The Aesthetics of the Invisible: Foundations for Sonic Fashion

Aural experience and sound thinking, in contrast to visual experience and image thinking, change the fundamental manifestation and perception of a dressed body: from looking and being seen to listening and being heard. Looking at and listening to a body that is wearing high heels are fundamentally different experiences. Although sound is an element of dress and identity, the visual sense is predominant in fashion and fashion education, and fashion is essentially understood to be a system of visual components. As an alternative to this dominant focus on the visual, this research investigates the sonic aspects of fashion, approaching them as largely unexplored and potentially interesting ontological alternatives with which to create an understanding of fashion that goes beyond visual stimuli.

The primary aim of the research presented in this thesis was to develop an introductory programme for sonic fashion that suggests a shift in focus – from visual perception and appearance to sonic. The programme consists primarily of ontological theory components: methods, tool-shifters, terms, definitions, and categories.

Knowledge regarding sonic expressions was collected using sound-based thinking in the form of listening/sounding research artefacts, which raised ontological questions; What is a sonic silhouette? How a sonic silhouette is created?

More generally, the research broadens our conception of fashion aesthetics by presenting a new direction for the fashion design field; a non-visual aesthetic that is based on sonic expression, wherein sound is considered to be a design/design thinking material and an alternative way of defining a silhouette.
THE AESTHETICS OF THE INVISIBLE: FOUNDATIONS FOR SONIC FASHION

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ABSTRACT
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The primary aim of the research presented in this thesis was to develop an introductory programme for sonic fashion that suggests a shift in focus – from visual perception and appearance to sonic. The programme consists primarily of ontological theory components: methods, tool-shifters, terms, definitions, and categories.

The research was conducted through investigations of sonic dress and sonic expressions, which were approached as interactions between the body and dress that occur during the act of wearing. Sonic aspects were explored on a fundamental level – i.e. the natural (physical) sounds of dress – in a manner that is relatively unprecedented in the fashion field, and so the research was experimental and speculative.

Knowledge regarding sonic expressions was collected using sound-based thinking in the form of listening/sounding research artefacts, which raised ontological questions; What is a sonic silhouette? How a sonic silhouette is created?

The research was conducted by exploring, recording, and systematising sounds arising from body-dress and dress-dress interactions, as well as speculative experimental workshops with students and case study involving people with differing seeing abilities.

More generally, the research broadens our conception of fashion aesthetics by presenting a new direction for the fashion design field; a non-visual aesthetic that is based on sonic expression, wherein sound is considered to be a design/design thinking material and an alternative way of defining a silhouette.
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INTRODUCTION
THE CONSTRUCT OF IDENTITY

Dress is part of a larger context of appearance, and relates to the defining of self-identity and interactions with others; the understanding of the self is duplicated, the combination of the opinions of oneself and others. We make assumptions regarding the social status and roles of the people we meet on a daily basis, based on what they are wearing: we treat their clothes as “social hieroglyphics” (Crane, 2000). Dress lies at the margins of the body, marking the boundary between the self and the other, the individual and society (Entwistle & Wilson, 2001). As Entwistle states, “dress is an embodied practice, a situated bodily practice which is embedded within the social world and fundamental to micro social order” (Entwistle, 2000a, p. 325).

In centuries gone by, clothing was the principal means of identifying oneself in public spaces. Various aspects of identity were expressed through clothing, including occupation, regional identity, religion, and social class. Certain items of clothing worn by everyone, such as hats in the nineteenth century, were particularly important, instantly communicating ascribed or aspired-to social status. Prior to the Industrial Revolution and appearance of machine-made clothing, clothes were generally among a person’s most valuable possessions; new clothes were inaccessible to the poor, who wore used clothing that had often passed through many hands before reaching theirs, and a poor man was likely to own only a one set of clothing (Crane, 2000). During the Industrial Revolution it was common for immigrants to divest themselves of their traditional clothing as soon as they arrived in their new country, discarding their previous identities and establishing new ones (Heinze, 1992).

Today, cultural authentication has merged with global trends. As the world grows seemingly smaller through improvements in communications and the integration of business on a worldwide scale, the diverging of cultures is mirrored by an increasing inter-cultural awareness (Eicher et al., 2008). As Eicher, Evenson, and Lutz argue, “[w]orld dress, or general types of dress originating in one culture but now found in many cultures, is apparent in most every part of the globe” (2008, p. 51).

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1. Dress in this research is considered to be any object that could be worn on the body, such as clothing, shoes, accessories, etc.
INTRODUCTION

The movement from real to virtual space has empowered us to develop multiple identities. Calefato approaches ‘mass fashion’ as a complex system of images, words, objects, and multi-layered social discourses (Calefato, 2004). We can also duplicate our identities across multiple media: we can have the same profile on Facebook, Twitter, etc. At the same time, we can create different virtual personas on the same website, and over time can change the appearance of these profiles. Thus, identity becomes an avatar or pseudo-identity.

In the majority of fashion research, fashion is considered and approached from visual perspectives and related to media, communication, language, semiotics, etc. connected to the visual. Such aspects are generally over-represented in mainstream perspectives on fashion. However, which other layers constitute identity?

*Who am I if I cannot see myself?*

Although identity in fashion is visually dominated, sound adds another layer and is considered to be another part of the construct of the self. If you close your eyes you can hear people talking, breathing, walking, etc. Fashion also comes into play: the bouncing of metal bracelets is audible as an arm moves, as are the zipping or unzipping of a synthetic sports jacket, electrostatic rasp of someone taking off a knitted sweater during winter, and clacking of high heels and squeaking of sneakers. The steps of individual people are even identifiable aurally due to their gait. As sonic objects that we ‘wear’ everyday, mobile phones add various sounds to our sonic identity, e.g. those of social networks (Facebook, Twitter, Skype, etc.), each of which utilises a unique sound for a new message, a call, hanging up, etc. Here the mobile phone becomes a “parlor organ” (Belk, 1988), an extension of the sonic self.

*What is a sonic identity and what are the elements that construct it?*

My background is as a fashion designer, but my Master’s degree was in visual art. I had prior experience of non-visual aesthetics before starting this thesis, having created audial and tactile works such as the interactive installation *Homo* (2012) and sonic-haptic interactive installation for people with different seeing abilities, *The memory of smell* (2013). My Master’s degree project investigated spatial sound and sonic identity, and led to the artistic project *Audial Imagination: inner monologues with the other* (2015), which focused on surrounding sound composition in the particular space. Knowledge within the fashion design field and experience of non-visual aesthetics in artistic discourse inspired me to merge these two contexts when seeking alternative perspectives on non-visual aesthetics, i.e. sonic fashion and
sonic identity in the field of fashion design. By linking different disciplines – fashion
design, sound art, and performance art – through a methodology that can be said to
utilise ‘experimental collisions’, the question that grew in my mind was
how can ‘sonic fashion’ be understood, and how can we design for it?

What, however, is known about sonic fashion? The area has received very little
scholarly attention and is widely uncharted, but as a result has the potential to open
up for wholly new perspectives on clothing and fashion. Moreover, the challenge
is already ontological in nature; as will be shown, very little exists in the way of
foundational definitions or methods for designing for sonic fashion.

Unlike the sense of self obtained through ocular reflection, the sonic self is always
mobile, ephemeral, and constantly spreading outwards while simultaneously refer-
ing back to what has been sensed previously (Stasiulyte, 2017b). The sonic self is
invisible, resonating, echoic, and felt throughout the body – as opposed to a self that
is perceived externally, as visual mimesis. What characteristics do notions of a sonic
body infer? What is a sonic silhouette? What potential design materials, methods,
and tools would the creation of a sonic silhouette involve?

In relation to these questions, the overall purpose of the research presented in this
thesis was:

• to propose an alternative approach to fashion design;
• to expand upon and challenge fashion aesthetics through experimental artistic
practice, using sound as a material for design thinking and design;
• to introduce a propositional programme consisting of sonic fashion design
methods and tools for the purposes of training and exploration;
• to suggest a primary ontological framework consisting of terms, definitions,
and categories relating to sonic fashion.

The intention, then, was to open up the field of design and expand upon images
and visual practices by introducing non-visual perspectives into the discourse.
The sonic qualities of fashion were considered due to the fact that they present an
alternative, fundamental theory and methodology – sonic fashion – which has the
potential to broaden extant design methods used in fashion design education and
inspire other fields to investigate discourses beyond those of a strictly visual nature
(Stasiulyte, 2017b).
CONTEXTUAL AND CONCEPTUAL FRAMEWORK
SONIC IDENTITY IN THE FIELD OF DESIGN

Sonic interactions are largely used in the fields of industrial and product design. One of the most comprehensive analyses of product sounds was performed by Özcan, van Egmond, and Jacobs, who question the predominance of the visual in products and discuss the relationship between the visual and sonic values of designed products. They also emphasise the lack of both evaluation methodologies for sound design and developed knowledge relating to everyday sound perception:

Although visual imagery and visual reproduction are the primary activities of designers during product development, the user-experience of a product is also determined and perceived by other (unconscious) senses. The vocabulary of designers with respect to other sensory product properties is limited, although their contribution to the overall product experience is well acknowledged (Crilly, Moultrie & Clarkson, 2004; Özcan & van Egmond, 2009; Schifferstein & Spence, 2008; Spence & Zampini, 2006).


In practice, product sounds are often tackled within the fields of engineering, acoustics (Lyon, 2000; Susini et al., 2010;), and interaction design (Franinović & Serafin, 2013; Liljedahl, 2011; Rocchesso et al., 2008). The sounds emitted by products were long considered to simply be noise and thus undesirable product features that were to be reduced or eliminated, and noise-control methods have been used to design noise enclosures, isolation systems, and silencers in order to make products more aurally acceptable (Özcan & van Egmond, 2006). In ‘Audio-visual interactions in product sound design’, Özcan and van Egmond argue that product sounds should not be considered in isolation, but as integral parts of the main product concept. Because the visual aspects of a product appear to dominate the communication of the concept, sound is usually expected to reflect the visual character of a product. The implication of this for sound design is that product designers have a natural tendency to analyse the ‘sound problem’ in isolation from the other properties of a product. In ‘Basic Semantics of Product Sounds’, Özcan and van Egmond claim that designers lack a tool with which to model sound, and that the product designers of the future will require specific competence with interactive sound (Ibid.).
SONIC IDENTITY IN THE FIELD OF FASHION DESIGN

Artificial sound. When sound is applied in the fashion design field it is usually in the context of smart textiles or soft wearables (Berglin, 2013; Dumitrescu, Nilsson, Persson & Worbin, 2014; Tomico, Hallnäs, Liang & Wensveen, 2017; Tomico & Wilde, 2016) to provide an additional property in the form of digital/artificial sound. Soft wearables include clothing and textile-based accessories that incorporate smart textiles and soft electronic interfaces to enable responsive and interactive experiences. Many projects use this embodiment of the senses, which is achieved by embedding sound-emitting elements in textiles.

Several research groups, including the Wearable Senses Lab (Technical University of Eindhoven; TU/e) and Smart Textiles (the Swedish School of Textiles; SST), and labs/project groups such as MAK, STEIM, Kobakant, and EJTech, work with sonic textiles (Cappelen & Andersson, 2011). Although the research area of artificial sounds that are embedded in garments/textiles is interesting and worthy of exploration, projects relating to this have already been undertaken. The literature analysis led to an undiscovered direction – the natural sounds of dress, the physical sounds that are already inherent in materials.

Natural Sound. Many items of clothing are associated with particular sounds: the sound of a zipper is associated with the action of opening and closing a fashion item such as a bag or jacket, for example. The sound differs based on the material of the zip, i.e. metal or plastic. We strongly recall the rustle of a raincoat or the sound of raindrops falling on it, the opening of an umbrella, and the sound of high-heeled shoes. We also link particular sounds to fashion brands, as with Chanel and the sound combination of pearls, metal chains, and tweed. We are familiar with and able to recall these natural sounds that fashion items are synonymous with.

Natural sounds are relatively rarely discussed in relation to fashion. In fashion theory sound is generally presented as an additional part of dress, as in the book Geisha (Dalby, 2008). Here, the clothes of geishas are presented via sonic properties, in that decorative details, such as bells, emit sound as a result of movement, emphasising the sound (the “rustling”) of the wearing of the kimono itself. In Dress Sense: Emotional and Sensory Experiences of the Body and Clothes (Foster & Johnson, 2007), Welters dedicates a chapter to Greek dress, focusing not only on the visual but also on the sonic. In a chapter entitled ‘The Classification System of Dress’ Eicher et al. (2008)
consider sound to be a component of dress. An entire page is dedicated to the sonic properties of dress and several examples are provided, relating largely to the sounds of steps in different footwear and the sounds of the body itself.

Nick Cave’s *Soundsuits* (2009) is one of the few fashion design projects that explores the natural sounds of clothing. Here, full-body costumes crafted from twigs, wooden sticks, buttons, ceramic figurines, toys, and other objects work as ‘sound generators’.

The *Dark Room Fashion Show* (2004) by Lars Hallnäs, Hanna Landin, Riika Townsend, Marcus Bergman, and Clemens Thornquist proposes the natural sound of a dress as a material for fashion, and explores the interaction between the fields of experimental fashion design and sonic art. It is a live performance centred on a fashion catwalk that is based not on visual but sonic perception, and so the sounds of materials were recorded and played to the audience:

*The Dark Room Fashion Show*, staged during EXIT 2004 at the Swedish School of Textiles, was based on a series of workshops where we experimented with the “near field” acoustics of various details of garment and different ways to capture and amplify the micro world of fashion sounds. (Hallnäs, 2004, p. 76)

Another example of natural sounds is a series of 11 short videos that explore the natural sounds of clothing – *The Sound of Clothes: Anechoic* (2006) by Show Studio. During this project, 11 costumes produced by different fashion brands were selected and recorded sonically, and this audio was combined with video material of participants dressing in and interacting with pieces of clothing.

SONIC IDENTITY IN THE FIELD OF SOUND AND PERFORMANCE ART

We can thus conclude that relatively little research has explored sonic aspects as a natural property of materials within the field of fashion. This realisation led to the decision to analyse examples from different fields: sound art and performance art. An example of bodily sounds (voice) is Alvin Lucier’s ground-breaking recording *I Am Sitting in a Room* (1969): “The piece features Lucier recording himself narrating a text, and then playing the tape recording back into the room, re-recording it. The new recording is then played back and re-recorded, and this process is repeated” (Strickland, 1993, p. 281). Every room has its own characteristic frequency, and this is emphasised in Lucier’s work as the sound resonates in the room, until it is replaced.
by the tone of the room itself. Therefore, it is a good example of the voice is affecting the space by resonating.

In the sound-art performance *Inside-Out* (2011), Borges questions the notion of a sonic body, bodily rhythms, and sonic elements of the body. Audio is recorded from near to a performer’s body and immediately transmitted to loudspeakers, meaning that the amplification makes the body audible. Thus, the work of Borges exemplifies the notion of the ‘sonic body’ (Wherein the body is already sonorous).

