in urban environments one may have difficulties to tell what caused the sound. I just heard a sound like hitting coming from the backyard. I could barely locate it precisely, nor tell what caused it. But of course this is not acousmatic listening, the sound is embedded in the environment. If somebody was to play it back in a concert hall, the whole framework is lost. So a sound of unknown origin has no meaning other than its pure sonic quality – unless the sound gets contextualised. This can happen in different ways. And in the case of my own field work in the harbour, it even *has* to happen if a listener I desire a listener to get a sense of the framework where the sounds were recorded.

Contextualization does not necessarily imply that the sources need to be revealed but rather it is a way of loading the sounds with meaning and it gives a hint which listening mode to apply. In artworks that use unprocessed field recordings it is a common habit to do this by indicating the time, place and sometimes the subject of recording. This would be an objective approach to the material which has very much in common with ethnographic methods or documentary. But meaning need not be a reference to the actual recording site. It may also point to other associations an artist has had, either during the act of recording or when listening back to the material later. This goes beyond pure documentary notions of the field recording. The material becomes *re*-contextualised. The use of images or accompanying text, as well as the use of other sound material are means of either contextualization or re-contextualisation. In any case, the latter is always an artistic intervention, such as staging a

performance or applying montage techniques. The former is not an artistic intervention. In the case of *Series Invisible* the contextualisation is not the artistic intervention, it is art because of its relationship to an extrinsic discourse, namely that of the dependence of field recordings on their context. *Series Invisible* questions if it is about field recording at all. Asking if playing a field recording though speakers in a concert hall has to be called an artistic intervention,
I would say yes. But it is a trivial re-contextualisation because it does not elaborate how to make the content understandable. One has to work with recordings of a very high intrinsic recognisability in order to make that an effective concert.

Summing up, the palette of embedding field recordings is huge. Elaborating the different effects these strategies have on auditory perception and the artwork as a whole is a topic for further research and unfortunately, beyond the scope of this thesis.

2.7.2 Modification

The second route towards being understood is the modification of the recorded material. This insight is caused by the fact that recorded sound events are never congruent with the listening experience. Above I described how to account for the multi-sensory impact that a listening experience has on the recordist. Yet two more aspects concerning mere sound need to be brought in concordance: Neither the perceived temporal aspects, nor the frequency content, amplitudes or spatial qualities of a recording seem to fully represent what a recordist heard while being in the place. The recording is only an approximation, it usually demands adjustments. This truth is known by any foley designer. Moreover, modification can serve as a way to shape the material in order to make field recordings fit other concepts than conveying a listening experience.

The principles of modification are not specific to working with field recordings but to working with sound in general. This is the contact point with the acousmatic and also, sound engineering and digital signal processing. Again it becomes clear that sound art working with field recordings is not a monolithic discipline because it draws knowledge from other sources. As the modification of recordings has been discussed in other writings extensively, e.g. Barrett (2009) or Wishart (1996), I will present the possibilities only very briefly.

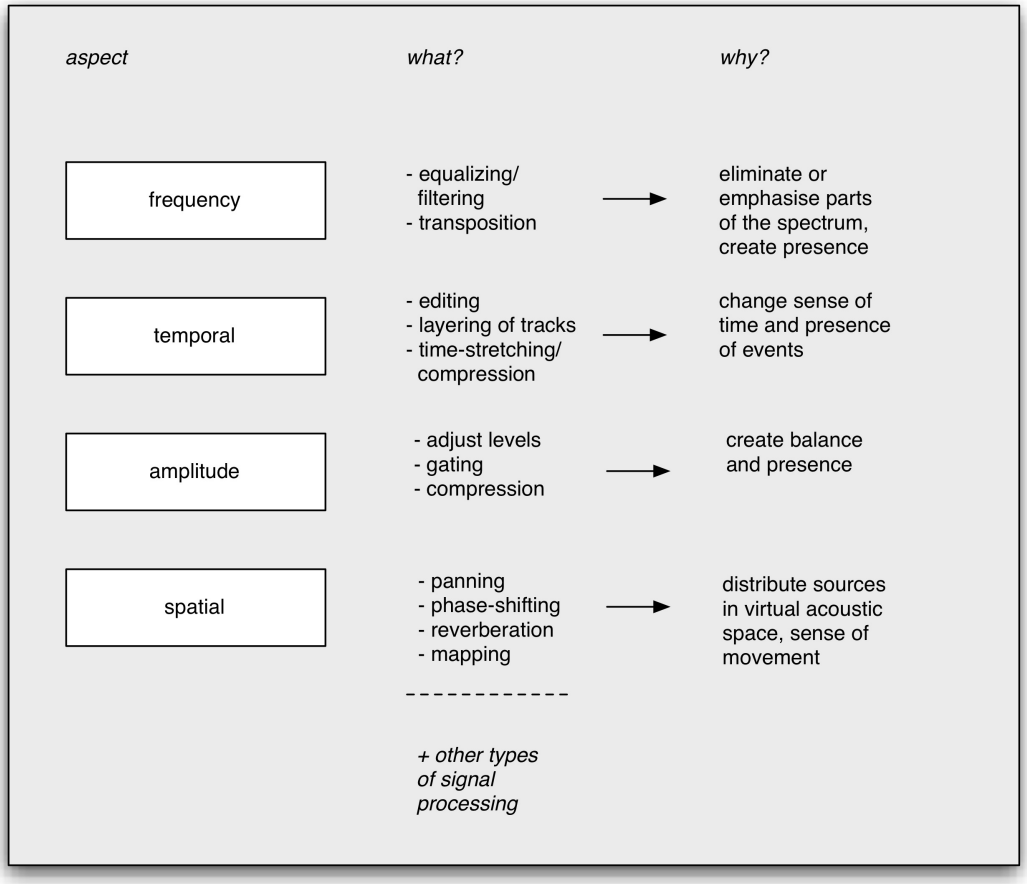

Figure 5. Rough scheme of methods for modification.

3 The rhythms and sounds of work

3.1 Definitions

In the following chapter I assume a dualism between machine and worker, according to common notions of work. Before following the line of this chapter's argumentation in detail, a few general definitions need to come into play.

A machine is a lifeless object which is man-made and obtains its initial onset from a human being with the purpose to transform. In the terminology of Raaijmakers (1978) machines that function are able to transform either time by speeding up or slowing down processes, or distance by moving, or force usually by facilitating a process. A definition stated like this would be too broad as it would also comprise steering wheels, knifes and other things which in terms

of common sense would not be called machines but rather tools. Although tools may be considered very simple machines, for the purpose of arguing that the rhythm of work changed throughout history, a distinction is useful. Tools reflect human body movements immediately, while operating the working parts have direct contact with limbs of the body and extend physical capabilities[13], whereas machines have a certain degree of independence from the body. In order to draw the line more clearly, and following Raaijmakers' concept, it should be stated that machines are composite objects whose inner parts are jointed and typically have little to do with the visible parts. Therefore, a knife is not a machine because it is solely a visible blade which performs a transformation of the object to be cut. A knife is a tool. Tools always reveal themselves on a time scale which is proportional to the movements of a human body. In contrast, in order to find out what a machine does one has to consider its workings on an absolute time scale, otherwise it remains a static object without meaning. Some objects, of course, are on the fringe of being either a tool or a machine, such as a battery-driven drill which hides its working parts from our sight, yet needs direct interaction with a human. Nevertheless, in general these differences between tools and machines profoundly afflict the kind of sound these objects make, as will be discussed in the following sections of this chapter.

A worker is a human being exclusively committing his or her activity to a certain transformation. An act of volition precedes this. Although a worker might want to obtain satisfaction or earn money by fulfilling such a transformation, these motivations are secon-dary to the activity itself and not comprised in the task per se. Eating is not an activity of a worker because satisfaction lies embedded in the act of eating itself. Nevertheless, a chef cooking for others is a worker. In contrast to machines, typically, a worker considers work to be only one mode of being among others and has opinions about what he or she does. Opinions and conversations with co-workers accompany work processes, which is why I regard them as part of the sounds of work.

All three, workers, tools and machines make entities change their quality, e.g. melting iron to produce steel, making thoughts become words on paper, etc. Hence, in general work stands for transformation. The word transformation has a two-folded meaning; on the one hand, it refers to the result of an event that has taken place and on the other hand, it points to a process of one thing becoming another thing. The latter concerns the temporal dimension of work,

13 This is why visually tools often resemble refinements of human extremities in action.

which is discernible either indirectly by a simple comparison of before-and-after a certain action, which makes it possible to assume that transformation caused this change, or by depicting an ongoing process of transformation in time. Ongoing work processes are potentially the more fruitful aspect for music, since music is also based on ongoing events on a time scale. What is the nature of the time scale of work? In this thesis am going to demonstrate that, embedded in their audible temporal structure which I am going to refer to as duration or rhythm in the broad sense, both work and music have enough in common to make work processes become music.

Rhythm in my broad use of the term concerns not necessarily repetition, but rather in general, work on a time-scale. Therefore, rhythm is synonymous with duration. As I will demonstrate in the discussion on rhythmanalysis, not only repetition but also the results of work processes can be considered part of the rhythm of work. The sonic aspects can be captured with the help of field recordings.