*The Sonic Body* (2010) by Brandon LaBelle is a work that aims for a total embodiment of sound; processes of ingestion, breathing, hunger, and embodied reaction are recorded, and so an energetic vitality propels the body outside itself and into the creation of a sensual micro-event. Similarly, Paula Garcia’s *Corpo Ruído* (2014) – ‘noise body’ in Portuguese – is a six-hour performance in which Garcia’s body is covered with very strong magnets, and other performers cover these magnets with scraps of industrial iron to the point that her body disappears under the layer of detritus. The relationship between Garcia’s body movements and the sounds created is central here, and both this performance and the work of Brandon LaBelle are strong examples of ‘sounding bodies’ (wherein the body is in motion).

*Ukiyo* (2009), created by the artists, composers, and designers Michele Danjoux and Johannes Birringer, connects the body and movement through creative use of sound. The choreographed installation fuses dance, sound, design, and digital projection to draw attention to the object as a whole, opening up for a new perspective on the moving, clothed body – ‘audial space’.

*Somatic Costumes* (2014) is a part of the ‘Somatic Movement, Costume & Performance’ project by the artist Sally E. Dean. Here, bodily extension is related to movement and the creation of sound through the rustling of plastic bags, which are ‘invisible extensions’ of a body.

The literature review thus showed that research into sonic identity, and more specifically natural sounds in the fashion field – an interesting and original field – is largely non-existent. The analysis guided the research towards a problematic ‘gap’ in the field and shaped a conceptual framework with which to explore the non-visual aspects of fashion based on natural sounds. The concept of sonic identity in the fields of fashion and fashion education pushes this research towards non-visibility and
sound ontology, leading to an examination of the current dominance of the visual in fashion, which is an increasingly contested phenomenon. An experimental fashion programme that merged fashion design, sound art, and performance art was thus developed to move the research towards a potential field – sonic fashion – in order to find new methods, suggest sonic approaches, and propose fundamental knowledge in relation to the field.
RESEARCH APPROACH AND METHODOLOGY
FOUNDATION FOR SONIC FASHION

Research approach. In order to establish a new programme for sonic fashion (supported by definitions and methods) based on the sounds of dress and bodily interactions, the research presented in this thesis utilised a combination of experimental and theoretical methods. In general, a practice-based research and research through design (RTD) methodology (Archer, 1979; Findeli, 1998; Frayling, 1993) was used. This artistic practice-based research sought to acquire new knowledge on sonic identity in the field of fashion design.

The research results were generated partly via experimental design practice: workshops, a ‘sonic diary’, sound recordings, a case study, and the creation of design artefacts. This material was analysed and systematised in order to find the possible categories and definitions of sonic fashion qualities so as to propose a primary design theory relating to sonic clothing and a suggestion for a sonic fashion system.

The research practice became an experiment in itself as it dealt with an alternative form of fashion – sonic silhouette. An experimental approach (Schwab, 2015), “happy accidents” (Meyers, 2007), contingency, and unpredictability were important components of this research. Although sound is an element of dress and identity, the visual sense is predominant in fashion and fashion education, and fashion is essentially understood to be a system of visual components. There is no such subject as ‘sonic fashion’ in fashion design discourse, and so this thesis is experimental and speculative in nature (Dunne, 2008; Dunne & Raby, 2001; 2013).

Building ontology. According to the Oxford English Dictionary, ontology is a set of concepts and categories in a subject area or domain that shows their properties and the relations between them (“Ontology,” 1970, p. 131). Ontology is the philosophical study of the nature of being, becoming, existence, and reality, as well as the basic categories of being and their relations. Ontology often deals with questions concerning which entities exist or may be said to exist and how they can be grouped, related within a hierarchy, and subdivided according to similarities and differences.

Fashion research, in which clothing in particular performs a major role in relation to the social construction of identity, is generally conducted from a perspective that is almost wholly visual.
Although sound, touch, and smell are elements of clothing, visual culture is predominant in the fashion system as material culture and fashion are essentially understood to be a system of visual elements.

The fashion show is visual, we show fashion in magazines, we show our new garment, we see the beautiful clothes of others etc. The basic design aesthetics we learn within the regular fashion design curriculum is all about spatial form and visual expression. It seems somehow natural to train our perception of forgotten aesthetical issues by bracketing these dominant perspectives. (Hallnäs & Redström, 2006, p. 299).

Fashion is primarily a visual ontology consisting of definitions and theory that are based on visual characteristics and design methods for designing and analysing visual identity. In order to rethink fashion as a primarily sonic field, this research aimed to explore and construct new foundational definitions and types of design method. Definitions and methods together form the foundation for sonic fashion, which proposes transformative approach to an undiscovered area in fashion design – sonic identity.

Building sonic fashion definitions (for ontology). In relation to the fields of art and fashion design, the main questions raised were: What is an artistic piece? What is an item of dress? “From the perspective of an art form such as fashion design, the ontological problems are therefore about when something is, or is becoming, e.g. a dress, a garment, a coat, a seam, a pocket, a fashion, etc.” (Thornquist, 2014, p. 42). “Ontological perspectives in dress are about exploring the nature, existence, reality and being of dress in order to propose new definitions in dress and in the creation of dress” (Thornquist, 2012, p. 17). The main ontological questions in this research relate to the fundamental – natural (physical) – sound of dress:

What is a sonic silhouette?

How a sonic silhouette is created?

Other related questions include: What is the relationship between the body and sonic dress? What is a sonic identity, and how do we represent it in the field of fashion? What is the form of a sonic silhouette? What are the modes of being of a sonic silhouette? And into which categories, if any, can we sort sonic silhouettes in order to start building systematic design knowledge?
This research intended to ascertain the answers to these questions by exploring the interactions between experimental design practice and theory creation. The research faced an ontological challenge due to the fact that there exists no theory regarding the natural sounds of fashion: the investigation had to start from a very fundamental point by creating the primary categories, terms, and definitions for a sonic silhouette.

**Building sonic fashion design methods (for ontology).** The methods used for designing or design thinking in the field of fashion are based on visuality – sketching, taking photos/videos, mood-board making, pattern making, draping on a dummy, etc. The elements that are used to design fashion items are visual, and include patterns, colours, and forms. The methods for thinking and designing in relation to sonic fashion design thus needed to be reconsidered on the basis that the main material in such a process is invisible, time-based, and perceived aurally.

Sound-based thinking and designing with sounds involve a new way of perceiving fashion, and so new methods were established, tested, and later collected in a framework entitled *Training for Sonic Fashion*. This consisted of selected exercises and ‘tool-shifters’ – sound amplifiers for exploring different listening modes – which shift the focus from visual to auditory perception. The research findings of this thesis function as an introduction to the concept of sonic fashion.

**The roles of artefacts and practice.** Sonic identity is an alternative way of thinking about fashion. This research used sound-based thinking to create artefacts that were used to explore and investigate the natural sounds of fashion on a fundamental level – the natural sounds of dress. The knowledge of sonic identity in the field of fashion was explored and developed through the research artefacts, which took the form of sonic objects and listening tools. The combination of artefacts used in this research (sonic objects, listening tools, and a collection of recorded sounds) inspired thinking processes and resulted in new experience and insights in relation to the field of fashion design. The artefacts were not art or design products themselves, but “notional objects” (Goodman, 1978) or “object generators” (Wensveen & Matthews, 2015). Artefacts were an integral part of the practice, and were used to develop and analyse theories – in this case, the development proceeded from the Sonic Fashion Archive (artefact) to the Sonic Fashion Taxonomy (theory).
RESEARCH APPROACH AND METHODOLOGY

In design experiments, we present suggestions; they illustrate and show the direction of a proposed program, methods, new design materials. Experiments present suggestions. It can also, be a matter of probing, exploring, presenting a notion. In this case, the design presents a given notion providing a foundation for, or a guiding example of, the given concept, idea etc. (Hallnäs & Redström, 2006, pp. 134-135)

Experimental objects, such as sonic objects, and tools for listening were central to the research, and intended to generate and test ideas. The artefacts used in this research were sonic in nature – invisible and time-based – and opened up new territory, in the form of an audial dimension, in the field of fashion design. As Zimmerman et al. state, an RTD methodology is the “process of iteratively designing artefacts as a creative way of investigating what a potential future might be” (2010, p. 312).

Theory creation and the role of theory. What is the role of theory in practice-based research? As Hallnäs and Redström argue,

> theoretical reflection on practice, experimental practice or professional work practice, is what we need for: the formulation of new design programs, the formulation of new design methods, the formulation of new teaching methods with respect to the issue of a systematic design aesthetics, the issue of systematic design critique, the issue of foundations.
> (2006, p. 141)

The theoretical foundation of sonic fashion resulted in new insights regarding non-visual aesthetics in the fashion field that are based on sonic expressions – the natural sounds of dress. They thus created a new concept in the form of the ‘sonic silhouette’.

Glanville argues that “theory is what turns the (collection of) observations we build into science” (1999, p. 84). “Through practice we expose basic questions related to the ‘why’ normally implicit in our foundations, thereby using design practice is a way to perform experiments to develop theory” (Hallnäs & Redström, 2006, p. 132). “The question of how practice relates to theoretical foundations becomes increasingly important. Just as theoretical foundations can help us reflect upon certain things (as well as help us forget about others), so do the methods and design programs we use.” (Ibid., p. 129).

In Making Design Theory (2017), Redström articulates the need for design theories that “support conceptualising, articulating, making, communicating, collaboratively
creating, and so on, something new and particular” (2017, p. 5). He writes that design theory is “transitional”, inherently unstable, fluid, and dynamic in character:

The basic idea is to create this shift in perspective by evoking the temporality of theory: by considering theory as something not always stable and constant, but in this case as something unfolding, something acted as much as articulated, performed as much as described. (2017, p. 2)

To summarise, this research intended to construct a theoretical framework of a fundamental nature and propose new definitions and methods for the fashion field. These were to be on the subject of sonic fashion, and function as propositional, transformative knowledge. While the theory was to be foundational in nature, it is also open to changes.

**Data-collection strategy and data characteristics.** The main data presented in this research is the collection of sounds of items of dress, which were recorded during the artistic practice. Interviews, discussions, and reflections recorded during or after the research workshops and experiments are also presented in audio form. Video was combined with audio to map sound in order to analyse the relationship between body movements and sounding/sound-absorbing objects.

**Methods for artistic practice.** Various qualitative methods taken from different disciplines (art, social science, design) were used for the artistic practice. Six primary methods were utilised: sensitising the body, speculative design, design experiments, sound documentation, research (sonic) diary, and case study.

*Sensitising the body* was based on different listening modes, and used low- and high-tech sound amplifiers to increase awareness of sound and shift the focus away from the visual and towards the sonic. It was utilised and developed during the experimental workshops and collaborative projects.

*Speculative design* was used to test sonic fashion concepts, generate ideas regarding sonic identities, and create speculative artefacts. This method was developed during the speculative workshops with students and people with different seeing abilities.
**RESEARCH APPROACH AND METHODOLOGY**

*Design experiments* were used to investigate sonic perception, body amplification/isolation, and the relationship between the moving body and sonic objects. Experimental design objects were selected after the investigations and presented as tool-shifters.

*Sound documentation* was used to collect the main data of this research – the sounds of dress – which was split into groups in order to establish different sonic categories. These categories were analysed and presented as a taxonomy of sonic fashion.

The ‘sonic diary’ was used to imagine and analyse the sonic properties of clothing through cultural and historical perspectives. The cultural/historical examples were collected as audio/audio-visual documentation.

The *case study* took the form of a participatory research act in the international project Beyond Seeing. Methods were developed and the notion of a sonic silhouette was defined through collaboration with people with different seeing abilities.

**Data-analysis methods.** The analysis that was conducted during this research was a reflective activity intended to move from the level of data to concept (i.e. a theory for sonic fashion). Two methods – ‘interaction net’ (Jones, 1992) and ‘classification of design information’ (Jones, 1992) – were used to analyse the collected data and construct a theoretical framework for sonic fashion.

After the sounds of each fashion item had been recorded, categories were established and variables and the relationships between them were identified. The classifications were later revised and updated to reflect the final design categories that were used for the taxonomy system. The ‘interaction net’ method was intended to define the elements/variants of sonic fashion design and ascertain the connections between them, with the pattern of the net showing the relationship between each category. The ‘classification of design information’ method was used to organise and classify these categories and create the typological system for sonic fashion design that became the theoretical framework for sonic fashion.

**Method for presenting artistic practice.** As is discussed above, the research artefacts used were idea-generators and tool-shifters. The ‘annotated portfolio’ method (Bowers, 2012; Gaver & Bowers, 2012; Löwgren, 2013) was used to present an overview of the artistic practice, i.e. the activities and outcomes on a timeline.
This format conceptualised the theory for developing the foundations of sonic fashion (Fig. 1). This allowed the creation of a systematic and conceptual body of research, as well as the connections between theory and artefacts to be identified (Gaver & Bowers, 2012).

The research practice was organised into three main sections: I. Training For Sonic Fashion, II. Extending the Body through Sound, and III. A Sonic Fashion System.

I. Training for Sonic Fashion consisted of four activities: Pilot Study 1: Sound from the Past, Pilot Study 2: Sonic Images, Pilot Study 3: Listening to Fashion, and Study 1: Beyond Seeing. The purpose of Pilot Studies 1-3 was to explore the non-visual aspects of fashion and test the pilot exercises within workshops. Following this, Study 1 – a three-day research workshop – was arranged for further development. The main outcome of this part of the research was the Training Set, which consisted of 16 exercises and tools (three analogue sound amplifiers: ‘glass headphones’, cones, cylinders and an infrasound amplifier). In addition, Methodological Guidelines for Training for Sonic Fashion, which suggests different ways of working with this training set, was developed.

II. Extending the Body through Sound consisted of Study 2: Sound Map. The aim of this study was to investigate the notion of a sonic silhouette and explore the relationship between the subject (body) and object (sound of dress). The study was performed using three object variables: balance, placement, and quantity. The main outcome was the definition of the primary terms, such as ‘sonic silhouette’ and ‘sounding silhouette’.

III. A Sonic Fashion System consisted of two activities: Study 3: The Sounds of Steps and Study 4: Sonic Expressions. The aim of Study 3 was to analyse the relationship between gait and the sound of footwear. Different sonic categories were found with regard to specific footwear and its components. Study 4 explored the sonic expressions of dress through sound-recording sessions and a costume collection (Theaterkunst GmbH, Berlin). The sonic expressions were grouped into nine primary categories: (1) main material, (2) lining, (3) height, (4) length (5) weight, (6) fit, (7) fastening, (8) decorative elements, and (9) placement. Hierarchical relationships between the categories were established and a primary taxonomy was suggested, which is presented as the main outcome of this section.
Foundation for Sonic Fashion

Training for Sonic Fashion

Extending the Body Through Sound

Training set (16 exercises and tool-shifters) + methodological guidelines

Pilot Study 1: Sound from the Past

Pilot Study 2: Sonic Images

Pilot Study 3: Listening to Fashion

Study 1: Beyond Seeing

Pilot Study 2: Sonic Images

Dress presence of sound

Primary terms and definitions for a sonic silhouette

Study 1: Beyond Seeing
FOUNDATION FOR SONIC FASHION

THE BODY THROUGH SOUND — — — SONIC FASHION SYSTEM

Primary taxonomy of sonic fashion

Primary terms and definitions for a sonic silhouette

Study 2: Sound Map

Study 3: Sounds of Steps

Study 4: Sonic Expressions

Figure 1: An overview of the main research practices and outcomes on a timeline.
TRAINING FOR SONIC FASHION
SOUNDINATION

The terminology that is generally used to philosophically debate perceptual experience – appearance, scenery, imagery, and observation – is predominantly visual (O’Callaghan, 2007). We do not have terminology along the lines of ‘soundination’ (auditory imagination), ‘smellination’ (olfactory imagination) or ‘haptination’ (haptic imagination). ‘Imagination’ derives from the word ‘image’ and refers to visual culture, and the verb form of ‘imagination’ is ‘to imagine’. Would the verb form of soundination be ‘to soundine’? What is the relationship between images and sounds? Are you seeing this sentence or/and hearing it?

In the early days of cinema there was no sound at all. In silent films dialogue was conveyed using gestures and mime in conjunction with title cards (written indications of the plot and key dialogue lines). The idea of combining motion pictures with recorded sound is nearly as old as film itself, and the introduction of synchronised dialogue became practical only in the late 1920s (Reviews & Phillips, 2012). However, audiences easily imagined the suggested sounds when watching the films. Can we “soundine” the sounds of fashion items just by looking at fashion objects? Can we “soundine” the sound of an outfit or detail that we have never heard, e.g. clothing or accessories that come from different cultures or historical eras?

Cultural Sounds. At the very beginning of my research I studied the sonic aspects of clothing and wrote a ‘sonic diary’, in which I collected fashion illustrations of historical and cultural significance and attempted to imagine the sounds that the garments would have emitted. An identical cultural sound could be heard by wearing a pair of shoes belonging to a particular culture, such as lotus, geta, or zōri shoes. We notice the sound of a person’s footsteps when stiff or hard footwear is worn. The lily foot is an example of the body being modified as it results in us not only seeing but hearing it. North American men often stride forcefully, which was evidenced aurally during the 1950s by the sharp metallic noise of the cleats that were often attached to the bottom of men’s shoes (the same noise is made by golf shoes when worn indoors). Tap dancers emphasise the rhythmic sounds made by their shoes with metal taps on the soles (Eicher et al., 2008).

Japanese women often barely lift their feet due to the fact that they take short steps, and so their shoe-covered feet make a scraping sound against the ground. Dalby describes the sound of a geisha wearing Western clothing:
When they wear Western clothes, geisha scrape their feet along as they are used to doing in their zōri. Their manner of walking with turned-in feet, which makes a kimono rustle delicately, looks simply pigeon-toed in shoes and a dress. They seem to be wearing invisible kimono, gesturing as if long sleeves were quietly constraining their arms (Dalby, 2008, p. 292).

The imagination and memory are closely related: “Geisha will appear before guests only in silk kimono and, further, only in certain kinds of silk kimono” (Ibid., p. 293). If we were to hear the particular sound of a certain kind of silk we could imagine it, but it would not be the correct sound because we do not have it in our memories – we would recall the sound of silk that we remember from our experience. What kind of sound do we imagine when we look at a garment/wearable object that we have never heard before because it comes from the past?

**Historical Sounds.** A cuckoo clock, the return bell on a typewriter, a hand-cranked telephone, and weights being dropped on scales are just a few examples of the sounds that have disappeared over time. Soundscapes are constantly evolving, and sounds can disappear over time. Where are the museums for housing them? How many sounds from your youth are no longer heard today? Can you imagine the sound of a fifteenth-century Italian suit of armour? Sonic silhouettes change over time, and there are many examples from specific eras: the sound of cotton folds touching each other on ancient togas, of the audio cassette playing in a Walkman, of a smartphone when a new WhatsApp message arrives or someone calls on Skype. What sort of sounds will people’s footsteps make in the future? Will they be digital, or constant and unceasing? Perhaps they will be characterised by fast rhythms, or simply merge together?

When writing the ‘sonic diary’, I realised that clothing sounds would likely have been difficult to listen to in, say, the fifteenth to seventeenth centuries due to the ubiquity of accessories, veils, and hats which half or fully covered the ears. Women wore head accessories or large high-ruffed collars, which amplified or reflected the wearer’s voice differently. In the seventeenth and eighteenth centuries the sound of skin touching the large, curly wigs that were frequently worn would have been common. These sounds were specific to particular centuries, and served as ‘sonic filters’. As the wigs were typically quite thick, they were sound-absorbing and/or reduced the volume of other sounds. This pre-study of cultural-historical sounds of dress led to a deeper investigation that is presented in Pilot Study 1: Sound from the Past.

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1. These examples are taken from a survey that I conducted, to which 44 responses were received.
PILOT STUDY 1: SOUND FROM THE PAST


Curators. Prof. Jolanta Talaikytė, senior lecturer, Costume Design department, VAA; Assoc. Prof. Renata Maloutienė, senior lecturer, Costume Design department, VAA; Gintautas Trimakas, Head of Photography and Media Arts Laboratory, VAA; Eglė Greliauskaite-Tursienė, PhD student, VAA; Rasa Šapnagienė, Head of Costume Design Laboratory, VAA.

Aim. Explore the synergy between the body, accessories, and sound; to analyse the relationship between imagined sounds (photographs of anklets) and present sound (anklet replicas).

Objects. Body, accessory (anklets) and sound.

Objectives:

Introduction stage: Explore the synergy between body, space, and sound while listening and performing with the VAA Chamber Choir on-stage.

Inspiration stage: Collect photographs of cultural-historical fashion items that sparked the imagining of never-heard sounds relating to a particular outfit/element of an outfit, and select one for further development.

Production stage: Produce the object shown in the chosen photograph.

Exploration stage: Explore and analyse the sonic properties of the produced object with regard to movement and the body.

Documentation stage: Wear the object and record this using audio and video equipment to produce a short artistic movie.

Results and discussions: Present and discuss the audiovisual work during an ArcInTexETN meeting; summarise the findings of the discussion and artistic study.

Methods. Sound and video documentation, design experiment.

Tools. Sheet of metal, metal cutting and polishing tools, sound recorder (Tascam DR-40 V2), headphones (Bose QC25), camera (Canon EOS 750D), computer, projector, loudspeakers.
Introduction. The introductory aspect of the study was performed as active practice: listening and performing on-stage with the VAA chamber choir. This introduction inspired an analysis of the difference between the acts of looking at the choir preparing to sing, and listening to them. The experience of being one silent body and a merged sonic body while singing inspired deeper investigation regarding the sonic experience when the body is sonorous.

Inspiration. During this stage, cultural-historical fashion photographs that caused the never-heard sound of a particular outfit/element of an outfit to be imagined were collected, and a photograph from 1922 showing a woman wearing large metal anklets was selected for further development. The immense anklets were the main part of a female outfit of the Igbo culture, native to the south-eastern part of Nigeria, and were worn until the early twentieth century. Women wore them permanently, stuffing rags between the skin and the metal to prevent chafing, and walked with a swing of the leg in order to avoid the plates crashing together and making a very loud sound. The large anklets of the Igbo women were the cause of much inspiration and led to
attempts to imagine sounds that I had never heard before. It was possible to guess which material used to make the accessory, and the association led to the sound of metal plates clanging against one another. A wearable replica of the anklets was made in order to explore the relationship between movement and sound.

**Production.** A replica of the object selected in the previous stage was made in the metal workshop at VAA (Fig. 2). Due to the limited time available, the object was simplified and produced without the metal part that protects the skin from the metal, which was instead made of wool.

**Exploration.** The sonic properties of the object were explored with regard to movement and the body. The extended body became sonorous when moving, and different body motions and rhythms affected this further. I wore the anklets, and my body became a musical instrument that transmitted the metal sound of the accessory (the anklets) that I had never worn before.

**Documentation.** A sound recorder and video camera were used to document the sound and movement created while wearing the replica. The audio and video footage was collected, analysed, and used to create a short artistic movie, which was presented and discussed during an ArcInTexETN meeting.

**Results and discussion.** Auditory imagination and the sonic aspects of dress provide inspiring and original insights into fashion design. Trying to imagine a sound by looking at visual elements shifts the focus from visual to sonic perception. Therefore, one can find new (or forgotten) aspects of fashion, such as the cultural-historical sound of a specific fashion item. Analysis of sonic aspects allows us to dive into an unexplored field of fashion – the audial dimension. The new experiences of wearing a sound and hearing a fashion item occurred through the creation and wearing of a replica of an object from the past. This new experience of ‘wearing cultural history’ – the replica of the Igbo anklets – provided a deeper understanding of the different layers of fashion, and the relationship between imagined and present sounds. The imagined sound of the anklets was not as loud as the reality when walking with the replica; the hitherto-not-experienced sound from the past was not linked to memory, and this is why this kind of study is speculative and imaginative. When a sound has not been heard, associations from one’s memory must be used, and this ‘turns on’ one’s creativity.
The analysis of the recorded footage showed how important walking manner was with regard to the sounds produced. The body became sonorous due to the interaction between the body and the sounding accessory, i.e. the act of moving. The faster the body moved, the louder the sound emitted – and vice versa. The gait changed due to the unwanted loud sounds that the body emitted while moving, slowing down or changing, with the legs being spread wider than usual in order to avoid the loud sound of the metal plates touching each other. The body was extended and amplified through the sounding artefact, resulting in a very different perception of a fashion item. As a result, the manifestation of the sonic clothing item was foundational, and deemed to be potentially interesting with regard to further investigation. The study was presented at the Redo Cumulus conference.

Pilot Study 1: Sound from the Past led to the development of the ‘Sonic Images’ exercise, to be used during workshops with students. Could this method of imagining sounds help to introduce students to sonic fashion design? How do we describe sonic aspects of clothing, and what is the vocabulary of sonic fashion? These questions were investigated by Pilot Study 2: Sonic Images and Pilot Study 3: Listening to Fashion while conducting a workshop for fashion design students at VAA. In both studies, a collection of 17 items was used. In Pilot Study 2 the students were only shown photographs of the 17 items, while in Pilot Study 3 the sounds of the items were recorded and presented to the students, who were then shown the photographs. Both studies were arranged in order to test and develop the training method and prepare the framework for the research workshop (see Study 1: Beyond Seeing).
PILOT STUDY 2: SONIC IMAGES

Location of the workshop. Vilnius Academy of Arts (VAA), Vilnius, Lithuania. Part of the ‘Soundtopia’ workshop.

Curators. Vidmina Stasiulytė, PhD student, SST, Borås, Sweden; Prof. Jolanta Vazalinskienė, Head of the Costume Design department, VAA, Lithuania; Ramunė Šuščevičiūtė, coordinator of the Costume Design department, VAA, Lithuania.

Participants. 18 BA and 4 MA Fashion Design students.

Aim. Investigate sonic fashion representation and vocabulary by having fashion design students use the sound-based thinking exercise ‘Sonic Images’.

Objects. ‘Sonic Images’, a collection of photographs that stimulates the imagining of dress.

Objectives:

Introduction: Focus on sounds and trigger audial imagination through a blind-folded ‘sound-walk’ at VAA.

Inspiration: Stimulate sound-based thinking by providing examples from Study 1: Sound from the Past and the ‘sonic diary’.

Exercises: Explore and analyse how students define/describe the sonic properties of the examples.

Results and discussion: Analyse the collected material and draw conclusions/propose changes for future workshops.

Methods. Sound and image documentation, sensitising the body, the ‘sonic diary’.

Tools. Sound recorder (Zoom H4N), headphones (Bose QC25), computer, projector, loudspeakers, blank A4 paper.
Introduction. In order to place the focus on sounds and trigger audial imagination, students were taken on a blind-folded ‘sound-walk’ at the Academy, which began on the second floor and ended at the lobby on the main floor. The students were asked to focus on and collect the sounds that they heard, and notice the sounds of their own clothing and bodies while moving. The sounds and the differences between seeing and not seeing an object that emits sound were then discussed.

Inspiration. In order to stimulate sound-based thinking, the examples of Pilot Study 1: Sound from the Past and the ‘sonic diary’ were presented. The students were asked to imagine the sounds that would be made by the examples and discuss these imagined sounds and the objects’ sonic properties.

Exercises. The primary aim of this experiment was to test the exercise itself; whether it shifted the focus from visual to audial, and how it assisted the students in exploring, defining, and describing the sonic properties of the fashion items. 17 photographs (Figs. 3 and 4) were shown, and the students were asked to write the sonic properties of each image on a sheet of paper.

Results and discussion. After the exercise, the sonic properties of clothing were discussed and the students described each image using sonic terms. The sheets of paper containing sonic descriptions were collected and analysed with the students. The results indicate that it was difficult for the students to describe fashion items in sonic terms, with the fashion item that was best described being the violet polyester dress (Fig. 3, Image 7). This prompted the most associations with sound, and it can be argued that its sonic aspects were stronger than its visual ones. The students primarily associated the dress with imagined sounds (e.g. “the sound of trees rustling”, “cellophane crunching”, “the sound of rain”) or the sound of the dress’s material in the active mode (e.g. “rustle”, “squeak”, “creak”). The active mode was based on body-clothing interaction, i.e. the wearing of a fashion item. Several students described the garment in relation to the intensity of the sound, using words such as “noise” and “loud” (Fig. 4, Image 9) or “rhythmic sound” (Fig. 4, Images 11 and 16). Noise absorption is another aspect of sound that was mentioned; Sonic Images 2 and 6 – the fur vest and fur coat, respectively – were described using the words “silence” and “soft silence”. Although students described the Sonic Images in sonic terms, this process was very challenging for them. Therefore, the discourse and terminology relating to the sonic aspects of fashion could be broadened more on the basis that the students struggled to find the sonic terms with which to describe the chosen fashion
items. As the results show, the descriptive vocabulary involves different aspects of sound, such as *intensity* and *active/passive modes*, *the sound of material itself*, leading to further investigation of the different categories of sonic expression. The exercise worked very well for shifting the focus toward the sound-thinking, therefore could be developed further.

*Suggested changes.* The blind-folded ‘sound-walk’ was found to be too intense. Although the students were guided from the second to the main floor, their attention was divided between the listening experience and avoiding colliding with walls or falling down stairs. The introductory element of the exercise could be simplified using eye masks when in the room or walking down the corridor outside the workshop room.

It would have been useful to record the discussion for later analysis as several interesting points were made.

As some garments featured sonic details, it would also have been useful to have taken photographs of the lining of each garment.
Pilot Study 2: Sonic Images

1. Clothing item 1
2. Clothing item 2
3. Clothing item 3
4. Clothing item 4
Figure 3. Sonic Images 1-8
Pilot Study 2: Sonic Images
PILOT STUDY 3: LISTENING TO FASHION

Location of the workshop. Vilnius Academy of Arts (VAA), Telšiai, Lithuania. Part of the 'Soundtopia' workshop.

Curators. Vidmina Stasiulytė, PhD student, SST; Prof. Zita Inčiauskienė, Head of the Design department, VAA; Žydrūnė Kriūkaitė-Juciuvienė, Senior Lecturer at the Design department, VAA.

Participants. 10 BA Fashion and Textile Design students.

Aim. Investigate the relationship between sound and image using the sound-based thinking exercise ‘Listening to Fashion’ with fashion and textile design students.