3.2 Work Songs

Albeit that environmental sounds have been deliberately used in numerous compositions from Händel to Messiaen (Messiaen 1994), little has been written about how humans structure their actions with the help of sound on a time-scale. Deliberately leaving out any political dimension of work songs, I will discuss the relationship between work and sound and point out that rhythmical movements and circular motion play a crucial role in understanding the processes and later making use of these sounds in compositions.

Inscribed in the nature of work songs is a rhythmical equivalent of human body movements and therefore the timing of a work process which is related to an object of the outside world. So listening to a work song means listening to a musical abstraction of somebody working. If one assumes repetitive movements of a human body as part of a work process, it is easy to think of this as musical rhythm. On a sonic level, three phenomena can occur in the worker: First, in case the task is physically demanding, controlled exhalation *releases tension* in the muscles. This may result in the use of voice. Second, *accentuation* of significant segments of the working cycle can appear. Certain movements will be emphasized to serve as a time-keeper but probably also to increase the cognitive threshold for performing the task. So rather than consciously activating a whole concept of a motion sequence, a worker concentrates only on certain parts of it. Accentuation is characteristic for easy tasks or is a result of training. Third, *redundancy* can occur on both vocal and bodily level. Redundant sounds are

imposed on a working cycle and become included in it even though they are not per se necessary. Often they are an expression of play or connect the individual to her task. Redundant sounds have psychological or even social effects when made in a group. Typically all three phenomena are not intended to be music but they have the potential to become it. Therefore, they need to be considered pre-musical behaviour

On the surface these sounds serve different purposes, but what binds them together is the fact that they are timekeepers, which is most obvious in the case of accentuation. Studies on rehabilitation of motor control (Thaut 2008) or learning in children (Iverson and Fagan 2004) suggest a time-keeping facility as part of the central nervous system which can be triggered by rhythm. I would claim that this is also the case vice versa. The production of rhythm and the physical response to it form a unity, repetitive physical action produces rhythm but it can also be induced from outside. A classic work song represents such unity. Originally it stems from the rhythms of a working body and is sung in order to coordinate movements. Work songs can be said to be redundant sound, none the less they were clearly needed to synchronize among workers, especially on large ships (Hugill 1978, Nijhoff 1980, Gioia 2006). The nature of work songs is that they simulate work processes with the voice, mapping the meter and accents of music to the actual task. The musical potential of work has also been recognized by the music anthropologist Karl Bücher in his book *Arbeit und Rhythmus* [work and rhythm] in 1924. Bücher considers the vocal sounds that release tension to be primal sounds [Naturlaute] which led to poetry and lyrics that contain words without any actual meaning. Instruments to him are abstractions of tools. The way they are played detaches a segment of a work process from its original context and stylizes it to become music. Doubts may rise whether this theory explains the origins of music to a full extent because there are also temporal structures in music which are not related to body movements. Also, composition is widely considered to be an intellectual activity rather than one of the body. Bücher cannot explain how these two facts came into being. But perhaps he does not need to explain this because work song are not intellectual music. The interesting point is that Bücher provides an early intercultural account on a type of music which developed out of body movements and their connection to sound. Tones to him are only abstractions of sound. Interestingly, Bücher even claims the existence of culture-specific sounds (Bücher 1924, 36) long before the Soundscape Movement did. Moreover, here the relationship with improvised music can be established which has a strong connection to time, place and body.

To summarize, the rhythmization of human work processes leads to music which itself is related to task-specific body movements. Not always do movements become rhythmized. It is even the majority of human work processes which is better described by a sequence of linear events that have only little in common. The sounds made in these cases are usually very far below the perceptual threshold. Their organization in time is so loose that a concept of human work rhythms and their sound exceeds the measures of song. On this side in the pool of material to compose with one has the sounds of humans working.

3.3 The Industrial World

3.3.1 Introduction

It has been lamented by several authors that the work song has disappeared (Gioia 2006, Hugill 1978, Lomax 2003, Schafer 1994). Work songs are considered to belong to folklore and therefore to reflect the natural connection of human and nature. Industrialization, read: capitalism, is considered the evil opponent of this relationship. Industrialization eliminated folklore by introducing its new rhythms: 'The fundamental tempo of work, once demarcated and paced by song would now be established by the much different sound of machines in motion.' (Gioia 2006, 1432 of 4608) But also the noise of industrialization eliminated work songs in this view. Gioia writes in a dramatic tone: 'The rise of industrialization had brought with it this new paean to profit – noise, which now resounded constantly in the heart of the economy, booming and bellowing with a relentless energy far beyond the scope of any merely human work song.' (Gioia 2006, 1496-1499 of 4608) It is true that with the advent of industrialization most manual tools became replaced by machines. The use of electricity accelerated this process. Machines require relatively little effort of the human body and work quite self-sufficiently. Mechanization led to the splitting of the work cycle with machines on the one side and the worker on the other. Yet they still interfere, e.g. because machines need to be turned on and off by a human. The latter point is hardly made by the authors mentioned above, because implicitly, they assume that workers become alienated from their work and that this is caused by the introduction of machines. Such Marxist conceptions require a strict distinction between worker and machine but work processes are too diverse nowadays to be reducible to alienation. Moreover, machines have become so well integrated in our daily routine that is it difficult to consider them as evil. The rhythm of work changed indeed on many levels, yet I find it problematic to make this a political issue. With the same conviction

one could claim that for millennia, an individual's body rhythms have been suppressed by the use of tools and the tiring repetitive work linked to them. So, seen from this perspective, work songs are a result of very tedious work which we might want to disapprove of. Also, in the western world we are far beyond Marx' description of precarious working situations in early industrialized England which were caused by machines. The life-threatening misery has almost gone in our societies. The social question is asked with less urgency nowadays, and therefore, a politicizing mechanization proves to be exaggerated in most cases.[14] Maybe by automating and detaching work processes from the human being, the worker is even liberated. However, I do not wish to take either side of the political discussion. Instead I will pursue looking for the rhythms and sounds of work in an industrialized world. In general a concept of sound is closer to the work processes themselves and offers a more suitable description of the sonic realm than tonal thinking within a work song. In this context machine sounds must not be neglected. With a recording device it is possible to detect pre-musical organization of sound which would never find its way into a work song. But before the discussion of the practical part, it is necessary to investigate the rhythms of the industrialized world.

Mechanization brought with it an increase in technical thinking and thereby also the rationalization of workflow. Scientific management which drew its force from a general rationalization in the sciences, was an influential paradigm to reinforce productivity. Based on the ideas of Frederick W. Taylor, the division of labour entered countless industrial plants. The sonic realm of work which had once been shared by workers in unison fell apart. A cacophony of layered repetitive movements could now be heard along the conveyor belt. The rhythm of such a working process cannot be expressed by one cycle, it takes several agents – human and mechanical – with each one performing a different task. The biggest challenges of new production methods were how to find the most suitable worker for a task, how to prevent physical fatigue in the workers, and how to avoid accidents. Especially in the 1910s to 1920s, when broad electrification in factories had effected labour, an increase in studies on physiology is noticeable which was very much related to biological rhythms. Among other reasons, for a huge part these studies have been conducted because during that state of industrialization, it became obvious that the desired speed of production found its limitations in the rhythms of the worker. Following the tone of efficiency, claims for welfare had been risen:

14 Instead of demonizing mechanization, political questions should better be asked about responsible globalization and the role of third-world countries manufacturing goods under miserable circumstances.

> If the pains of labor are heavy, the tone of the workman is lowered, and his surplus energy disappears, while he tends to become a mere automaton valuable to society for the net surplus he creates for others. The round of production of energy into goods, goods into utilities, and utilities into energy is broken down by any such heavy burden. We must, therefore, hail, certainly from the viewpoint of the community, any [political] movement likely to increase its working power. (McVey 1903, 521)

In order to match the realms of worker and the new rhythms of work, to my knowledge, on two levels the rhythm of work processes has been addressed directly[15]. First, the time-and-motion studies of Frank and Lilian Gilbreth offered a visual description of human motion. Second, radio was deliberately used in factories to influence the rhythm of work. In both cases one could even speak of a rationalized discovery of the rhythms of work conceived through the eyes of industrialization.

3.3.2 Time-and-motion studies

Just as instrumentalists and craftsmen, a skilled worker is able to perform his task with the least effort. A skilled worker is fast, his movements are smooth, without hesitation, and he does not waste his energy. This fact has been addressed by Scientific Management. By dissecting movements of work processes into their parts, the Gilbreths had found a way to express expertise and make use of it for educational purpose. These endeavours were supposed to increase efficiency, also in favour of the workers. Frank B. Gilbreth writes:

> It must be understood that motion study always implies fatigue study, for the best and least wasteful results cannot be obtained otherwise, and that the worker who operates under these standards, therefore, not only has time to do the work in the best way, but ample time for adequate recovery from the fatigue of his work. (Gilbreth 1916, 275)

The studies were conducted with the help of a chronocyclegraph, a cinematographic method that took pictures of a working process at very low shutter speed. Lights attached to the worker's limbs turned into lines on the image and revealed the path of the motion. This was repeated. As the process took place in front of a grid and had a clock running in the picture, it was possible to derive wire models and finally, compare them. According to their timing and to their path in space, the rhythms of work became measurable on a visual level. The stereoscopic method provided for the image to re-enter three-dimensional space in form

15 In a broader sense, also studies on a working day are concerned about the rhythm of work. But the difference is that they reflect work on a bigger timescale.

of the model. The wire models were crucial for educational purposes but they also unfolded their very own beauty depicting pure motion.