Objects. A collection of sound recordings of fashion items.

Objectives:

Introduction: Focus on sounds and trigger audial perception using sound amplifiers.
Inspiration: Encourage sound-based thinking by providing the examples from Study 1: Sound from the Past and the ‘sonic diary’.
Exercises: Explore and analyse how students imagine fashion items by playing the recordings of garments/accessories/shoes.
Data collection: Record the discussion for later analysis.
Results and discussion: Analyse the collected material, draw conclusions/propose changes to future workshops, and develop exercises further.

Methods. Sound and image documentation, sensitising the body, the ‘sonic diary’.

Tools. Sound-amplifying cones, sound recorder (Zoom H4N), headphones (Bose QC25), computer, projector, loudspeakers.
**Introduction.** In order to shift the focus to sounds and stimulate audial perception, the students were asked to wear sound-amplifying cones made of thread reels (Fig. 5) to listen to their surroundings, initially with cones in both ears and then using only one, switching from the right ear to the left. They were asked to focus on the different sounds that they could hear. The students walked around and listened to the internal and external sounds of the academy, and were asked to pay attention to the sounds of their own clothing while walking. After this 30-minute introduction, sonic perception and the experienced audial pallet were discussed.

**Inspiration.** In order to stimulate sound-based thinking, the examples of Pilot Study 1: Sound from the Past and the ‘sonic diary’ were presented. The students analysed the examples and discussed the sonic aspects of clothing.
Exercises. The primary aim of the experiment was to explore and analyse how the students imagined fashion items when they listened to the recorded sound of one of 17 garments/accessories/pairs of shoes (Figs. 6 and 7). The students were asked to describe the sounds that they heard and the kind of fashion item the recording may have been of. An image of the fashion item was then shown.

Data collection. The discussion that proceeded the exercise was recorded for later analysis.

Results and discussion. After the exercises, the students discussed the recordings, associations, and sonic properties of clothing, as well as the relationship between sound and image.

The analysis of the collected audio material suggests that it is easier to guess a very common sound, such as that made by polyester (Fig. 6, Images 1, 3, and 7) and rubber (Fig. 7, Image 15). The sound of stickiness is very specific, and allows this particular fashion item to be described (Fig. 7, Image 9). It was also easy to guess the sound of footwear (Fig. 7, Images 11 and 17). Some fashion items were easy to identify as a result of hearing the movement of the material, while for others the interaction between the body and the item was more informative, as with walking in shoes. Therefore, the physical aspect of the material is important for some objects, while for others it is the function (e.g. walking). Hence, elements of a garment such as zips and fastenings made it easier to guess what an object was.

The stethoscope (Fig. 7, Image 13) was the most difficult, likely due to lack of familiarity and its use in the relatively unfamiliar medical field.

The necklace (Fig. 7, Image 14) directed the students towards the wardrobe, and thus the concept of accessories, as the materials (metal and plastic) were easy to identify.

The boxing gloves (Fig. 7, Image 12) were not easy to identify due to their fit. While the rubber gloves have a strong, identifying sound that relates to medical interaction with the body or cleaning act, the boxing gloves proved to be more difficult.
The calf-length boots and clogs (Fig. 7, Images 11 and 17, respectively) were identified based on the differences in terms of the sole and heel (with regard to height and form) of each. The results indicate that the height of footwear is very important with regard to the sound produced, and taller footwear adds another layer to the sonic identity (the calf-length boots touch each other during walking, for example). The zip (opening and closing act) indicate the height of a shoe, and longer zips (Fig. 6, Image 1; Fig. 7, Image 11) better facilitated the identification of objects. In some cases, they were wholly unable to guess the garments, as was the case with those shown in Fig. 6, Images 2 and 6; here, the garments were made from sound-absorbing materials (fur), and so the sound was very subtle.

At the end of the workshop, the sound collage experiment was presented – the sounds of the objects shown in Fig. 7, Images 16 and 17. Here, the sound of a person walking in clogs was merged with that of someone using a wooden stick, and the students were asked to guess the fashion item. Most of the students were able to recognise the sounds that they heard, and felt that the collage was easy to understand because of the ‘training’ in listening that they had received.

The sonic categories were established in order to describe sounds, and include length, weight, and fit. These have the potential to broaden the vocabulary of fashion terminology, and therefore are an interesting area for further investigation (see the ‘A Sonic Fashion System’ chapter in this thesis).

In comparison to Pilot Study 2, this inversion of Pilot Study 3 (listening to a recording of a fashion item before seeing an image) proved to be more challenging for the students as sound-thinking is a very new experience in their own education and practice. Therefore, the focus on ‘training’ was chosen for further exploration.

It was felt that the method of recording the sound of each fashion item could be improved with regard to the clearness of the body-dress interactions/movements (e.g. dressing and undressing); these improvements will be enacted in future research (see the ‘A Sonic Fashion System’ chapter in this thesis).

The ‘sound-walk’ using sound amplifiers worked very well, and allowed the students to shift their focus away from the visual and to the sonic. It was felt that further tool-shifters would be useful in future workshops for introducing sonic aspects into fashion design. As a result, Study 1: Beyond Seeing was arranged.
Pilot Study 3: Listening to Fashion

1. <image>
2. <image>
3. <image>
4. <image>
Figure 6. Listening to Fashion, sounds 1-8
Pilot Study 3: Listening to Fashion
Figure 7. Listening to Fashion, sounds 9-17
TRAINING FOR SONIC FASHION

STUDY 1: BEYOND SEEING

Location of the research workshop. The Textile Museum of Sweden (SST), Borås, Sweden.

Curators. Vidmina Stasiulytė, PhD student, SST; Prof. Clemens Thornquist, SST; Francine Pairon, programme curator for 'Beyond Seeing', La Cambre-Mode, Brussels, Belgium; Katharina Scriba, programme curator for 'Beyond Seeing', Goethe-Institut, Paris, France; Timo Unger, assistant and press contact for ‘Beyond Seeing’, Goethe-Institut, Paris, France.


Objects. Body, space, sound objects.

Aim. To investigate the notion of a sonic silhouette and test the ‘training’ method.

Objectives:
Exploration: Test the training method with the research workshop participants; explore how they carry out the given exercises.
Documentation: Record sounds and discussions, and record video footage of the group exercises.
Analysis: Analyse the recorded footage.
Results and discussion: Update the exercises.

Methods. Sound and video documentation, speculative design, sensitising the body, case study, ‘sound-walk’, 16 exercises.

Tools. Sound recorder (Zoom H4N), headphones (Bose QC25), video camera (Panasonic DMC-G7K), tripod, loudspeakers (Genelec 8030A), sound-amplifying cones and cylinders, along with infrasound amplifiers and ‘glass headphones’, eye masks, sonic materials, computer.
The predecessors to Study 1 indicated that shifting the focus from visual to sonic in relation to fashion is challenging, and requires training in listening and perceiving the aural dimension. The Pilot Studies conducted with students demonstrated that exercises such as ‘Sonic Images’ and ‘Listening to Fashion’ function well as introductions to the sonic aspect of fashion, and so this ‘training method’ was further investigated.

I had the opportunity to join the international project ‘Beyond Seeing’, which aims to find new, non-visual concepts, tools, and methods for fashion (more about the project: https://www.goethe.de/ins/fr/prj/bes/en/res.html). The primary question of ‘how do we perceive and design fashion without visual stimuli?’ was explored within the project’s activities. The non-visual aspects of fashion were investigated alongside with people with different seeing abilities, artists, students, and professors from various design schools. The non-visual aesthetics of fashion were explored in relation to sound, smell, touch, and motion. It was valuable in terms of sonic fashion and my own research in that the training method was tested and developed during one of the project’s research workshops.

The three-day research workshop, also called ‘Beyond Seeing’, was held at SST and focused on testing the sonic fashion training method alongside 13 participants. The training method was investigated by challenging four groups of participants with 16 exercises, which were based on the sonic aspects of fashion: **Listening, Touching-listening, Speculative-kinetic,** and **Sounding-performing.** Literature, such as *A Sound Education: 100 Exercises in Listening and Sound-Making* (Murray & Murray, 1992), *Grapefruit* (Ono & Lennon, 2000), *Pedagogical Sketchbook* (Klee & Moholy-Nagy, 1953), and *Artistic Development in [Fashion] Design* (Thornquist, 2010), was used as inspiration during the creation of the exercises.

The tools and materials for the investigation were prepared in advance. The analogue (cones, ‘glass headphones’, cylinders) and digital (infrasound) amplifiers (Fig. 8) and sound room (the floor of which was covered with different sounding materials) were used for the listening exercises. A collection of pre-recorded sounds of various fashion items was used for the exercise ‘Sound quiz’. The workshop was held at the Textile Museum of Sweden, located at SST. Clothing, footwear, headwear, and accessories were selected from the collection of the Museum, and later used for ‘Selecting fashion by hand’ (Exercise 9). ‘Tactile Sketches’ created by the textile designer Rugilė
Gumuliauskaitė (a researcher at VAA) were used for ‘Seeing fashion through hands’ (Exercise 8), and e-textile samples made by the textile designer Emilie Gilies (a researcher at The Open University) were explored in ‘Embedding sound in textiles’ (Exercise 11).

The speculative method was used to create a scenario involving a future in which visuals do not exist (Exercise 11: ‘Introducing the self’) and to explore bodily rhythms through translating sound into movement (Exercise 12: ‘Sound Translation’). After the introductory part of the exercises, experiments involving creating analogue sonic silhouettes were conducted. The materials for creating the sonic silhouettes were pre-selected: fabrics that make interesting sounds, paper, cardboard, plastic, wooden sticks, metal details, etc. The participants were divided into two groups and created the analogue sonic silhouettes; later, they listened to the digital recordings and compared these to their real-time experience. The outcome of this research workshop is the collection of exercises, tools, and methods for exploring sonic fashion.
TRAINING FOR SONIC FASHION

a

b
Figure 8. Listening devices: a. ‘Glass headphones’; b. cones and cylinders; c. an infrasound amplifier.
Exercise 0. Focusing hearing

Instructions

Put on the eye mask.

Listen.
Exercise 1. Listening to self

Instructions

Put on the ‘glass headphones’ and listen to yourself.

Notice the sounds coming from inside you.

What are these sounds?
Exercise 2. Listening with amplifier cones

Instructions

Put one of the cones on one of your ears.

Listen.

Put both of the cones on both ears.

Listen.

What kinds of sound do you hear?

Can you discern and filter the sounds?
Exercise 3. Listening with cylinders

Instructions

Put the cylinders on your ears.

Stand,

listen.

Walk,

listen.

Walk backwards while listening.

Did you notice the difference?

What kinds of sound do you hear?
Exercise 4. Listening to infrasound

Instructions

Put the headphones attached to the infrasound amplifier on your ears.

By moving the amplifier, listen to the electronic signals that come from computers, telephones, electrical sockets, etc.

Feel that your body is amplified: you can now hear the infrasound frequencies that you were not able to hear with your ears.

What kinds of sound do you hear?

How does this experience change your perception of the un-heard and the invisible?
Exercise 5: Collective listening with sound amplifiers

Instructions

Select any amplifier and put it/them on your ear(s).

Listen to each other while using the same or different amplifiers.

Do you hear each other?

What sounds do you hear?
Exercise 6: Sound quiz

Instructions

*Listen to the pre-recorded sounds of clothing.*

*Guess what kind of fashion item each recording may be of.*

*Look at the photograph and compare your imagined sound to what you see.*

*Did you guess correctly?*

*What sound did you imagine?*
Exercise 7: Blindfolded sound-walk through the sound room

Instructions

*Put on your eye mask and let me guide you to the sound room.*

*Stand,*

*listen.*

*Walk,*

*listen.*

What sounds do you hear?

How big is the room?

What material(s) is the floor covered with?
Exercise 8: Seeing fashion through your hands

Instructions

*Put on your eye mask.*

*Pick up the tactile sketch.*

*Touch it.*

*What do you imagine?*

*What kind of silhouette does it have?*
Exercise 9: Selecting fashion by hand

Instructions

Put on your eye mask.

Let me guide you to the wardrobe.

Choose the fashion item you like.

Wear it.

*Present to the group what you are wearing, without using visually based terminology.*
Exercise 10: Embedding sound

Instructions

Divide into groups of two.

Pick up the textile sample you were given.

What kind of sound would you add to this particular textile?

Why did you choose this sound?
Exercise 11: Introducing the self

Instructions

Put on your eye mask.

Imagine that you are in the future where there are no visuals.

Introduce yourself to others.
Exercise 12: Sound translation

Instructions

Choose a material that makes an interesting sound.

Play with it: touch it, (un)fold it, wear it, sit on it, etc.

Stand in a circle with the other participants.

Perform as a group; translate the sound using body movements.

How are the rhythms and sound connected?
Exercise 13: Creating an analog sonic silhouette

Instructions

Divide into two groups.

Put on your eye masks.

Select the materials that you would like to use to create a sonic silhouette.

Create a live sonic silhouette that lasts 10 minutes.
Exercise 14: Performing an analog sonic silhouette

Instructions

*Group 1 listens while wearing eye masks while Group 2 performs a sonic silhouette.*

*Group 2 listens while wearing eye masks while Group 1 performs a sonic silhouette.*

*Share your experiences with the group.*
Exercise 15: Listening to a digital sonic silhouette

Instructions

Put on your eye mask.

Listen to the recorded sonic silhouettes through the loudspeakers.

Take off your eye mask.

Listen to the recorded sonic silhouettes through the loudspeakers.

Compare your experience with and without the eye mask.

Compare the analogue and digital versions of the sonic silhouettes.

Share your experiences with the group.
Documentation. The sonic silhouettes were digitised using a sound recorder. The discussions and group exercises were filmed for later analysis.

Analysis. The recordings (sonic and visual) were analysed and presented as research workshop findings.

Results and discussion

The listening exercises (Exercises 0-6) functioned well as an introduction to the audial dimension, helping the participants to focus their attention on and filter sounds. New listening experiences were explored using analogue and digital sound amplifiers (Fig. 8); this involved directing, filtering, and spotting sounds, amplifying hearing, and extending the body’s limits by hearing the previously un-heard. The cone and infrasound amplifiers were the most useful in shifting from the visual to the sonic, and the participants found their own ways of combining the amplifiers for individual and group listening. Spotting and filtering sound resulted in an interesting insight into sonic identity, in that there was speculation as to how sonic identities could be heard and filtered using amplified hearing.

It was possible to mix the analogue sound amplifiers, with e.g. the cone on the right ear and the cylinder on the left. The experience of sound amplification differed based on the amplifier used, with the sounds heard using the cylinder seeming more ‘pointed’ than those heard using the cone. Another approach would be to place the cone or cylinder on one ear and one of the ‘glass headphones’ on the other, which would stop one ear from perceiving the outside world. Thus, the experience of hearing the inner sounds of the body in one ear and one’s surroundings in the other would create a ‘dual listening’ experience, consisting of two radically different inputs.

The cones were made out of either plastic or cardboard, with the former reflecting and amplifying sounds more efficiently. The cylinders varied between 30 and 115 cm in length; the longer cylinders offered greater amplification of sound. The shorter cylinders were made of either plastic or cardboard and, as with the cones, the plastic cylinders provided a better listening experience.

The ‘glass headphones’ amplify the wearer’s bodily sounds, e.g. tinnitus, digestion, and the grinding of bones. The digital infrasound amplifier makes infrasound audible to the human ear, and thus expands human listening abilities such that we are able to
hear the electronic signals of mobile phones, computers, electrical sockets, etc. The amplification provides an interesting insight into the limitations of the body, and a new experience of extended hearing.

The touching-listening exercises (Exercises 7-10) combined the sonic and haptic senses. ‘The Sound Room’ (a prepared exhibition room at the Museum) strongly amplified sounds, which were reflected by the ‘sonic floor’ when the participants walked across it. The participants focused on the sonic and spatial aspects of the room, which had specific acoustic properties relating to echoes. Therefore, the ‘textile floor’ and individual steps echoed in the space and merged with each other.

The speculative-kinetic exercises (Exercises 11-12) involved training the mind to perceive the self in a non-visual way and translate sound into choreographed movements. Both exercises were very challenging for the participants, who struggled to introduce themselves without thinking visually. It was difficult to locate the person to whom one was talking solely by listening for breathing and voices. The participants noted that the height of bodies was an important aspect during the group discussion, in that they focused their hearing in the direction of voices and so tilted their heads up or down depending on the person’s height. The bodily rhythms of the participants echoed their movements and gaits.

The sounding-performing exercises (Exercises 13-15) were felt to be the most inspiring by the participants, who had already had two days of ‘training’ in sonic fashion and shifting their attention to the audial dimension. ‘Performing an analogue silhouette’ (Exercise 14), in which the listeners sat around a table while the performers created a sonic silhouette, resulted in a very strong experience for the former group. The choreographed sound performance filled the space with the sounds of fabrics and sound objects moving back and forth, up and down, in circles, and close to the face. It was felt that the silent sections of the performances were intimidating due to their unexpectedness. During this exercise, the components for a sonic silhouette were found, such as speed of moving and sound, physical sound of materials, voice, sounds of mobile phone, sound intensity, which was manipulated by interaction with material. As well, the silence was considered as an important component to a sonic silhouette (e.g. sonic silhouette 1). The exercise opened up a potential discourse for deeper investigations – designing components for a sonic silhouette.
However, the ‘listening to a digital silhouette’ (Exercise 15) was somewhat disappointing for the participants in that the analogue and digital versions of the sonic silhouettes were entirely different due to the digital nature of the sound and the fact that it was projected from two directions (loudspeakers).
Comments. Exercises 6-10 were performed without taking off the eye masks, and so the extended period of time for which the participants were blindfolded sensitised them to sounds, such that they were able to discern them more easily and readily. Blindfolding participants for an hour could be an exercise itself, in that wearing an eye mask intensifies the sonic experience (as highlighted in Exercise 15).

Following ‘Blindfolded sound-walk through the sound room’ (Exercise 7), Irma – who has been blind since birth – immediately noticed that the room echoed strongly, and was interested in singing in order to ‘scan’ the obstacles in the room (i.e. echolocation). The experience of her singing in the room and describing its architectural properties through echolocation was a very strong experience for everyone, and the idea of seeing by hearing echoes inspired subsequent discussion and could be used in future exercises.

The participants were asked to bring fashion items that they like to wear due to the sounds they emit to be presented to the group. Some participants demonstrated the ability to create an identical sound using their own bodies. The discussion that followed was fruitful and inspiring, and it was felt that this introductory task would work well in future workshops.

The most challenging exercise for both groups was ‘Creating an analogue sonic silhouette’ (Exercise 13), which is a time-based artefact. Both groups struggled and asked questions such as: “What is a sonic silhouette?” “What does it mean to design a time-based artefact (in this case a 10-minute silhouette)?” “How do we design it?” Therefore, further investigations were conducted in order to define the notion of a sonic silhouette.

Methodological guidelines for training for sonic fashion

The purpose of the activities conducted within Pilot Studies 1-3 and Study 1 was to develop the ‘training set’, consisting of 16 exercises and tools (three analogue sound amplifiers, the ‘glass headphones’, the cones and cylinders, and the infrasound amplifier), as well as to suggest methodological guidelines for its use. The training set was to be used to shift the focus from the visual to the sonic, introduce the audial dimension, and train one’s hearing. There are several ways to use this training set, a few of which are presented as methodological guidelines.
The 16 exercises were divided into four groups: **listening** (Exercises 1-6), **touching-listening** (Exercises 7-10), **speculative-kinetic** (Exercises 11-12), and **sounding-performing** (Exercises 13-15). One approach is to follow this sequence; another is to begin with Exercise 13 and then conduct Exercise 14. Beginning the process with the audial dimension and sound-based thinking would, however, be quite challenging, although the process may offer new insights. The four groups of exercises could also be mixed in different ways for further experimentation.

Having 13 participants undertake the 16 exercises required one day of a research workshop (approximately 7 hours). This could be reduced by only undertaking Exercises 1-6, 0, or 11. Alternatively, one exercise from Exercises 1-5 or 7-9 could be chosen and explored for a longer duration.

Stimulating the hearing through the deprivation of the other senses shifts thinking from image-based to sound-based. Different methods of achieving this are incorporated into the training set, such as amplification and reduction of sound. The described processes are encouraged by tool-shifters (sound-amplifiers), with the ‘glass headphones’ blocking external sound and the eye mask blocking sight. Tool-shifters add to the experience by extending the self, with sound amplifiers extending hearing to encompass electromagnetic frequencies (infrasound). Therefore, concepts such as non-visual aesthetics, the extended body, and audial appearance could be used to stimulate further discussion.
TRAINING FOR SONIC FASHION
Figure 9. Exercise 11 during the 'Beyond Seeing' research workshop (video still, Raphael Rueb).
TRAINING FOR SONIC FASHION
Figure 10. Exercise 9 during the 'Beyond Seeing' research workshop (photograph, Jan Berg).
TRAINING FOR SONIC FASHION
Figure 11. Exercise 13 during the ‘Beyond Seeing’ research workshop (video still, Raphael Rueb).
Figure 12. Exercise 7 during the ‘Beyond Seeing’ research workshop (video still, Raphael Rueb).
EXTENDING THE BODY THROUGH SOUND
THE EXTENDED SELF

The body and clothing are so closely connected that the former is seldom seen without the latter. However, the body has many possibilities for adornment. Body modification as a concept involves making alterations to the body that relate to all senses: adding tattoos, a tan, cosmetics, perfume, piercings, and scars. The body can be modified through subtraction, such as hair removal, cosmetic surgery, etc., and clothing can be seen as a second skin (Entwistle & Wilson, 2001). We could, however, also consider the body and clothing to be two separate objects. What exactly counts as clothing? Is a tattoo part of the body or is it clothing? As Kate Soper asks, “where does the body end and the accoutrement or decoration begin?” (Entwistle & Wilson, 2001, p. 24). What is me and what is mine? With regard to sonic identity, the sounds that our bodies emit – our voices, along with those produced by our digestive systems, joints, blood vessels, etc. – can be defined as me. The other component, mine, constitutes their sonic extensions. But what are they?

Belk (1988) examines the self-defining roles of places, public monuments, experiences, time periods, television programmes, motion pictures, and public figures in relation to our bodies, and introduces the term “additional extended self”. We could add to this list a tan, cosmetics, perfume, the clothing we wear, tattoos, piercings, having a donor organ, or feeling phantom limb pain – these are all extensions of the self, and clothing is the additional extended self. Sound that is emitted by clothing, accessories, shoes, or any other object that we wear extends the body by amplifying or reducing it within the space in which it exists. If we attach a sounding object to a moving body, the sound extends it. The moving, clothed body becomes a sonic event, with the sounding object echoing the body’s movements.

Belk investigates the relationship between possessions and the sense of extended self – between mine and me. If we use tools, instruments, and electronic devices that we understand to be our belongings, we use what Belk terms “the extended self” (1988). In his chapter ‘Investing Self’, Belk analyses how we buy, own, and extend ourselves by buying new things, which he calls “parlor organs”: phones, computers, cars, houses, land, and other things that we associate ourselves with. People bring their acoustic worlds with them, first with the Walkman, now with iPhone. A mobile phone is a sonic object that we wear every day, adding various sounds to our sonic identity; those of social networks such as Facebook, Twitter, and Skype, as well as sounds for a new message, a call, hanging up, etc. To Belk, the sound of a mobile phone is
EXTENDING THE BODY THROUGH SOUND

is a “parlor organ”, the extension of the sonic self. **What are the other elements that construct the sonic silhouette that we ‘wear’? What is a sonic silhouette?**

The notion of sonic silhouettes was investigated during the pre-study and ‘Sound Map’ collaboration that are presented in this chapter. The knowledge of sonic clothing and expressions was collected using sound-based thinking and the listening/sounding research artefacts that gave rise to ontological questions such as:

- **What is a sonic silhouette?**

and

- **How a sonic silhouette is created?**
EXTENDING THE BODY THROUGH SOUND

Being a Sound

?
Wearing a Sound

?
Figure 13. Sonic Object: A Bell
Mode: Amplifying the self

Addition to the body: Attachable bell

Experiment: The presence of an expected sound

Movement: Sound-sound-sound-sound-sound-sound-sound...

Bodily part: Chest

I am a sound when I move.

Am I a sound when I do not move?

You can hear me from around a corner.

What is the form of my sonic silhouette?

You cannot see me, but you can hear me.

Do I sound like a cat wearing a bell?

I have been wearing this sound for two weeks.

Do I still sound like a cat wearing a bell?

You can recognise me from the sound, without seeing me.

Would it be the same sound if I replaced my body with someone else’s?
Mode: Isolating the self

Addition to the object: A fur sole on one shoe

Experiment: The absence of an expected sound

Movement: Silence-sound-silence-sound-silence-sound…

Area of the body: The feet

I am walking and you see me.

You laugh at the strange fashion.

I am walking and you do not see me.

Are you waiting for another step?

Do you think that I only have one shoe/leg?

Do you think that it is not a body, but some object?

I stopped walking.

What does this ‘interruption’ of the sonic silhouette mean?

Is it a ‘garmentless’ situation?
Figure 14. Sonic Object: A fur-soled shoe.
EXTENDING THE BODY THROUGH SOUND

STUDY 2: SOUND MAP

Location of the collaboration. The Swedish School of Textiles, Borås, Sweden.

Curators. Vidmina Stasiulytė, PhD student, SST; Linnea Bågander, PhD student, SST.

Objects. Body, space, sound objects.

Aim. Investigate the notion of a sonic silhouette, and explore the relationship between the subject (body) and object (sound of dress) using three different variables (balance, placement, quantity).

Objectives:

Introduction: Try on the made/found sound objects.
Exploration: Explore the choreography of sounds, with the body moving with different sound objects.
Documentation: Record audio and video footage of the body moving with each sound object.
Analysis: Analyse the recorded sounds and compare these with the movements shown in the videos.
Results and discussion: Define a sonic silhouette and a sounding silhouette.

Methods. Sound and video documentation.

Tools. Sound recorder (Zoom H4N), headphones (Bose QC25), video camera (Panasonic DMC-G7K), tripod, sound objects.
Figure 15. The toolkit for collaboration. 'Sonic Object 1'.
Figure 16. The toolkit for collaboration. 'Sonic Object 2'.
Figure 17. The toolkit for collaboration. "Sonic Objects 3-7"
Introduction. In collaboration with my research colleague Linnea Bågander of SST, the relationship between the moving body and sound was investigated, with Bågander performing and experiencing the ‘sounding silhouette’. Bågander’s research focuses on the qualities of bodily movement in temporality (Bågander, 2017), and so the collaboration was very productive. The performer explored the pre-made toolkit (Figs. 15-17), which consisted of seven sound objects:

1. A t-shirt featuring metal bells.
2. Paper shoes.
3. A remade musical instrument (made of the shell of a nut and wooden balls attached to a leather bracelet);
4. Grains inserted into wooden sticks.
5 and 6. Remade musical instruments (made of wooden sticks).
7. A remade musical instrument (a wooden ball filled with small metal balls).

Exploration. The performer experimented with the sound objects, moving with them and exploring the relationship between her body, movement, and the sounds that the objects emitted. The wearable and attachable sound objects amplified and choreographed movements in different ways, with sounds echoing bodily rhythms. The investigation was performed using three variables (Figs. 18-29):

Placement: Feet, legs (upper/lower part), waist, chest, arms (upper/lower part), head.

Balance: Asymmetrical, symmetrical.

Quantity: Single, several or multiple objects.

Documentation. The sounds were recorded and video footage of the body moving with each sound object was captured for further analysis. The performer was asked to produce a written reflection on each sound object, for example:
Sound Object 1: “The bells created a lot of sound, even as a result of relatively little movement; the echoing of the metal was loud, and very annoying.”

Sound Object 2: “The paper shoes made it impossible for me to move quietly.”

Sound Object 4: “The sound clearly choreographed my movements, making me move in a stiff, robotic way.”

Sound Objects 5 and 6: “I particularly liked the aesthetics of these two sound makers. It was very difficult to move without making a sound as the sticks were very close to each other, and this inspired me to work with tempo and stillness.”

Analysis. The recorded sounds were analysed and compared with the movements shown in the video footage. This resulted in the primary definitions of the concept of a sonic silhouette.
Sonic Object 1

Placement: Upper body

Balance: Symmetrical

Quantity: Multiple
Sonic Object 2

Placement: Feet

Balance: Symmetrical

Quantity: Two
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Sonic Object 3

Placement: Arm

Balance: Asymmetrical

Quantity: Single
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Sonic Object 4

Placement: Legs

Balance: Symmetrical

Quantity: Four
**Sonic Object 4**

Placement: *Arms*

Balance: *Symmetrical*

Quantity: *Four*
Sonic Object 4

Placement: Upper arms

Balance: Symmetrical

Quantity: Two
Sonic Object 5

Placement: Head

Balance: Symmetrical

Quantity: Multiple
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*Sonic Object 6*

Placement: *Shoulders*

Balance: *Symmetrical*

Quantity: *Multiple*
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Sonic Objects 5 and 6

Placement: Head and shoulders

Balance: Symmetrical

Quantity: Multiple
Sonic Object 3

Placement: Lower leg

Balance: Asymmetrical

Quantity: Single
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Sonic Object 4

Placement: Head

Balance: Symmetrical

Quantity: Single
Sonic Object 7

Placement: Lower leg

Balance: Asymmetrical

Quantity: Single
Results and discussions

The difference between visual and non-visual artefacts. The analysis of the sound recordings raised the question of the difference between audial and visual data. A photograph of a pair of shoes can be described in visual terms, i.e. in relation to colour, form, style, etc. How do we present a non-visual artefact such as a recording of the sound of a dress, however? The photograph of the pair of shoes (Fig. 30) and the sound recording of the shoes (Fig. 31) are different design artefacts with regard to perception. The sound of the shoes is dynamic as the act of walking is audible, and the recording is temporal, lasting 43 seconds. In contrast, the image is static.

Figure 30. A visual representation of an item of dress.