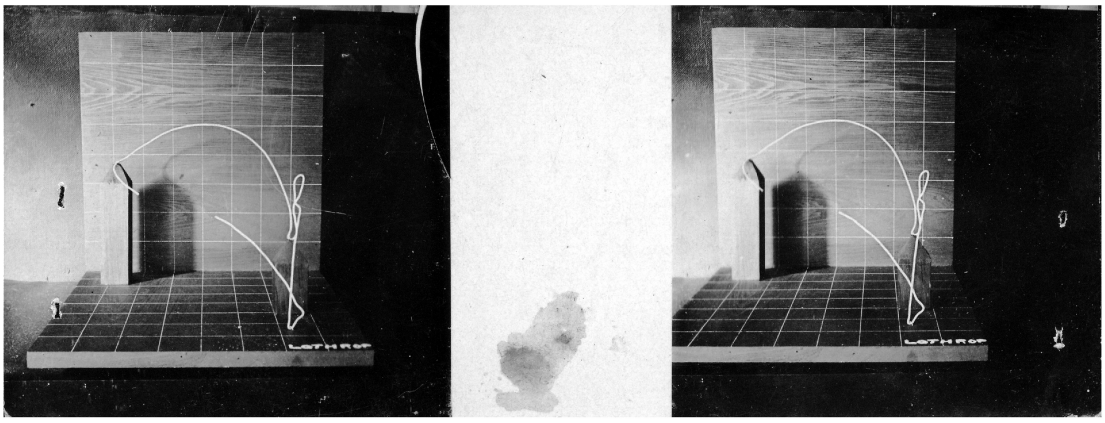

Figure 6. Stereoscopic photograph of a wire model depicting a perfect drilling operation.

A reader familiar with the history of photography might immediately identify how similar the Gilbreths' photographic method is to the works of Muybridge and Marey, who at the end of the 19th century developed techniques how to visualize details of processes which were too fast for the eye. Yet there is a fundamental difference. Marey's *plaques fixes* were linear sequences of movements, whereas the Gilbreth's light paths represented circular motion. The latter is more suitable to describe work processes because they reveal their nature over longer periods of time, i.e. through their repetition. However, bearing the wire model in mind, one might ask if time-and-motion studies can be related to sound in any way. The visual model can be of value in order to describe where sounds are likely to occur within a work process.

Most likely sounds occur at the beginning or at the end of cycles. That is because these points typically mark beginning contact or finishing contact with an object, and therefore, are fundamental parts of transformation. These are usually the most distinctive sounds of manual labour and bear the potential to become accentuated. Sharpening this statement further, the sounds of work always indicate transformation. In the example of the drilling operation, the cycle starts with grabbing the object to be drilled. The object needs to be fixed in the drilling machine – another possible sound. The cycle ends with the worker pulling the lever to drill a hole through the object. Of course, certain manual work processes make ongoing sounds because the transformation requires friction, e.g. a sweeper who cleans the pavement causes *glissandi* and *accents* with the broom. These are also contact points, only they are expanded in time. It seems the Gilbreths have achieved to freeze the rhythm of work.

Yet the wire models are only suitable to describe manual work. This is no surprise remembering that they had been introduced to make manufacturing processes more efficient. How can this be extended to a general description of work rhythms that also includes machines?

In his essay *The Art of Reading Machines* (1978), Dick Raaijmakers gives an account of general viewpoints on machines. When reflecting on the model of machines, he writes:

> The metaphor for a machine existing in the world is a closed cube with tubes sticking out of either side. The tubes stand for connection and contact, the cube for action. The world comes in through one of the tubes, enters into a relationship with the cube, and comes out of the other tube in modified form.
> (Raaijmakers 1978, 137)

It is at the metaphorical tubes where a worker interacts with the machine, unless a bigger apparatus consists of interrelated machines which pass on objects via their tubes. Yet even in the latter case the contact with the worker would take place at the beginning and at the end of such a process. Switches, levers and handles represent these points in the physical world. Considering electric machines, it has to be noted that motion takes on a different form than in the worker. In the electric machine, moving electrons designate the working processes, i.e. current runs in a circuit. The typical sound of this process is a drone. Comprised in the drone are the sounds characteristic of the machine, the moving parts determine the formants. In its spectrum a drone is always rich in meaning but the sheer endless *fermata* makes it difficult to distinguish the components. The components reveal themselves most clearly either when an electric machine is switched on or off, or when the machine changes its programme. If such a machine is defect or just simply badly designed, it makes sounds as if to indicate its malaise. As Raaijmakers points out (1978, 136f.), the housing of a machine hides its inner parts visually. Listening can thus be a way to speculate about what is hidden and be more meaningful than vision. Having offered this very short section about machines, it is possible to combine the realm of the worker with the realm of a machine.

Relating the idea of contact points in manual work back to Bücher's theory about the origins of music, one can easily imagine that these sound events became detached from the cycle and that the objects were refined to instruments. But if contact points are also to describe machines, a few differences need to be stated. First and foremost, in ideal electric machines

there is constant contact: the circuit needs to be closed to make the current run. A musical abstraction of this contact cycle is not folklore but electronic music, most obviously with early techniques of synthesizing sound and voltage control. Second, singular instances of contact are present in the electric machine, belonging either to the programme or the contact with the world outside, i.e. the tube. The rhythms of humans and machines can be seen to correspond at certain contact points which again mark transformation in the work process. This is when the machine is in one of the following states:

- moments of being switched on or off
- requires steering
- changes its mode by human force
- gets loaded with any kind of objects or input
- the transformed objects are collected

A very simplified representation of both work processes combined will be approached. Take for instance the process of loading and unloading a dishwasher in a restaurant.

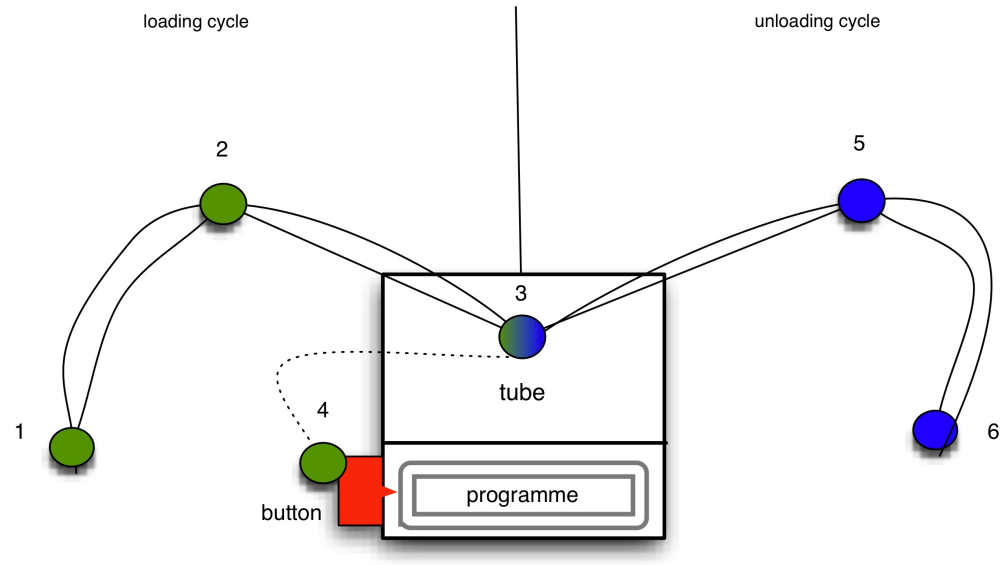

Figure 7. The three working cycles of washing dishes with the help of an electric machine. Their contact points are marked. Raaijmakers' metaphorical cube and the tube of the machine are stylized for the sake of the diagram's clarity.

Dirty dishes are taken from, let us say, a box with one hand (1). This hand passes the objects on to the other hand and goes back to the box to grab the next object. Meanwhile, the other hand loads the dishwasher with the first object (3), then goes back to (2) to take the next

object. This process is repeated until the dishwasher is filled enough, then the machine gets switched on (4). The switch functions as the contact with the circuit. Contact point (3) represents contact with the metaphorical tube mentioned above. The cycle (3)-(5)-(6) is the reverse process, taking clean dishes and putting them in a box. The switch is not involved because the programme finishes automatically. Apart from the switch, the work process of the dish washer is independent and more correctly, in the illustration dishwashing includes the programme running in the machine as a third work process. Note that the contact points (1) to (6) are rhythmically the most potential ones. The dishwasher usually produces also sounds of water washing the dishes or when the programme changes, which again stands for contact but then in a more textural fashion. Also, the current running might produce a hum-ming sound as a sign for alternating current. Thus, a closed circuit can also be thought of in terms of contact between the poles.

Generally speaking, the way in which contact is present reflects the relationship with the task itself. It is the contact points which can be captured by a recording device. Despite the fact that the spectral content of sounds can tell a lot about the materials which have contact, they are especially meaningful on a temporal level. The musical categories of articulation and gesture are naturally comprised in everyday sound. However, the fact that these phenomena can be expressed in musical terms does not cover their whole range of meanings. The following examples are very dependent on the particular work which is done, but might give a glimpse on possible implications. In manual work, considering a single contact point which is distin-guishable, the attack time[16] can stand for the precision of movement and may also indicate trained tasks. In machines, the attack time may be anti-proportional to the smoothness of performance, i.e. the ease of transformation. The shorter the attack time, the more it is performed with ease. More important though are the interrelations of contact points. If, over time, a contact point loses its force and precision, the change of sound may stand for fatigue in either machine or human. The opposite would be gaining precision in performance. In humans this would stand for increasing skills, in machines for a technical improvement applied by a human being. Confused temporal distances between contact points stand for dysfunction in the work process. Dysfunctions usually effect all other work processes related to it, e.g. the work of colleagues or other machine units. A comic illustration of these

16 Attack time in my use does not refer to the acoustical term. It is the time it takes for a contact point to reach its maximum amplitude. Thinking of an extremely tired person using a computer keyboard, it is obvious that it takes longer for her to press a key than for somebody who is wide awake.

interrelations is presented in Charlie Chaplin's Modern Times (1936), where the protagonist unavailingly does his very best to keep up with the social and mechanical rhythms around him.

Reflections on time-and-motion studies in an artistic framework can be found in two approaches, namely in Dick Raaijmakers' performance piece *The graphical method bicycle* (1979) and Brian Ferneyhough's composition *Time and motion study II* (1973-76). Raaijmaker shifts Marey's photography of a man descending from a bicycle back to real-time, a process that takes a few seconds normally is stretched to more than half an hour. While the performer descends from the bicycle in extreme slow motion, it is the sensors and microphones attached to his body parts which give an indication of the physiological rhythms. These signals are amplified or used as control signals. They contrast the long textures of the amplified pulling device which keeps the bicycle on track. Yet, despite the rhythmical contrast, both sound worlds merge. Although not directly linked to work processes, Raaijmakers clearly examined time passing on different sensory levels and wedded mechanical to human rhythms by simply amplifying them. In contrast, Ferneyhough had a more abstract compositional idea in mind when he composed *Time and motion study II*. The piece can be considered a critical allegory on the method of deriving data in the way the Gilbreths did. The composition incorporates a solo cello and electronics. The electronics in this case are a 'weird double' (Ferneyhough, n.d.) of the cellist. By recording and playing back in various ways, it functions as an insufficient memory of the performance. As the composer states: 'Although the electronic equipment offers the texture the opportunity for self-reflection via repetition, it is only very seldom that the elements designated for repetition seem willing to subordinate themselves to the continually unfolding live material.' (Ferneyhough ibid.) At certain points of the performance, the electronics even seem to take over the performance space and rule out the performer who had initially produced the sounds. Attempting to relate this composition back to the time-and-motion studies as described above, I would say it is pessimistic regarding the validity of the method, because it questions the role of the human being in relation to such quantification. This pessimism culminates in the dramatic take-over of the electronics. Still it has to be noted that Ferneyhough does not relate to Scientific Management in his description of the piece. Having high ambitions, he sees his composition in the bigger context of juxtaposing the individual and the collective. Such abstraction of work processes will not be attempted in my work. I am interested in the direct phenomena.

Still these considerations are not enough to describe the sonic realm of work in times of industrialization. In the background of the contact points described, yet another rhythm is present in the industrial soundscape. It comes from music, notably from the radio.

3.3.3 The role of the radio

Already at the turn of the 19th to the 20th century the positive effects of music on the human body and mind have been researched. With the advent of radio broadcast around the 1920s, these studies flourished even more. During the second world war radio was widely used in factories that were related to war production. The radio also served the function to inform people. In the United Kingdom, according to Beckett and Fairley (1944, 14), radio became an essential part of the working day since the BBC warned for German air raids. At the same time, there was a claim for music which would motivate the workers to produce more. First and foremost, in the view of the authors, music serves a psychological function rather than a physiological one, 'since the machine sets the pace of production.' (Beckett and Fairley 1944, 16). In addition to this observation, there cannot be an all-inclusive rhythm for the diverse work processes in a factory (Reynolds 1942). Beckett and Fairley draw a picture which music should be used in industrial plants:

> Workers have the added fatigue of noise in these departments and the need for the psychological benefit of music is acute. The average commercial record, however, with its alternate loud and soft passages, either 'blares' unpleasantly or fades out. It has been demonstrated that a new type of recording at constant level and with special orchestration scientifically designed to penetrate machinery noise can successfully compete with a surprising amount of industrial noise, provided that loud speakers of sufficient power and numbers are installed. (Beckett and Fairley 1944, 16)

They conclude that in the future music should the purpose of increasing efficiency:

> For, although the major purpose of music is to relieve monotony and allay the nervous tensions of repetitive work, as well as fatigue, the program costs money to maintain. If it can be shown with figures that, as a by-product, production curves rise when music is rightly used, the future use of music is assured.

Based on similar rhetorics, broadcast series had been designed to increase productivity in industrial plants, notably by the British Broadcasting Corporation, called *Music While You Work* (Reynolds 1942). *Industrial music* in the original sense of the term refers to this kind of music which is said to be cheerful and gay. The programme building involved a strict selection, for details see Reynolds (1942). On the rhythmic level Reynold states:

> Extremes of tempo should be avoided. Slow items may act as a soporific, fast items as an irritant. The rhythm should not be too strongly accented – drum solos can sound like machine-gun fire when amplified, 'hot' rhythms may give a confusion of sound. Any numbers that depend for their effect on accented rhythm rather than melody are unsuitable. (Reynolds 1942, 6)

These statements leave the composers with very limited choices, yet a strangely familiar view on the radio world nowadays can be traced back here, where songs need to be slick, sober and predictable. Also, constant sound levels and the need for compression might originate in this context. In the examples above, radio is used to sedate the workers and music is supposed to work as a happy pill.

In contrast to the negligence of physical rhythm by the BBC, the record company Muzak did integrate the ideal physiological rhythms of the workers. Related to the frequency of heartbeat and respiration rate, plus, as they claim thorough quantitative studies, they derived the following chart as an overview of suitable music in work environments.

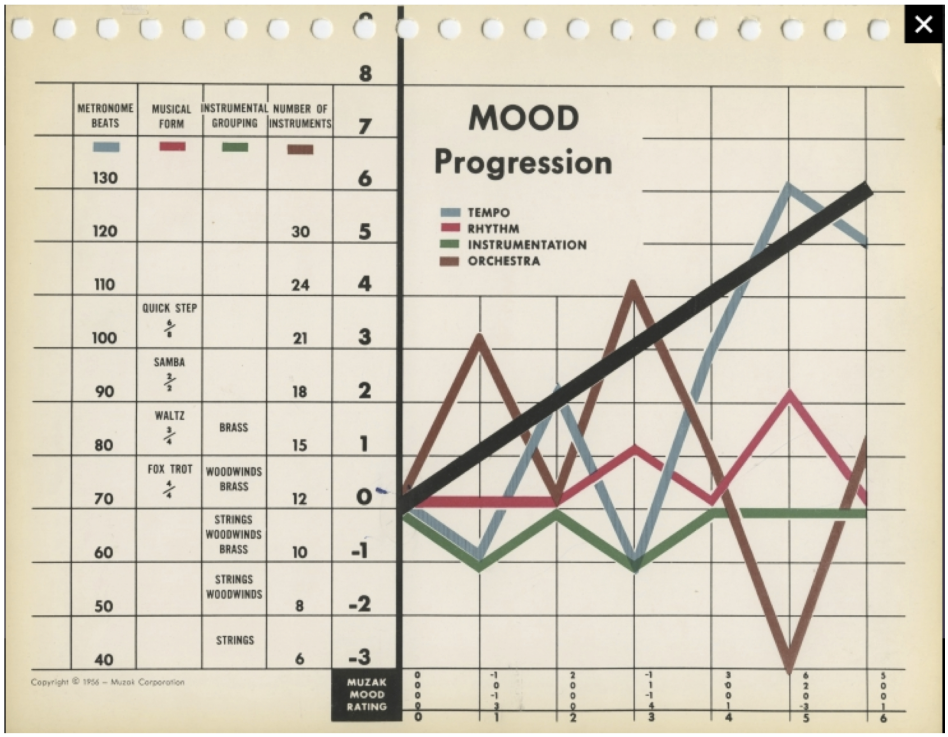

Figure 8. Muzak's Mood Progression Chart from 1956.

Rhythm in this conception was not related to an individual's body movements but to their nervous system in general which again was dominated by the imposed idealized production. The influence of Muzak was tremendous, because apart from positive effects on the production, music's influence on the mood is also believed to effect consumption. Up until today the company's findings are still being implemented in music for consumption, from supermarkets to bars, although doubts have been aired about the validity of the results.