Figure 31. An audial representation of an item of dress.
Locating sound. Although sound is ephemeral and spreads in all directions, the location of its source is possible to identify. When the sound of steps in shoes is heard, it is possible to use one’s ears to approximate the source of the sound – a pair of feet. Does sound have a ‘form’, however? Can we identify its location? The source of a sound has a location that is dependent on which part of the body the sonic object is placed: If the object is a pair of shoes, the sound comes from the bottom of the body during the act of walking (Fig. 32a). If the object is a hat, the location of the source is the head (Fig. 32b). Sound is generally emitted as a result of an interaction between the elements of a dressed body – arms and legs touching each other (dress-dress interaction), for example (Fig. 32c, d). The circles in Fig. 32 show the abstract form of a sound emitted in a space in relation to the location of its source.
EXTENDING THE BODY THROUGH SOUND

Each wearable and attachable sonic object amplified and choreographed movements differently, and the sounds that they produced echoed the body’s rhythms. The use of the variables – placement, balance, and quantity – showed the strong impact of emitted sound. Following the analysis of the Pilot Studies and Study 1, the primary definition of a sonic silhouette was established based on the answers to two questions: (a) What is a sonic silhouette? (b) How a sonic silhouette is created?

**The Components of Sonic and Sounding Silhouettes**

A sonic silhouette consists of two main components: *a sonic object* and *a sonic subject*.

The *subject* is a human body, which is in itself sonorous. Each of us creates identifying sounds by talking, breathing, and moving and through the bodily processes of digestion and circulation, along with the sounds of joints. Therefore, the subject is always *a sonic subject* and always active in terms of sound – it is sounding (assuming we are dealing with a living body).

An *object* is a physical article that emits a sound when activated; clothes, accessories, shoes, or other fashion items that are worn on the body, therefore it is a *sonic object*.

**Sounding Object.** Garments are generally considered to be silent unless they are interacting with bodies – being worn, scrunched up, taken off, hung up in a closet, folded, etc. Such interactions are based on touch and movement. The human body’s haptic and kinetic interactions empower the article of clothing to become active, and this is the process of *sounding*. A change in a sound-emitting object involves the object shifting from being silent to producing sound, and can be referred as a “becoming-state” (Stasiulyte, 2017a). The active mode of a sonic object is sounding, and so the shift is enacted by a sonic object, to a sounding object. There are two primary considerations here: (a) the presence of sound – sounding (kinetic-haptic interaction) – and (b) the absence of sound – silence (no kinetic-haptic interaction).
A sonic silhouette is a passive form of the combination of a sonic subject and a sonic object (Fig. 33):

**Sonic subject + Sonic object = Sonic silhouette**

A sounding silhouette is an active form of sonic silhouette that occurs when sound is emitted. The interaction shifts the silhouette from sonic to sounding (see Fig. 34):

**Sonic subject + Interaction (wearing) + Sonic object = Sounding silhouette**

A sonic silhouette

sounds

as a result of the interaction of wearing,

which happens between

a sonic object and a sonic subject.
Figure 33. The components of a sonic silhouette

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Figure 34. The results of kinetic-haptic interaction – sounding silhouette.
A SONIC FASHION SYSTEM
IDENTIFYING SOUNDS

Many items of clothing are associated with an identifying sound. The sound of a zipper is associated with the action of opening or closing a fashion item such as a jacket or bag; the rustling of a raincoat or opening of an umbrella. The sound of a high-heeled shoe is a warning of the approach of a person with supplementary height (Eicher, Evenson & Lutz, 2008). We are able to easily distinguish between the sounds of stiletto heels and sneakers, and the material of a fashion item, height and form of a heel, walking manner, etc. all influence sonic expression. How can we group similar clothing sounds? Can we construct categories and subcategories for sonic expressions?

Linnaeus's *Systema Naturae* (1758) introduced the Linnaean taxonomy, which is a botanical ontology. In the tenth edition Linnaeus classifies nature into three kingdoms and presents a hierarchical model of nature consisting of five levels: kingdom, class, order, genus, and species. Could we organise sonic expressions according to a similar taxonomy?

If we turn to the fashion field, we find the example of Barthes' semiotic analysis *The Fashion System* (1990), which considers fashion to be a language. Here, Barthes provides a brief history of semiotics and investigates the relationship between “image clothing” and “written clothing”. The fashion system mediates taste and received meaning, filtered by a relationship between signs, discourse, and the sensible world (1990). This structural analysis of fashion as a language analyses the “translation” of clothing into language. According to Barthes, the fashion text is a technique for “opening the invisible”. What kinds of relationship between categories can be identified, and what kind of system could be developed for sonic fashion?

The primary categories of sonic expressions of dress that were identified during the research activities (workshops and sound recordings) are presented below. The establishing of primary categories was a move towards a taxonomy for sonic fashion, and the analysis of the systems of Barthes and Linnaeus provided a framework for categorising sounds.

Kinetic-haptic interactions play an important role in sonic expressions of dress. As has been explored and discussed in previous chapters, this interaction is the means by which an item of dress becomes sonorous. The sense of touch during movement and...
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various tactile qualities elicit the sounds of a fashion item, as Welters argues in ‘Sight, Sound, and Sentiment in Greek Village Dress’:

The noise made by women dancing reinforced the festival dress as something special for the community. The sound of the coins clinking together echoed the rhythms of the music. The sense of touch must have contributed to the sensory experience of wearing the festival dress. The difference in the tactile qualities of “best” dress – soft silks, delicate trims, and textured embroideries – contrasted sharply with the rough, coarse textures of everyday dress. (Foster & Johnson, 2007, pp. 13-14)

These interactions are generally related to the body that is wearing the sonic object: dressing, undressing, walking, sitting, etc. The interaction with the sonic object can also be an act other than that of wearing, such as hanging a garment up in the closet, folding it, putting it in the washing machine, etc. In this research, however, only acts relating to wearing a sonic object are considered. A deeper analysis of the sonic expressions that occur during the wearing of items of dress was conducted in a workshop and sound-recording session during my secondment at the University of Arts (UdK) in Berlin. This led to Study 4: Sounds of Steps and Study 5: Sonic Expressions, which aimed to categorise sonic expressions and analyse the relationship between the moving body and sound. The established categories of sonic expression were organised into a primary taxonomy.
STUDY 3: SOUNDS OF STEPS

Location of the workshop. The Stage Design and Costume Department at UdK, Berlin, Germany.

Curators. Vidmina Stasiulytė, PhD student, SST; Prof. Lisa Meier, Stage Design and Costume Department, UdK; Dr. Berit Greinke, senior researcher at the Design Research Lab, UdK.

Aim. Analyse the relationship between gait and the sound of footwear, and investigate the sonic expressions of footwear.

Objects. The body, footwear.

Objectives:

Introduction: Introduce the students to sonic fashion by presenting the examples of Study 1: Sound from the Past and the ‘sonic diary’, then discuss the sonic properties of dress.

Inspiration: Undertake the exercise ‘Listening to Steps’.

Exploration: Select pairs of shoes from the costume wardrobe at UdK, and explore and analyse the relationship between gait and the sound of footwear.

Documentation: Record the sounds of steps and photograph the footwear.

Analysis: Analyse, compare, and categorise the sounds of the steps.

Results and discussion: Discuss the results of the analysis with the participants.

Methods. Sound and image documentation, sensitising the body.

Tools. Sound recorder (Zoom H4N), headphones (Bose QC25), camera (Sony DSC WX500), 17 pairs of shoes, 4 woollen walls, the ‘sonic diary’, sound-amplifying cones.
**Introduction.** This study was part of a two-day workshop called ‘Soundtopia: Possibilities for Future Sonic Body and Behavior’, held for fashion (MA) and costume design (BA) students at UdK and the Weissensee Art Academy (Berlin). Study 4: The Sounds of Steps was performed with four BA Costume Design students. In order to introduce students to sonic fashion the examples of Pilot Study 1: Sound from the Past and the ‘sonic diary’ were presented, and the sonic properties of dress were discussed.

**Inspiration.** The exercise ‘Listening to Steps’ was conducted to inspire the students, who were asked to all walk together for five minutes while wearing the ‘cone’ sound amplifiers and paying attention to the rhythms of their own steps and those of others.

**Exploration.** After the inspiration stage, the students selected pairs of shoes from the costume wardrobe at UdK. Four woollen walls were put up in the workshop studio to create a more ambient space for the sound-recording session. The group investigated how the sounds of a body are amplified through the wearing of shoes, and explored the relationship between walking manner and the sounds of footwear.

**Documentation.** The participants were recorded walking under five parameters (Figs. 34-38): (a) all of the participants walking barefoot (Fig. 35); (b) all of the participants walking in socks (Fig. 36); (c) all of the participants walking in own shoes (Fig. 37); (d) multiple participants walking in identical shoes (Fig. 38); (e) the same participants walking in seven different pairs of shoes (Fig. 39). Photographs of each experiment were also taken.

**Analysis.** The collected audio was analysed and compared. Various step sounds were identified with regard to the different forms, materials, heels, soles, fastenings, and other details of the footwear. Gait was identified as the primary influence on sonic identity, particularly under parameter (d), in which every member of the group wore identical shoes.
Figure 35. The participants’ bare feet.
Figure 36. The participants socked feet.
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Figure 37. The participants in their own shoes.
Figure 38. The participants in the identical shoes.
A SONIC FASHION SYSTEM
Figure 39. The seven different pairs of shoes worn by the same participant.
Results and discussion. The findings of this study were presented and discussed with the participants. Different sonic categories were established, such as the gait of the individual, weight, material, height, form, decorative details, and fastening of the footwear and its components. The study showed the potential for further investigation of the relationship between the moving body and sounding objects with regard to the act of wearing. During the discussion, it was observed that the acts of putting on and taking off footwear are important components of sonic identity, and could be explored further. The sound of wearing one shoe on the left foot and a different shoe on the right foot, or only one shoe, could be interesting to explore with regard to the sonic identity of the unexpected. This study created a deeper understanding of how clothing sounds can be categorised, which was further investigated in Study 4: Sonic Expressions.

In order to analyse the relationship between the moving body and sonic objects (shoes) in more depth, gait was investigated under the five parameters listed above.

When the participants walked barefoot and in socks (Figs. 35 and 36), the most noticeable differences in the sound recordings related to the habit of one participant to place her heels down more strongly than the others, as is discussed in the analysis section below in relation to walking in shoes.

Gait was very obvious when the participants walked in their own shoes, e.g. with regard to some participants dragging their feet along the floor (Fig. 37, Sound 3). In the sound recordings steps are audible, but so too are additional layers of sound; in Recordings 1 and 3 a zipper can be heard, and in Recording 4 trouser legs rubbing together is audible. These elements added another layer to the sonic identity of specific pairs of shoes. The size of zippers also influences the sound: a larger pull tag results in a louder sound, and the zipper in Sound Recording 1 was louder than that of Sound Recording 3 (Fig. 37). The fit of a shoe also matters: a tight or loose fit affects the sound, as with the audibly loose-fitting shoes in Sound Recording 1, based on the sound of friction between the socked feet and the shoes’ insoles. In this case, the material of the sock and the insole also influenced the sound.

When all of the participants wore the same footwear, it was possible to discern the fact that one participant walked faster than the others (Fig. 38, Sound 4). In addition, the sound of trouser legs rubbing together was audible (Fig. 38, sounds 2 and 4).
The soles of shoes emit different sounds based on the material; some are ‘flat’ and ‘dry’ (Fig. 37, Sounds 4), while others are ‘gummy’ and ‘creaky’ (Fig. 39, Sound 3). The form of the sole of the shoe is important with regard to the emitted sound, as in Sound Recording 1 (Fig. 39). A sound of flip-flopping made by shoes without fastening is heard in the Sound Recording 6 (Fig. 39). The fastenings for ankles of shoes are too wide for the wearer, therefore, the sound is resonating with material (Fig. 39, Sound 5).

The main interaction between the bodies and the shoes occurred during the act of walking, and so the sonic silhouette of a particular pair of shoes has different layers. These are based on the details on the shoes, such as zips, shoelaces, decorations, etc., the material of the sole and the insole, the fit of the shoe and fastening, the sock, the form of the heel (Fig. 39, Sounds 4 and 5), the height of the heel, the details of fastening (Fig. 39, Sounds 5 and 6) and the height of the shoe (Fig. 39, Sound 1).
Location of the sound-recording session. Theaterkunst GmbH, Berlin, Germany.

Curators. Vidmina Stasiulytė, PhD student, SST; Katharina Bredies, PhD, senior researcher, UdK.

Collaborator. Theaterkunst GmbH costume collection, Berlin, Germany.

Aim. Investigate the sonic differences between fashion items (clothing, accessories, footwear) and categorise the items.

Objects. Clothing, accessory, footwear.

Objectives:

Introduction: Tour of the costume collection.
Exploration: Explore the collection at Theaterkunst GmbH by interacting with fashion items; select fashion items that emit interesting sounds.
Documentation: Record sounds and photograph the selected fashion items.
Analysis: Analyse the recorded sounds, compare these to the photographs, and consider their sonic properties.
Results and discussion: Construct a primary taxonomy of sonic categories.

Methods. Sound and image documentation, interaction net, classification of design information.

Tools. Sound recorder (Zoom H4N), headphones (Bose QC25), iPhone 6 (for taking draft photographs), computer.
**Introduction.** During my first secondment at UdK I had the opportunity to record various clothing sounds at the largest costume collection in Berlin – Theaterkunst GmbH, which consists of 10 million costumes, uniforms, and accessories. The collaboration took place over the course of one week. At the outset I took a tour of Theaterkunst GmbH to see the costume collection and find a location in which to record material.

**Exploration.** The clothing collection at Theaterkunst GmbH was explored by interacting with fashion items through touch. Each item of clothing was selected based on interesting sounds that it emitted.

**Documentation.** After the exploration stage, sounds were recorded and photographs taken of the fashion items; this data was collected into a ‘Sonic Fashion Archive’ (see and hear: Appendix). The method of recording a piece of clothing was developed during the documenting process, and allowed sounds to be analysed and compared. It consisted of six steps:
1. description of the item of dress;
2. putting on the item of dress (dressing);
3. touching the surface of the item of dress with the hand;
4. wearing (moving with) the item of dress;
5. interacting with the details of the item of dress;
6. taking off the item of dress (undressing).

Step 5 was added after several trials, on the basis that the sounds of the details of the items were felt to strongly contribute to their sonic identity. Each sound recording follows a formula, starting with a description of the item of dress to aid identification during later analysis. The focuses of dressing and undressing are acts of closing and opening, e.g. fastening zips and snaps, putting on a belt, etc. The dress/body interaction was recorded while the hand was touching the surface of the fashion item. The wearing act was then recorded while the body was moving with the object, which was based on walking, and so the sound came from the arms and/or legs moving back and forth. The sounds of the details of the item of dress, such as a chest pocket with a zip, were also recorded. The recording method of each garment was not photographed. Therefore, the example with my own jacket was photographed and presented in Fig. 40a-e.

**Analysis.** The recorded sounds were analysed and compared with the photographs, and the aspects of sonic properties were identified and categorised.
A SONIC FASHION SYSTEM

A hip-length waterproof jacket with long sleeves, a hood, a chest pocket on the left, and two side pockets. 100% nylon (main fabric), 100% polyester (lining).
Figure 40a. The recording process: (1) Describing and (2) dressing.
A SONIC FASHION SYSTEM

1. 
2. 
3. 
4.
Figure 40b. The recording process: (3) Touching (body-dress interaction) and (4) wearing (dress-dress interaction).
A SONIC FASHION SYSTEM
Figure 48c. The recording process: (S) Interacting with the details of the item of dress.
A SONIC FASHION SYSTEM
Figure 40d. The recording process: (6) Undressing.
A SONIC FASHION SYSTEM

Figure 40e. An audial representation
of the recording process.
A SONIC FASHION SYSTEM

The taxonomy of sonic fashion. Our world has a structure, and we naturally group objects into categories. These help people to respond appropriately to new objects that they encounter. As the Oxford Dictionary defines: “Category is the pure a priori conceptions of the understanding, which the mind applies to the matter of knowledge received from sense, in order to raise it into an intelligible notion or object of knowledge” (“Category,” 1970, pp. 180-181).

Objects fall into many different categories, but the most fundamental is the “basic-level category” (Murphy, 2004). Categories can be created as a result of sensory perception or generic knowledge (Medin & Barsalou, 1987), with the latter resulting from similarities in conceptual knowledge (e.g. birds) linked to meaningful semantic associations (e.g. birds have wings and can fly). In addition, emotional responses elicited by objects and events can be used as a basis for relating objects to one another (Isen & Daubman, 1984; Niedenthal, Halberstadt & Innes-Ker, 1999). In summary, the sensory, cognitive, conceptual, and emotional processing of objects and events can result in the categorical organisation of objects into taxonomies (Dubois, 2000).

According to the Oxford Dictionary, taxonomy is “the classification of something, especially in relation to its general laws or principles” (“Taxonomy”, 1970, p. 122). Taxonomy is mostly used in the field of biology. In this study, the audio recordings of the sonic expressions of dress constituted the data that was systematised. As is discussed above, an item of dress is any object that we wear, such as jackets, trousers, socks, shoes, hats, earrings, etc. The sounds of these objects (sonic expressions) were recorded and systematised. The system arranged similar sonic expressions into categories.

Although the term ‘sound’ includes both infrasound and ultrasound, only those frequencies that the human ear can detect (20 to 20,000 Hz) were considered in this research. The taxonomy has three main components – body, dress, and space – with regard to the importance of sound. The human body can be dressed and undressed, and is in itself sonorous due to processes such as digestion, breathing, tinnitus, and the sounds of bones and/or joints. In addition, we can hear imagined sounds such as hallucinations, dreams, memories, etc. (see Fig. 41).
The sonic expressions of dress were studied by exploring, recording, and systematising sounds during subject (body)-object (dress) interaction (dressed body). The haptic-kinetic interaction is based on the body wearing an item of dress (Fig. 42), and is considered to be an action: dressing, undressing, scrunching, touching, walking, etc. Sounds are the results of this interaction. A dressed body emits sounds that are analogue (natural/physical) and/or digital (artificial sound embedded into textiles). In this study, only analogue sounds were considered.

Natural sounds are ‘activated’ by moving/touching through of two interactions: (1) dress-dress, and (2) body-dress. A dress-dress interaction occurs when one fabric touches another, and can be subdivided as either (a) monophonic – when multiple pieces of the same fabric are touching – or (b) polyphonic – when different fabrics are touching each other. A body-dress interaction takes place when human skin touches fabric – generally through the hand interacting with the item, movement, wearing, dressing/undressing, or contact with shoes or accessories. A sound event that occurs between skin and clothing such as an electrical discharge (often during undressing) is considered to be a body-dress interaction.

A dressed body is generally manifested in a space. The sounds of a dressed body during haptic-kinetic interaction (wearing) are thus always emitted within the space in which the body is situated. The notion of space is significant with regard to the phenomenology of lived experience, as the movement of bodies in space is an important feature of their perception of the world and relationships with others and objects in the world (Merleau-Ponty & Carman, 2013). Spaces echo the sounds of these interactions and add another category for a dressed body (the dressed body in space). Sounds vary because of the acoustics of spaces, which each absorb, diffract, reflect, reduce, or amplify sounds in a different manner. Although space is an important variable with regard to sonic silhouettes, this aspect requires separate research. In this thesis the space variant is considered to be neutral as, within each study, all of the sounds of clothing were recorded in the same space.
A SONIC FASHION SYSTEM

FREQUENCIES

range of human hearing

20 to 20,000 Hz

infrasound
0.001 - 20 Hz

undressed body

BODY

making sounds

breathing

voice

tinnitus

bones/joints

digesting

hearing sounds

dreams

hallucinations

imagined sound

memories

physical sound

artificial sound

dress-dress interaction

DRESS

making sounds

breathing

voice

tinnitus

bones/joints

digesting

hearing sounds

dreams

hallucinations

imagined sound

memories

physical sound

artificial sound

dress-dress interaction

DRESS
Figure 41. A taxonomy of sonic fashion.

- Frequencies range of human hearing: 20 to 20,000 Hz
- Ultrasonic from 20,000 Hz and above
A SONIC FASHION SYSTEM

Figure 42. A segment of the taxonomy of sonic fashion for deeper study.

Results and discussion

The recording method aptly demonstrated the complexity of sonic identity – see and hear, for example Figure 40a-e, which demonstrates a jacket. The different sounds merged together when the sonic object (jacket) was being worn (including dressing and undressing). Five different layers of sound were identified: (1) zips; (2) plastic fastenings with pull tags (for adapting width); (3) Velcro fastenings (on the sleeves); (4) layers of material touching one another (dress-dress interaction); (5) skin touching the material (body-dress interaction). The zips varied in length and so the duration of the sound identified the zip, being longer in duration for a main zip in the middle of the garment and shorter for zips on the chest and side pockets. The sonic expressions of the zips belong to the length category, as well as to fastening (the sounds of the Velcro and zips were distinct).
The strategy of recording the sounds was based on the discovery of common relationships between the sonic expressions that influence sonic silhouettes. The analysis produced nine primary categories for sonic expression: (1) main material, (2) lining, (3) height, (4) length, (5) weight, (6) fit, (7) fastening, (8) decorative elements, and (9) placement. All of these categories contribute to the overall sonic expression of an object.

**The primary categories of sonic fashion**

**Main material.** The sonic expression of an object is strongly influenced by the material that it is made of. A jacket sounds different if it is made of leather versus denim (Fig. 43).

**Lining.** The inside of a fashion item adds another layer of sound when the main material touches the lining and/or the lining touches the wearer's skin or another fabric that the body is dressed with. The physical properties of the material define its sonic expression: the sound of polyester, viscose, fur, etc. (Fig. 44).

**Height.** The location of a sound defines a sonic silhouette, in that the sound travels from its source to our ears. With a body that is dressed with metal earrings, for example, the location is the ear and so the sound comes from the height of the ear of the body. Similarly, headwear emits sound from the top of the body and footwear from the bottom. Height is thus considered with regard to the perception of the sound emitted by the object. Height can also be considered to be a property of the item of clothing itself, e.g. different heel heights cause shoes to sound different (Fig. 45).

**Form.** The different forms of fashion articles influence the emitted sound; stiletto heels and cowboy boots sound different (Fig. 46), for example.

**Length.** The length of an item of clothing influences the direction in which a sound is emitted (as with height), e.g. the jacket and overall sound different if they extend down to the waist, hips, or ankles. The length of a zip identifies the length of a garment (Fig. 47).

**Fit and elasticity.** The fit of clothing also influences the emitted sound, e.g. if the garment is tight or loose. A thick and hard garment produces a different sound than a thin and elastic one (Fig. 48).
A SONIC FASHION SYSTEM

Weight. The weight of a material influences the sonic expression of an object, e.g. leather, denim, and silk sound different. The weight of a fashion article can be categorised as light, medium, or heavy (Fig. 49).

Fastenings. Different kinds of fastening (button, zip, snap, Velcro, etc.) emit different sounds. The sounds of fastenings are connected to the main material category, and so the sounds of metal and plastic zips differ. The act of dressing/undressing using a particular fastening is different and defines the sound, e.g. tying a belt or fastening the buckles of a belt (Fig. 50).

Decorative elements. Decorative elements such as sequins, prints, beads, bells, feathers, and embroidery change the sonic expression of the main material and add another sonic layer (Fig. 51).

Placement. The placement of decorative details such as pockets or fastenings such as zips on e.g. the back, bottom, front, or side of a garment influences its sonic expression.

Categories and subcategories. As the study results show, it is possible to arrange the sonic expressions within hierarchical relationships. The defined categories and subcategories for sonic expressions are linked to a sonic object (dress) and/or a sonic subject (the human body). These categories could be further divided into subcategories such as:

(1) Main material  
(2) Weight  
(3) Elasticity

These subcategories can be further subdivided. For example, the sub-category ‘weight’ can be divided into ‘light’, 'medium', and 'heavy'. This gives three further subcategories:

(1) Main material  
(2) Weight  
(3) Light  (3) Medium  (3) Heavy

All of these categories can be placed in the primary taxonomical system in order to explore the relationships between them (Table 1). In order to identify all of the possible categories, further analysis through more recording sessions is required.
Advantages and disadvantages of the primary taxonomy

The primary categories show that it is possible to group and categorise the sonic expressions of dress, and that the approach is potentially interesting and fruitful as a foundation for the concept of sonic fashion. Different strategies could, however, be employed for categorising sounds, e.g. basing categories on intensity (silent, medium, loud), frequency (low, medium, high), emotional response elicited (tense, pleasant, etc.). The chosen strategy is based on the different expressions of dress with regard to the sonic silhouette, and is relatively comprehensive.

The sonic categories, based on the sonic expressions of dress, mix the two main components of a sonic silhouette – the sonic object (dress) and the sonic subject (the human body) – and the category of ‘height’, for example, is related to both. Therefore, building a taxonomy based on hierarchical sonic categories will require further study by identifying and defining the sonic categories for sonic objects and sonic subjects.

Problems and possible improvements. Following the analysis of the recorded sounds, it was clear that the sound recorder was too close to the objects and the sounds were always directed toward the centre of the items that were equipped with microphones. A microphone is an artificial ear: if it is placed near the belt it perceives sounds from that location, and if it is placed on a hat the sound is recorded differently. The distance between and relative heights of the recorder and the item of clothing, along with the placement of the sound recorder and focusing of the microphones, should be analysed so that improvements can be made in future recording sessions.

The layers of digitality (sounds from the recorders and microphones themselves, as well as that of any other audio equipment involved) should be considered. Sound that is recorded with and listened to using a tape recorder is different to that recorded with a digital sound recorder and listened to on a digital audio player. The sound is affected by the speakers or headphones used for listening, and different brands of playback device also affect the sound. Although the level of these sounds is quite low (what is generally defined as white noise), the additional filtering of the audio material (the recorded sounds of clothing) is present, if ambient. Another problem is that noise in the spaces in which the recording took place – air conditioning systems, lamps, and breathing – are all audible. As the process of identifying sounds is based very much on clarity (Ballas, 1993), a sound recording studio would be the best means of avoiding this kind of noise while recording.
**Possible future directions**

**Situation.** Electrostatic discharge occurs most frequently during the winter, when it is cold outside and warm and dry inside. Recordings of swimwear are entirely different when performed in and out of the water. The metal spikes of golf shoes would sound different if they would be worn not on a grass. The specific situations in which sonic expressions are recorded could be investigated further.

**Sonic objects.** In order to further develop the sonic categories for sonic objects, the sounds of materials could be investigated in greater depth, e.g. the differences relating to the size of a piece of material. As well, the studies of material interactions could be expanded to include e.g. folding, shaking, cutting, tearing, etc.

**Sonic subjects.** As is discussed above, the sonic subject is one of the main components of a sonic silhouette, and so it would be useful to record the constant bodily sounds of a human body and identify new sonic categories through this.

**Layers and convergence.** One of the most interesting aspects of sound is the multilayering phenomenon. This has been discussed in the fields of art and philosophy, and opens up an interesting perspective on the body and identity as a complex system (see e.g. Hundertwasser in Restany, 1998; Deleuze & Guattari, 2013). From a sound-engineering perspective, sound consists of several layers that are created by an object and an action in a location (Özcan, van Egmond & Jacobs, 2014). With regard to identity, too, sounds have several different layers. The sound of an engine is fundamental to our mental image of the sound of a car, but there are other sounds: doors opening and closing, tyres touching the road while driving, sound of brakes, cleaning the windows with wiper blades, etc. Each brand of products has different sounds that could be categorised, e.g. the closing of the door of a Volvo sounds different to that of a Porsche.

The same logic can be applied to a sonic silhouette. What sounds are layered and belong to it? If I am walking in a pair of shoes you hear the sound of my steps, but other sounds are involved in my sonic silhouette, such as the sound of legs: skin touching skin, pantyhose/tights/trousers touching one another, or skin touching the material of a skirt. If I wear a jacket, this adds another layer of sound, e.g. unzipping, materials rubbing against other materials, etc. If I have a mobile phone in the pocket of my jacket, this will add yet another layer. How many layers could we count?
Figure 43. Category: Main material.
Figure 44a, b. Category: Lining.
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Figure 45 a, b, c. Category: Height.
Figure 46a, b. Category: Form.
Figure 47a, b. Category: Length.
Figure 48a, b. Category: Fit and Elasticity.
A SONIC FASHION SYSTEM
A SONIC FASHION SYSTEM
Figure 50a, b. Category: Fastening.
A SONIC FASHION SYSTEM
Figure 51a, b. Category: Decorative Elements.
## Category System for the Sonic Expressions of Objects

<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Further subcategory(-ies)</th>
<th>Further further subcategory(-ies)</th>
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</thead>
<tbody>
<tr>
<td><strong>Main material</strong></td>
<td>weight</td>
<td>light / medium / heavy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>elasticity</td>
<td>stiff / medium / flexible</td>
<td></td>
</tr>
<tr>
<td></td>
<td>thickness</td>
<td>thin / medium / thick</td>
<td></td>
</tr>
<tr>
<td><strong>Lining</strong></td>
<td>weight</td>
<td>light / medium / heavy</td>
<td></td>
</tr>
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<td></td>
<td>elasticity</td>
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</tr>
<tr>
<td></td>
<td>thickness</td>
<td>thin / medium / thick</td>
<td></td>
</tr>
<tr>
<td><strong>Decorative element</strong></td>
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<td>small / medium / large</td>
<td></td>
</tr>
<tr>
<td></td>
<td>placement</td>
<td>depth</td>
<td>front / side / back</td>
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<tr>
<td></td>
<td></td>
<td>horizontality</td>
<td>right / middle / centre</td>
</tr>
<tr>
<td></td>
<td></td>
<td>verticality</td>
<td>head / neck / shoulders / chest / arm / elbow / waist / hips / legs / knees / feet</td>
</tr>
<tr>
<td><strong>Fastening</strong></td>
<td><strong>Size</strong></td>
<td>Small / medium / large</td>
<td></td>
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<tr>
<td>---------------</td>
<td>----------</td>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td>Positioning</td>
<td>Front / side / back</td>
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<tr>
<td>Head / neck / shoulders / chest / arm / elbow / waist / hips / legs / knees / feet</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Weight</td>
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<td></td>
</tr>
<tr>
<td>Fit</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>Mini short sleeve / short skirt/dress / shorts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midi</td>
<td>¾ sleeve / ¾ skirt/dress / ¾ trousers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maxi round / oval / squared / flared</td>
<td>Long sleeves / long skirt/dress / long trousers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Form</td>
<td>Round / oval / squared / flared</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Primary sonic fashion taxonomy.
FUTURE DIRECTION
FOCUSING THE BODY ON SOUND THINKING

I hear the beep of the e-key unlocking the door of the PhD room. You are entering the room. I hear your gait and the jingle of a set of keys, which amplifies your steps. I recognise you. You wear sneakers. It was raining. You take off the waterproof jacket, which rustles a lot. You put down the backpack, take a glass (your ring clinks against the surface), and leave the room.