But the use of radio while working is not only a means of control. As part of my practical work, the conversations with workers showed that they find the radio harmless. They even prefer the radio being turned on while working because it can serve as a contrast to intellectual work and grounds them in the working day or distracts them from boring tasks. Also, one must not underestimate the social function of music in a working space. It is a shared sonic realm with an exterior rhythm that is experienced as neutral. In case music is listened to via headphones, the function is often to isolate the worker from distraction or annoying sounds. However, the ubiquitous music in work environments made it often difficult to record the pure sounds of work and in particular, trying to edit these recordings would always cause undesired discontinuities of the music in the background.

It can be speculated whether such use of sonic gravy impairs awareness of the sounds that surround the workers or the ones which they produce. However, in search for the direct sounds of work I had no other choice than to ask for the radio to be turned off.

3.4 Lefebvre's Rhythmanalysis as an ecological approach to listening

> *... it appeared to us that the meditations of rhythmanalysis carry for us a philosophical echo from the pleasures of poetry.*
> Bachelard 1950, X-XI, own translation

Several field recordists refer to Lefebvre's idea of rhythmanalysis in order to describe what they are concerned about (Bennett 2011, Kahn 2011). Rhythmanalysis is not to be understood as a theory about how to analyse musical rhythms in terms of measure and meter. It conceives reality as a whole being a conglomerate of durations. This meets a recordist's practice that she captures the environment in real-time, and that timbral qualities of sound might be only an effect of the deeper nature of durations. Philosophical reflections on the deeper nature of durations can be traced back until the turn of the 20th century (Bergson 2002, Weber 1913), in

parallel with the new rhythms of broad industrialization. Studying the effects of the new rhythms on the human body made physiology become a respected science, especially in respect to the use it had for keeping workers healthy. But also, a new notion of rhythm was incorporated in a revolutionary paradigm in psychology, namely the psycho-dynamic model that considers the interactions between the unconscious and the conscious. A general concept of durations would have to relate to all these different aspects of reality. But how can they be made sense of? In order to grasp these durations, Lefebvre offers an account how to perceive the everyday. By this he aims at establishing a new science. Sound artists usually do not share that ambition but grasp other ideas from rhythmanalysis for their work. The important thing to them is that the discovery of the everyday offers a playground for art where phenomena reveal themselves naturally. In Lefebvre's words, perceiving the everyday through its rhythms is key to understanding society without being an expert:

> Electric locomotives only present to the eyes a big box that contains and conceals the machinery. One sees them start up, pull and move forward, but how? The electrical wire and the pole that runs alongside it say nothing about the energy that they transmit. In order to understand, one must be an engineer, a specialist, and know the vocabulary, the concepts, the calculations… The same goes for our economo-political society. The visible moving parts hide the machinery. Is there nothing left of the visible, the sensible? Is our time only accessible by patient analyses, which break up the complexity and subsequently endeavour to stick back together the pieces? It is not necessary to go too far […] The gaze and the intellect can still grasp directly some aspects of our reality that are rich in meaning: notably the everyday and rhythms. Everywhere where there is interaction between a place, a time and an expenditure of energy, there is **rhythm** [emphasis by L.]. Therefore:
>
> a) repetition (of movements, gestures, action, situations, differences);
>
> b) interference of linear processes and cyclical processes
>
> c) birth, growth, peak, then decline and end.
>
> (Lefebvre 2007, 20)

It is interesting to note that Lefebvre thinks the concept of beginning and end together with repetition as constituents for rhythms. At a first glance it seems easily possible to imagine a process without repetition, e.g. a cup of espresso being consumed by an individual in one sip. But being a marxist, Lefebvre sees repetition everywhere – it only depends on the scale one applies. On a larger scale the drinking of the espresso might point towards a repetitive process of roasting coffee beans or perhaps repetitive and tiring circumstances of work that make it necessary to consume such a beverage. However, repetition brings forward differences

between cycles. Lefebvre avoids the term progress and rather calls these differences between cycles linear processes (Lefebvre 2007, 8).[17] It is no surprise that space for Lefebvre is closely related to time, rather than being a distinct entity. Time is cyclical and space is linear, they constitute each other. Differences can only be perceived when the background for comparison is predictable. In musical terms, this can be linked to minimalism, where small changes within a steady meter are crucial for the development of a piece. But also and more important for the course of this paper one can find the interaction between the cyclical and the linear quite obvious in work: Repetition of a task leads to its completion, the result is passed on to become part of another cycle. To illustrate this together with the idea of interfering rhythms, reading an example from Marx' The Capital (1867) through the eyes of Lefebvre is useful. Marx describes the precarious circumstances of a working day at the second half of the 19th century. On the one hand, there is the example of workers who need to be fed their lunch bread while operating a machine. The rhythm of the working day at a machine determines this kind of intake of food. On the other hand, there is a bakery, where bakers work under miserable conditions, working long shifts, sleeping next to the oven and not having hygienic facilities at their disposal. Bread is a linear result of baking, it points to production which is for Lefebvre the rhythm of capitalism. Due to the conditions in the bakery, the quality of the products decreases. Marx (1867) describes this in a very plastic way:

> [The Englishmen] did not know that he [the worker] had to eat daily in his bread a certain quantity of human perspiration mixed with the discharge of abscesses, cobwebs, dead black-beetles, and putrid German yeast, without counting alum, sand, and other agreeable mineral ingredients.

It is clear that the bread which is being fed to the worker at the machine gets more harmful the longer the working cycle in the bakery is sustained. To some extent, the condition is also due to a certain demand for bread and thus, the cycles interfere on another level, too.

Rhythmanalysis is an undertaking to understand the meaning of repetitions. It comprises everything which is present (Lefebvre 2007, 21) and the present is to be found in the every-day. As the realm of the everyday also contains solid objects, they, too, need to be taken into consideration. In his idealized description of a rhythmanalyst he writes:

17 His three constituents of rhythm are themselves difficult to distinguish, they seem intermingled just as Lefebvre's concept of reality of rhythms. Here a reader encounters a programmatic use of language.

> For him [the rhythmanalyst] nothing is immobile. He hears the wind, the rain, storms; but if he considers a stone, a wall, a trunk, he understands their slowness, their interminable rhythm. This object is not inert; time is not set aside for the subject. It is only slow in relation to our time, to our body, the measure of rhythms. An apparently immobile object, the forest, moves in multiple ways; the combined movements of the soil, the earth, the sun. Or the movements of the molecules and atoms that compose it (the object, the forrest). (Lefebvre 2004, 20)

Here the author is in concordance with a Bergsonian concept of reality which considers solid objects to be built of vibrating atoms and therefore, movement. At the same time, Lefebvre reminds the rhythmanalyst to use his senses just as they are and to relate them to her own physiological rhythms (Lefebvre 2007, 21). Listening is in this case a metaphor for understanding movement in general. Listening refers to time and interactions, whereas vision is only concerned with static objects. But does knowledge about atoms stem from the everyday? On the one hand, 'it is not necessary to go too far'. On the other hand, one would need to go to beyond immediate percepts to grasp the rhythm of atoms. Lefebvre remains unclear here.

In general, the way rhythmanalysis is presented has logical implications. If rhythm is the truth which binds all phenomena of reality together, then how about the temporality of rhythm itself? In other words, is there an end to rhythm? According to the definition of rhythm he stated above, there must be an end to the totality of rhythms. But that means that rhythmanalysis itself is not always the correct description of reality. A rhythmanalyst would detect only a temporary truth value in the sentence 'Everything is rhythm.', meaning that there is also a time when this sentence is false. Hence, rhythmanalysis is self-contradictory. Yet the most fertile way of reading Lefebvre is to take rhythmanalysis as a source for artistic inspiration rather than an epistemological theory.

One can derive an approach of perceiving the totality of processes in the environment and trying to understand their interconnections. What is special about rhythmanalysis is the fact that it ascribes very concrete meaning to the way time passes. Applying this to the sphere of field recording, sounds are not captured for the sake of their timbre. Rather one is aware of the way sounds are embedded in their natural surrounding and what they stand for. There is no doubt what they mainly point to in the eyes of Lefebvre: From the examples that he gives about the rhythms of urban life, one can tell that he reflects on time in a social sense. Especially when perceiving work processes with their steady rhythms, interdependences and implications for the workers involved, rhythmanalysis proved to be a very valuable concept

for my own work. In the later discussion of my piece 'We pass it on', I attempt to exemplify this.

Although Lefebvre is convinced that '[t]echnology kills immediacy […]' (Lefebvre 2004, 53) and that it is part of capitalism's evilness, field recordists usually do not reflect on their use of a recording device in such a way. But as I said earlier, artists take Lefebvre more as a poetic source than a serious theory and it is their right to do so. An artwork made by the rhythmanalyst would have the task to project back the multiple articulations of everyday rhythms and in the long run, transform society (Lefebvre 2007, 25-26). The latter claim is in one line with other ecological concepts of sound, such as acoustic ecology which I will discuss next. By trying to make listeners aware of their surroundings, the rhythmanalyst wishes to influence rhythm on a larger scale. Interesting to note is that this influence is not a political act but based on the temporality of pure observation (Lefebvre 2007, 19 ff.). Therefore, the rhythmanalyst interferes with other rhythms naturally.

To conclude, I have tried to show that rhythmanalysis is a concept to perceive the durations of reality. The term itself is rather technical and slightly misleading because rather than proposing a clear and distinct method of analysis, rhythmanalysis points to a rather comprehensive interpretation of phenomena of the everyday. The theory is weak but fruitful as a source for inspiration.

4 Case Study: The sounds in the Port of Rotterdam

4.1 Preliminary considerations

The harbour is a giant rehearsal room. A constant drone tries to keep rebellious instrumentalists under its command. Textures come and go. Engines are started or turned off, trucks pass by, alarm signals can be heard. Water splashes against the pier whenever a ship comes. Seagulls shout. Every now and then an obscure drum sound gets carried on, is being reflected over and over again. It has no place, it seems to be everywhere. The surface of the Maas and the even architecture of the factory buildings dislocate the instrumentalists. Sounds play hide-and-seek, their sources remain mirages. Even if one approaches the industrial areas, everything seems to be happening in the distance. A tremendous reverb makes any listener's physical presence seem ridiculous, it becomes overruled by the sublime size of the concert hall. One can be close but there is no intimacy. Is this where we wanted to be?

Figure 9. An attempt to describe the harbour's general soundscape.

After having studied a map of the harbour in detail, it became clear that the area could not be captured completely within the two years of study. Consequently, with a slightly documentary thinking I decided to concentrate on the diversity of activities in the harbour. As the harbour is roughly subdivided into different sections, such as fruit harbour, container shipping, refineries etc., it became relatively easy to know where to go. But after first visits to the recording site the sonic impression as described in the figure above proved to be the only one. On the way to the sea the industrial landscape would not change much, except that the structures became even more gigantic and the feeling of dislocation increased.

Numerous sections of the harbour are enclosed by fences and inaccessible to visitors. The security guidelines also effect smaller companies but their handling of them was less strict, so after frowning at my recording device they would usually let me enter – under the condition that I would not make their names public. The contrast between the anonymous mega-structures of globalization and the joy and dignity of the workers fascinated me, especially when comparing the soundscapes. In most of the pieces, it is this tension that I attempted to trace back in the recordings. Admittedly, the sounds were sometimes bent violently in order to suit such expression.

The large amount of modifications of sounds makes this body of work non-ethnographic. Although one might see a documentary approach in exploring the area the way I did, the pieces themselves tend to be artistic reflections on the experiences. They are not pure.

Yet by limiting the sound material to the places where the recording was made, the original aural context is preserved to some extent. But that does not mean that the pieces represent the recording site in any way. It is only to say that the phenomena are linked to a certain surrounding. The contextualisation I apply serves the same purpose.

The body of practical work consists of several pieces which are bound together by the idea of an imaginary journey from the door of my house to the shore of the North Sea. On the way there, different work environments become portrayed and contrasted with other sound impressions from this industrial area. Out of the sound journey that also incorporates fixed-media works, I will discuss three of the performance pieces.

4.2 A few pieces

4.2.1 To Take The Load Off From You

At the beginning of my research, musical listening to the environment was very dominant, which is manifest in this composition. This piece is based on the recordings of a crane unloading dry bulk from a ship. Already while recording, the gestural content and easy-to-follow melody of the machine was striking. Not only could the sounds easily be musicalised, but also the visual impression of it could easily be anthropomorphised. A metal arm bent over the ship, a hook was fixed and while lifting the cargo, the chains attached to the hook were tensed like muscles. On the recording the engine and the chains are audible. Musically the richest sound was the switching between gears when the crane changed modes, in the score in bar 12 and 13. The initial idea to emphasize the musical aspects of the material was to establish an automatic orchestration of the original crane sounds.

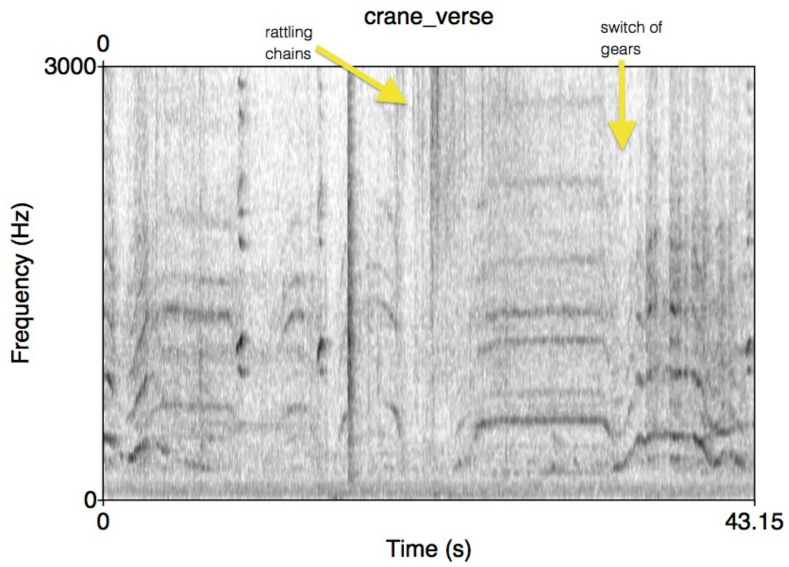

Figure 10. Spectrum of the crane's movements.

The experiments involved deriving MIDI-control data from the spectrum and let them trigger their own accompaniment. The method was successful but the result not interesting. It lacked livelihood. This is the reason why I started to improvise with a synthesizer and a voice along with the melody. The synthesizer's sound is a pitched spectral slice of the original recording as an attempt to make the sounds blend. This blending also involved patching a pitch correction for the synthesizer. The movements of the crane were repeated in order to establish a song structure. Throughout the piece the song structure gets disturbed by sudden moves of modified crane sounds between four loudspeakers. The machine attempts to juxtapose the impression of control which is given by the rather traditional pop structure of the voice and the synthesizer. With the machine that has taken on a life of its own, the voice tries to regain control.

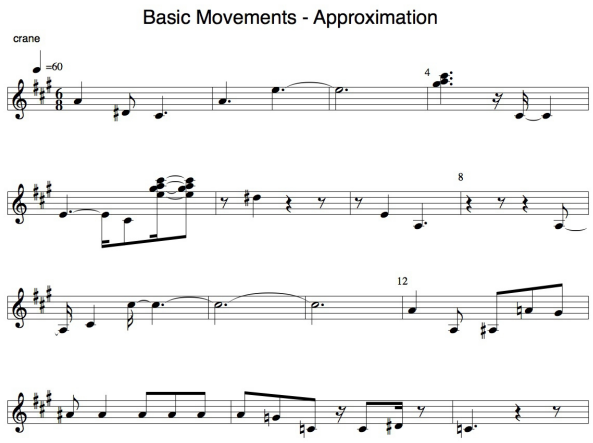

Figure 11. Approximated melody of the crane.

The whole method of composing with the crane's sound might appear rather arbitrary as it exaggerates the poetic stylization. And in the discussions about the piece the problem seemed to be indeed that the machine sounds became ruled out by the massive musicalisation coming from voice and chords and that therefore, the quality of the original recording was masked. These remarks led to the extension of the machine solo in the piece where the machine sounds begin

to work more in their own right. But also the synthesizer sound changed from organ-like to more noisy. Moreover, I encountered the problem that the three sources of the performance – field recording, voice and synthesizer – did not form a unity because of their different characteristics. This was later accounted for by using the impulse-response like sound of the original and map it to a reverberation algorithm to filter the voice and the synthesizer. A third problem is that the recording gives the impression that it was made from a larger distance to the crane than it actually was. I used equalizing to create a bit more presence.

4.2.2 Holy Grinder

Holy Grinder juxtaposes the two fundamental types of work in a coffee factory. The grinder, a machine that grinds 300 kg of beans in 1.5 h is operated by a single person. He switches the machine on and off. In the meantime he dedicates himself to silent work – or at least work whose sounds are masked by the massive machine noise. This worker is the foreman to five other workers who during my visit spent the whole day cleaning coffee tins. On a sound level these two activities are distinct types of work. Manual work is characterized by rhythmic patterns, machine sound by drones and textures. The thoughts mentioned in the chapter on the sounds of industrialization can be applied here. In the staging of this piece, a percussionist performs the movements of cleaning a coffee tin, which relates to manual work and the rhythm that evolves out of it as a traditional source of music. For this purpose, the original coffee tin is used. So partly, the sounds of the factory become re-enacted. The second performer is concerned with electronics that represent mechanical work. His sound attribute is the industrial drone of a coffee grinder, a texture whose bands are slowly accentuated to reveal its harmonic components. The piece is very minimalist, juxtaposing merely these two working styles.[18] The reason for a scarce use of musical elements is to make the piece drift to other, more performative questions: Whom of the two is in control? How is time being structured by both activities? Or even: whose task is the more human one?

These questions are especially intended to arise when the drumming sound of the cleaning process get sampled and analysed by the mechanical worker's machine. At this point the memory of the computer overrules human capacity – not only through its strict timing but also because of its possibility to make any little detail audible. The act of sampling in this piece is a sonic reference to the time-and-motion studies which I described earlier. This reference is

18 On another level, questions about musical performance practice may also be asked, contrasting an instrumentalist and a computer musician.

also given by the lights that are attached to the percussionist's hands. A simultaneous projection shows the light trails produced by the movements.

4.2.3 We Pass It On

The initial idea for this piece was derived from rhythmanalysis, noticing that everyday rhythms interfere with each other on many levels. The recordings were made in the Rotterdam food bank, an institution that collects left-overs and slightly flawy food. This food becomes distributed to the poor of the city. Normally companies would have to throw this produce away and pay for dumping them, but the food bank makes this obsolete. Every Thursday about 70 volunteers gather in an old factory hall to pack about 2800 crates with food. The work is tedious, the workers at the conveyor belt have to be fast in order to fill the crates in time. The crate is passed on to the next worker who puts another product in it. But the conveyor belt is only the surface of the work process. Other layers involve refilling pallets where the food is stapled, forklifts move in the background, paper gets dumped, lorries come and go, etc.

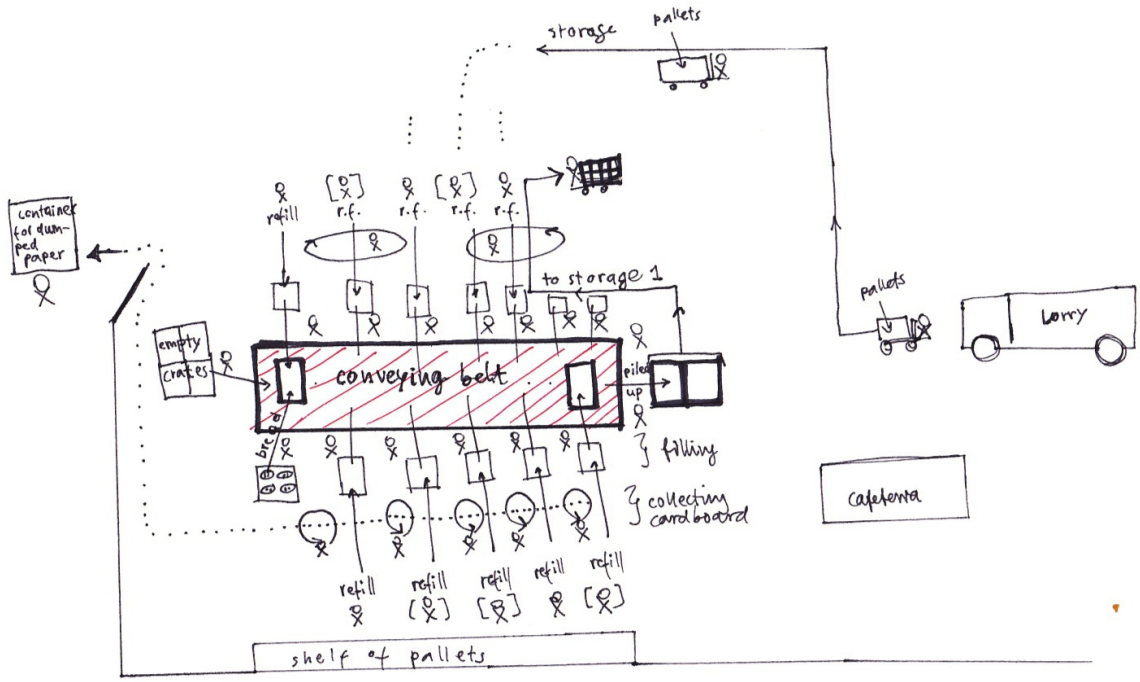

Figure 12. Sketch of activities at the food bank

The recordings were made at different points along the conveyor belt but also outside the factory to get a fuller picture of the activities. I managed to have a few conversations with the

workers. This probably had the strongest effect on me because it turned out that most of them were in precarious situations. Their work would be rewarded by a crate every week. Yet their pride of doing voluntary work together with their specific linguistic expressivity fascinated me. Bearing in mind that the existence of the food bank depends very much on temporary economical situations, i.e. the overproduction in western economies, I felt compassion for the workers' circumstances. The food bank is an extremely fragile institution – just as fragile as the living conditions of the volunteers. So putting it to the more abstract words of rhythmanalysis, the food bank deals with the linear results that stand at the end of production cycles. But these results presuppose an overproduction of goods, a phenomenon that is about to decrease[19].

Experimenting with the superimposition of the rhythms of work as I had recorded them, I wanted to achieve a general picture of the activities at the food bank. Also, the movements of processes were attempted to be mimicked. I implemented this in a Wave Field Synthesis system but the results were not satisfying. First of all, although I had carefully placed the microphones at the recording site, the sonic illusion of standing at the conveyor belt was not convincing, it had too many acoustic holes in it. Second, despite having been unsuccessful in re-creating the space, the superimposition of recordings did not bring forward any interesting music. Third, I did not feel that the expressivity which the workers had was represented well enough. By just putting the recorded voices in a virtual acoustic space, they became distant and lifeless. Finally, the metaphorical use of rhythms which also played a role in the initial sketch remained imperceivable for listeners. It lacked context.

I decided to start all-over again. So after listening back again to what I considered to be the most striking recording of the conveyor belt, I suddenly noticed that one of the workers who was mentally impaired commented her moving of the crate on the belt with a joyful *O-ho*, just in-sync with the movements of her arms. Of course, I treated this expression as a connection to the history of work songs, in particular, using the redundancy of a voice imitating a process. The rhythm of the conveyor belt became the pulse of the piece and the most musical utterances of the workers formed the chorus line. The stanzas are based on the conversations with the volunteers.[20] The form of a song was chosen because it refers to the structures that the workers hear through their radio[21] and also, because to me, singing their words appeared

19 This fact is a reaction to the supposedly critical situation of Europe's economy. Companies strive to make their production process even more efficient and avoid over-production.

20 See appendix for the lyrics.

21 In the piece the radio is not audible because for editing reasons, I asked for it to be turned off.

to be the best way of conveying the content of the conversations. In the background of the piece one hears the atmosphere in the food bank's cafeteria while slowly other rhythms get modulated. Those sounds were chosen according to their intrinsic musicality. So in this case, acousmatic listening guided the selection. In the instrumental part of the piece, a randomised time-compression algorithm disturbs the formerly established straight rhythm of crates moving on the belt. The sounds move randomly in the virtual acoustic space. The rhythms in the food bank start to dysfunction.

Whether this form of the piece conveys anything to a listener still has to be found out during a performance situation. It could be the case that while the lyrics and melodic elements dominate the sounds and degrade them, a reference to the recording site – calling it explicitly 'food bank' – still has to be made. This piece is extremely dependent on context, perhaps too much to give way to the sounds.

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5 Conclusions

The compositions as described above feature a strong emphasis on modification and re-contextualisation to make the unintentional everyday sounds become music. This was considered necessary because I wanted to convey my research about the sound of work in the most understandable way, especially towards an audience that has only little experience reflecting on everyday sounds. Whether or not this is an effective approach will have to be shown during performances in the future.

Having asked what is special about the sounds of work and what they could stand for, I presented the idea of contact points in sound to be crucial for thinking about work processes in the industrialized world. Contact points form a meaningful concept referring to how a task is performed. The temporal aspects of work are intended as a new perspective on the act of field recording.

Furthermore, in this report I attempted to give an overview and demonstrated the ill-defined aspects in the discourse on field recording. Most prominently, I suggested to not call field recording a discipline but rather a method having certain aesthetic ambitions. In order to clarify what the ambitions could reasonably be about, representational problems appeared to be the biggest issue. In addition to this, it was demonstrated that most artists who work with field recordings relate to other disciplines than pure music. I hope that in the future a more deliberate and clearer use of language will help sound art that incorporates field recordings to evolve.

In which ever systematic or confusing way the discourse will develop, field recording will stay a fascinating way of exploring the world we live in.

6 Bibliography

Bachelard, G. (1950). *La dialectique de la durée*. Paris: Presses Universitaires de France.

Barrett, N. (n.d.). *Peru*. Retrieved May 09, 2013 from http://www.natashabarrett.org/peru/

Barrett, N. (2009). *The 'Barely' project and thresholds of auditory experience.* Retrieved on March 15, 2013 from http://www.natashabarrett.org/barely-paper.html

Beckett, W. and Fairley, L. (1944). Music In Industry: A Bibliography. *Notes. Second Series.* Vol. 1, No. 4, pp. 14-20. Retrieved on January 18, 2012 from http://www.jstor.org/stable/891287

Bennett, J. (2011). Raw Materials. In J. Eckhardt and A. Goossens, A. (Ed.): *Field Fest*. Brussels: Q-O2. pp. 10-11.

Bergson, H. (2002). *Matter and Memory.* New York: Zone Books.

Blesser, B. and Salter, L. (2007). *Spaces Speak. Are You Listening?; Experiencing aural architecture.* Cambridge: MIT Press. Retrieved on April 12, 2013 from http://soundenvironments.files.wordpress.com/2011/10/experiencing-_aural_architecture.pdf

Bücher, K. (1924). *Arbeit und Rhythmus.* Leipzig: Reinicke.

Carlyle, A. and Lane, C. (2013). *In the Field. The Art of Field Recording.* Devon: Uniformbooks.

Drever, J. (2002). Soundscape Composition: the Convergence of Ethnography and Acousmatic Music. *In Organized Sound, Vol. 7 (1).* pp. 21-27. Cambridge: Cambridge University Press. DOI:10.1017/S1355771802001048

Ferneyhough, B. (unknown). *Time and motion study II (1973-76).* London: Peters Edition Limited. Retrieved on April 23, 2013 from http://www.editionpeters.com/resources/0001/stock/pdf/time_and_motion_study__ii.pdf

Giedion, S. (1969). *Mechanization takes command. A contribution to Anonymous History.* London, New York: W. W. Norton & Company, Inc.

Gilbreth, F. (1916). The Effect of Motion Studies upon the Workers. *Annals of the American Academy of Political and Social Science*, Vol. 65, Personnel and Employment Problems In Industrial Management. Sage Publications Inc. pp. 272-276. Retrieved on October 16, 2012 from http://www.jstor.org/stable/1013582

Gioia, T. (2006). *Work Songs*. Durham and London: Duke University Press. [Kindle version] retrieved from amazon.com

Hugill, S. (1978). *Zeemansliederen.* Bussum: De Boer Maritiem.

Iverson, J. and Fagan, M. (2004). Infant Vocal-Motor Coordination – Precursor to Gesture-Speech System? *Child Development. Vol 75, No. 4*, pp. 1053-1066 Retrieved on April 4, 2013 from http://www.jstor/stable/3696526

Kahn, J. (2011). In Place: Brussels (2011). In J. Eckhardt, and A. Goossens (Ed.): *Field Fest*. Brussels: Q-O2. pp. 48-49.

Lefebvre, H. (2007). *Rhythmanalyis*. Trans. Elden, S. and Moore, G. London, New York: Continuum.

Konstantinidou, F. (2011). *Aural Cognition and Listening Imagination in Electronic Music.* (Master's Thesis, Institute of Sonology). Retrieved on April 22, 2013 from http://www.sonology.org/NL/thesis-pdf/Fani_Konstantinidou.pdf

Korn, C. and Riek, L. (2007). *Series Invisible.* Frankfurt am Main: Selektion and Revolver. Retrieved on May 2, 2013 from http://www.gruenrekorder.de/pdf/rz_series_invisible.pdf

Lomax, A. (2003) *Selected Writings 1934-1997*. Ed. Cohen, R. New York, London: Routledge. [Kindle version]. Retrieved from amazon.com

Messiaen, O. (1994) *Traité de rythme, de couleur et d'ornithologie*, *Tome 1.* Paris: Alphonse Leduc & Compagnie.

McVey, F. (1903). The social Effects of the Eight-Hour Day. *American Journal of Sociology Vol. 8, No. 4.* pp. 521-530. Chicago: The University Of Chicago Press. Retrieved on May 5, 2013 from http://www.jstor.org/stable/2762054

Mulder, A. and Brouwer, J. (Eds.) (2007). Dick Raaijmakers: Monografie. Rotterdam: V2_Instituut voor de Instabiele Media. pp. 148-195.

Mulder, A. and Brouwer, J. (Eds.) (2008). Dick Raaijmakers: A Monograph. Rotterdam: V2_Institute For The Unstable Media. pp. 120-149.

Nijhoff, M. (1980). *Wat lijdt den zeeman al verdriet*. Het Nederlandse zeemanslied in de zeiltijd (1600-1900). Den Haag: Nijhoff.

Pinheiro, S. (2012). Sound Intermittences (Master's Thesis, Institute of Sonology). Retrieved on February 2, 2013 from http://www.sonology.org/NL/thesis-pdf/Sara%20Pinheiro.pdf

Riek, L. (2009). Matthias Ferkau (Interview). *Transkribiertes Interview mit Lasse-Marc Riek vom 28.05.2009.* Retrieved on April 9, 2013 from http://www.lasse-marc-riek.de/articles/Interview_ferkau.pdf

Riek, L. (2011). Norbert Lang (Interview). Fieldrecordings. *Artmix Gespräch* [Podcast]. Bayern 2. Retrieved on May 9, 2013 from http://www.br.de/radio/bayern2/sendungen/hoerspiel-und-medienkunst/artmix-gespraech160.html

Reynolds, W. (1942). *Music While You Work. A Summary Of Research On Music In Industry.* London: British Broadcasting Corporation. Retrieved on May 09, 2013 from http://www.g4dmp.co.uk/bbc-mwyw.pdf

Russolo, L. (2000). *Die Kunst der Geräusche*. Trans. Owig DasGupta. Mainz: Schott.

Schaeffer, P. (2006). *Traktaat van de muzikale objecten*. Trans. Konrad Böhmer. Ubbergen: Tandem Felix.

Schafer, M. (1994). *The Soundscape. Our Sonic Environment and the tuning of the World*. Rochester VT: Destiny Books.

Thaut, M. (2008). *Rhythm, Music and the Brain. Scientific Foundations and Clinical Applications.* New York: Routledge.

Tsunoda, T. (2011). About Field Recording. In J. Eckhardt and A. Goossens, A. (Ed.): *Field Fest*. Brussels: Q-O2. pp. 38-39).

Volmar, A. (2012). *Klangexperimente. Eine Geschichte der auditiven Kultur der Naturwissenschaften seit 1800* (Doctoral Thesis, Universität Siegen).

Weber, L. (1913). *Le rythme du progrès: Étude sociologique*. Paris: Alcan.

Wishart, T. (1996). *On Sonic art*. Amsterdam: Overseas Publishers Association.

Sound examples

Einstürzende Neubauten (2007). Die Wellen. *Alles wieder offen*. Potomak (Indigo).

Lucier, A. (1969). *I am sitting in a room.* Retrieved on May 15, 2013 from http://ubumexico.centro.org.mx/sound/source/Lucier-Alvin_Sitting.mp3

Ruttmann, W. (1930). *Wochenende*. Retrieved on February 12, 2013 from http://www.youtube.com/watch?v=KVZVpAVfZ6M

Westerkamp, H. (1990). *Kits Beach.* Retrieved on March 20, 2013 from http://vimeo.com/9679356

Wishart, T. (1977). *Red Bird.* Retrieved on September 30, 2012 from http://www.ubu.com/sound/wishart.html

Films

Chaplin, C. [Producer & Director](1936). *Modern Times.* [Motion Picture]. United Artists (1930s-2003), MK2 Editions (2003-2010), Janus Films/Criterion (2010-present). Retrieved on November 13, 2012 from http://www.youtube.com/watch?v=Ps6ck1ejoAw

Vertov, D. [Director](1931). Symphony of the Donbas. Enthusiasm. Soviet Union: 1931. Retrieved on May 16, 2013 from http://www.youtube.com/watch?v=vUInm2dC6Ug

Figures

Figures 1-3, 5, 7, 9-12 by author.

Fig. 4. *Wire Model Of Foreman On Drill Press. This shows "positioning" in the midst of "transporting"*. By [Unknown, probably Gilbreth, F.] (1915 estimated). Frank B. Gilbreth Motion Study Photographs (1913-1917). The Kheel Center for Labor-Management Documentation and Archives. Cornell University Library. Retrieved on May 5, 2013 from http://www.flickr.com/photos/kheelcenter/5279836660/sizes/l/in/set-72157625643870092/

Fig. 6. Page adapted from *Series Invisible* by Korn, C. and Riek, L. (2007). Frankfurt am Main: Selektion and Revolver. Retrieved on May 2, 2013 from http://www.gruenrekorder.de/pdf/rz_series_invisible.pdf

Fig 8. *Muzak Mood Progression Chart (1956)*. By [Unknown]. Retrieved on May 6, 2012 from http://75.muzak.com/#/1950s/ on May 6, 2012

7 Appendix

7.1 To Take The Load Off From You – Lyrics

Whatever my hands can do
they will do
these chains can hold tight
when I sway
and I will sway to you
to take the load off from you
to take the load

In places that you'll never see
it will all dissolve
you won't feel a thing
I have done this a million times
I'll take the load off from you
I'll take the load

Whatever my hands could do
they did
as empty as you are, featherweight
go home
I took the load off from you
I took the load

Leave me here
I'll be suspended
someone one day will take
the load off from me

7.2 We Pass It On – Lyrics

from the rim of your plate i saw
precious, precious food falling
you don't need to clean no more
we pass it on, we pass it on

daddy is a gambling man
but if all goes well, if all goes well,
we'll spend this summer in disney land
and not at the conveyor belt

hoppakee nou, daar komt weer de
ontbijtkoek daar aan
oh, oh, je moet die krat vullen, man
vullen!

doing something for the poor
you know, gives satisfaction
they need me here
look, these are my friends
at the end of the conveyor belt

hoppakee nou, daar komt weer de
ontbijtkoek daar aan
oh, oh, je moet die krat vullen, man
vullen!

from the rim of your plate i can tell
less and less you give away
you call this efficiency
when you're passing me
an empty crate