If we consider garments to be sound-producing objects, the act of listening is the most important for perceiving the sonic silhouette. How do we use our ears for fashion, and how do we hear a sonic silhouette? The sound amplifiers, which were used during the artistic practice, are sculptural, wearable objects that extend the human body. The experience of wearing, hearing, and extending the self using the objects/instruments suggests a direction for further investigations. Therefore, the manifestation (wearing = sounding) of a sonic silhouette guides us towards a deeper analysis of the listening act and listening modes themselves.

**Listening modes.** We are all constantly listening. There is no button to turn off sounds; the ears do not have an equivalent of eyelids, we cannot close them, and we even hear when we are sleeping. To be listening is to be at the same time outside and inside. Jean-Luc Nancy asks what it means “to be all ears”; “sound has no hidden face; it is all in front, in back and outside inside, inside out” (Nancy and Mandell, 2007). The listening process is a multi-dimensional tool and shifts between active and passive, determined and undetermined modes by decoding sonic information: we ‘create’ the surrounding spaces using our listening apparatus.

There are several different modes of listening, such as causal listening, which can be direct or acousmatic and cochlear or non-cochlear. As Chion states, causal listening consists of listening to a sound in order to gather information about its cause (the source of the sound). When the cause is visible, sound can provide supplementary information about it (Pilot Studies 2 and 3). Sound itself can constitute our principal source of information about the source of a sound when this is not visible to us. Causal listening can take place on various levels. In some cases, we recognise the precise source: a specific person’s voice or the sound produced by a particular object (Chion, 2016). In another kind of causal listening we do not recognise an individual

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1. A quotation from the ‘sonic diary’.
or an object, but a source that can be categorised as human, mechanical, or animal: an adult man’s voice, a motorbike engine, or the song of a meadowlark. We may say ‘that must be something mechanical’ (based on a certain rhythm – a regularity aptly called ‘mechanical’) or ‘that must be an animal’ or ‘a human’ or ‘a piece of clothing’ (Ibid.).

Acousmatic listening is the opposite of direct listening, which is the ‘natural’ scenario wherein a sound source is present and visible. Schaeffer defines acousmatic listening by referring to Larousse: “A noise that one hears without seeing the cause from which it originates” (Palombini, 1993). The term derives from the ancient Greek ‘akousmatikoi’, and refers to the name given to the disciples of Pythagoras who listened to the master’s lectures through a curtain. For the akousmatikoi, the physical body of Pythagoras was hidden, leaving them with only the sound of their master’s voice. Acousmatic listening changes the way we hear in that, by isolating the sound from the “audiovisual complex” to which it initially belonged, favourable conditions for listening are created which place the focus on the sound for its own sake, as a sound object, independent of its causes or meaning (Chion, 1994).

When we hear a sound, we try to identify what it is and create associations. “Identification is more than a process of matching, and more precise than a classification of features; it is a concrete statement regarding what we think a sound is, what it signifies, and what makes it” (Farnell, 2010, p. 95). Identifying the source of a sound can therefore be viewed as the connecting of auditory perception and concepts (Lemaitre, Houix, Misdariis & Susini, 2010). From an acousmatic listening perspective, the identification of sound when an object is invisible opens up for deeper investigations into sonic silhouettes. How does the perception of a sonic silhouette change if the source of the sound is invisible, e.g. it comes from around a corner? What if a sound is not as we expect, e.g. one of the soles of a pair of shoes is covered with fur (see the ‘Extending the Body Through Sound’ chapter of this thesis).

We hear others and our surroundings at the same time as we hear ourselves: we are outside and inside, to be open from without and from within (Belinfante & Kohlmaier, 2016). John Cage in particular argues that sounds are all around us, and famously used an anechoic chamber to listen to the internal sounds of his body, which legitimated an aesthetic claim that vibratory and thus musical reality was inescapable (Cage, 2011). Some people (myself included) experience tinnitus
and so constantly hear a particular frequency, which is a daily noise that the person lives with. While often described as a ringing sound, it may also take the form of a clicking, a hiss, or roaring. It becomes a sonic filter for any other sounds from one’s surroundings. Noises that occur in our inner ears are termed “oto-acoustic emissions, which are produced by the inner ear of the one who is listening: the oto- or self(auto)-produced sounds that come to mingle with received sounds, in order to receive them” (Nancy & Mandell, 2007, p. 16). These sounds are consciously made audible in Maryanne Amacher’s ‘third ear music’ (1999) and Jacob Kierkegaard’s _Labyrinthitis_ (2008). These examples demonstrate the concept of “hearing” (Nancy & Mandell, 2007) or “quantum listening”, which is described as “listening to our listening” (Oliveros, Dempster, Adams & Buzzarté, 2010).

**Wearing hearing.** The new experience of ‘wearing hearing’ was investigated within this thesis, and opened up for an interesting discourse on bodily extension. During the artistic practice, the body was extended using various sound amplifiers. The act of listening was explored within Pilot Study 4 alongside Bågander by extending the body using various sound amplifiers (Figs. 52-55). Various combinations of sound amplifiers facilitated different interactions between the body and objects in a space, blurring vision and hearing. When worn on the ears, the ‘glass headphones’ created a shell-to-shell effect – the body heard itself. As Bågander explained, it was possible to hear two different sounds in her inner ears; the ‘glass headphones’ allow the wearer to concentrate and focus on the sounds of their surroundings, and these frequencies were mixed with those caused by tinnitus, which Bågander also experiences.

Hearing with the ears – cochlear listening – is only one part of audio-physical perception. “An acoustical stimulus, an audio information is absorbed with the entire body, not merely with the ears” (Fricke, Steininger & Leitner, 2017, p. 60). When the body hears sound without the aid of ears, this is termed ‘non-cochlear listening’. How would we experience a sonic silhouette if we experienced sound vibrations with our skin and bones? Further investigations of non-cochlear listening would be fruitful, as this would encompass another mode of listening that involves all of the body.
The infrasound amplifier was used in Study 1: Beyond Seeing, and was described by the participants as a very good tool-shifter and idea generator. In this particular listening mode, the body is extended because it hears the un-hearable – infrasound – and so another listening mode was found that could be developed further.

The artistic practice (see the ‘Training for Sonic Fashion’ chapter of this thesis) explored the physical differences that affect hearing. For example, the cone amplifiers were made out of either plastic or cardboard, with the former better for reflecting and amplifying sounds. The cylinder amplifiers varied between 30 and 115 cm in length, with the longer cylinders offering greater amplification of sound. The sound amplifiers constituted ‘sculptural dress’ or ‘object-instruments’ that were worn on the ears, and so functioned as body modification pieces in that they modified the wearer’s sense of hearing and perception of a soundscape, amplifying or isolating, spotting or reducing using absorbing filters. Therefore, the amplifiers suggested a possible direction for future artistic practice – investigating hearing with regard to the material, form, and size of sound amplifiers.

As Studies 3 and 4 showed (see the ‘A Sonic Fashion System’ chapter of this thesis), it is possible to hear e.g. size, length, volume, elasticity, walking manner. The study of body extension using objects that generate sounds while moving (Study 4) encouraged the linking of experiences: making sounds and listening to them at the same time. The listening modes that were explored using the ‘wearing hearing’ objects in the research workshop (see the ‘Training for Sonic Fashion’ chapter of this thesis) resulted in new listening experiences: directing, filtering, spotting, or blocking sounds, amplifying or reducing hearing, and extending bodily limits by hearing the un-heard.

Different modes of listening to one’s surroundings and oneself, along with collective listening (when the participants listened to one another listening) opened up for a discourse regarding the extended body and suggested directions for further investigation. “[T]he sonic persona is shaped and constituted by the sonically perceptive, performatively generated traces, the sonic traces, that any vibrating entity leaves in a specific culture and historical era as well as in a situated sonic environment” (Schulze, 2018, p. 123; emphasis by the author). Listening to the everyday performativity of sonic silhouettes moves us towards a discourse on the audial appearance and experience of “being surrounded” (Schulze, 2018) – or, as Nancy defines the phenomenon, “being singular plural” (Nancy, 2000). When we engage in the
act of wearing (the body is interacting with an item of dress), sound spaces (Leitner, 2005) are created that we can listen to. A subject is an observer – he/she experiences everyday sonic silhouettes by augmenting his/her ears with ‘wearing hearing’ objects. Therefore, the wearing hearing discourse could be a future direction for further investigations as it opens up potentially interesting and undiscovered field in fashion design for generating the new knowledge and methodology.
Figure 53. 'Wearing hearing', Pilot Study 5, Sound Amplifier 2.
Figure 54. ‘Wearing hearing’, Pilot Study 5, Sound Amplifiers 3 and 4.
Figure 55. 'Wearing hearing', Pilot Study 5, Sound Amplifiers 5 and 6.
A SHIFT IN FASHION DESIGN AESTHETICS

Through experimental practice, this artistic research identified the boundaries of fashion and explored alternatives to visual fashion discourse. As fashion is essentially understood to be a visual system, the research needed to start with fundamental questions: what sonic fashion and sonic silhouettes are. Rethinking aesthetics and design thinking and shifting from the visual to the sonic opened for a previously un-thought-of and unexpected concept – the sonic silhouette. Therefore, this thesis proposes a new direction for the fashion design field and expands fashion aesthetics through experimental, artistic practice that uses sound as a material for design thinking and designing. The main findings of the thesis – the introductory programme for sonic fashion – provide a training set, methodological guidelines, tool-shifters, and primary theory (terms, definitions, and a taxonomical system) for sonic fashion, and can be seen as a contribution to the field.

The shift in fashion aesthetics from visuality to audiality – from visual identity to sonic identity, from visual silhouettes to sonic silhouettes – changes the perception of fashion. The perception and manifestation of sonic silhouettes were investigated by exploring the concept itself, as were the new experience of wearing (sounding/ listening), and the creation of terminology for the purposes of definition. The materiality (sound) itself had to be taken into consideration and explored, and it was established that the research artefact/design material is invisible and temporal.

Perception, manifestation, and materiality. Sound is invisible, abstract, intangible, and ethereal. Unlike vision, it is not specifically directional; by contrast, it surrounds our bodies omnidirectionally, effecting a kind of 360-degree bodily extension. This, along with the invisible ‘form’ (you hear a sound from a distance, without seeing it), and circularity (circular, repetitive structures with no obvious beginning and end) influenced the notion of the sonic silhouette. Although sound is ephemeral and spreads in all directions, its source can be identified. When the sound of steps in shoes is heard, the ears can pinpoint the source of the sound – it is a pair of feet (Study 2). Walking in shoes and closing or opening fastenings such as zips and Velcro create the rhythmical patterns of sonic silhouettes.
CONCLUSIONS AND DISCUSSIONS

Tellenbach’s expression “atmosphere as an envelopment” is particularly appropriate for characterising the experience of sounds, which detach themselves from their source and pursue us. We are able to turn away from visible objects, but unable to preserve a distance between ourselves and sounds (Drobnick, 2004). Looking at a body wearing a bell or a fur shoe is a very different experience to listening to one. Aural experience and sound thinking, in comparison to visual experience and image thinking, change the fundamental ways in which the identity of a dressed body is manifested and perceived: from looking and being seen to listening and being heard.

The experience of sound is based on time; therefore, an item of sonic clothing is a time-based artefact. A sonic silhouette, as a time-based artefact, changes the experience of an object; seeing a red or striped dress is very different to experiencing a sonic dress for ten minutes, one hour, one day, or even a year. Materiality influences the experience and defines the notion of a sonic silhouette, and this experimental phenomenon brings new experiences of wearing; wearing the invisible, entering or listening to clothing, and ‘wearing’ culture/history (as in Pilot Study 1).

The act that creates a sounding silhouette is wearing, which is understood to be the interaction between a subject (a body) and an object (an item of dress): dressing, undressing, walking, sitting, touching, etc. In a way, wearing becomes a means of perceiving a material through the sounds of contact. Interaction between body and sound are based on touch and movement, and so are always kinetic-haptic. In this way, fashion becomes active (a sound) rather than static (an image).

The notion of a sonic silhouette. The study of bodily extension through the placement, balance, and quantity of sonic objects guided the research towards the defining of primary terms and definitions (see the chapter ‘Extending the Body Through Sound’). A sonic silhouette consists of two main components – a sonic object and a sonic subject – which merge together.

A sonic silhouette is a passive form of the combination of a sonic subject and a sonic object. A sounding silhouette is an active form of sonic silhouette that occurs when sound is emitted. The interaction shifts the silhouette from sonic to sounding, and so the notion of sonic and sounding silhouettes were defined using two formulae:

\[
\text{Sonic subject} + \text{Sonic object} = \text{Sonic silhouette}
\]
\[
\text{Sonic subject} + \text{Interaction (wearing)} + \text{Sonic object} = \text{Sounding silhouette}
\]
Terminology for a sonic fashion. During the experiments and workshops with fashion design students, the sonic aspects of clothing were described using imagined sounds (e.g. “the sound of trees rustling”, “cellophane crunching”, “the sound of rain”) or the sounds of items of dress in active modes (e.g. “rustle”, “squeak”, “creak”). Sonic aspects were also described with regard to the intensity of sounds – “noise”, “loud” (Pilot Study 2) – and the sound of footwear was described as being “flat”, “dry”, or “gummy” (Study 4). The study of sonic expressions showed that the terminology relating to the sonic aspects of fashion could be broadened further.

The study of sonic dress and imagined sounds demonstrated that the terminology used for perceptual experience – appearance, scene, image, observing – is predominantly visual. We do not have terminology such as ‘soundination’ (auditory imagination). The word ‘imagination’ is derived from the word ‘image’, and refers primarily to visual culture. The verb form of imagination is ‘to imagine’, and so the verb form of soundination could be ‘to soundine’ (Pilot Study 1). The study indicated a problematic ‘gap’ in the terminology that relates to other fields, such as philosophy and art.

Tools and methodologies. The studies and experiments indicate the difficulty inherent in shifting our approach to fashion from visual to sonic, and from visuality to audiality. We need to train our skills with regard to listening to and perceiving the aural dimension. The experiments with students demonstrated that exercises such as ‘Sonic Images’ (Pilot Study 2) and ‘Listening to Fashion’ (Pilot Study 3) worked well, and could be used as introductions to sonic aspects in the field of fashion, and so further investigation of training methods was undertaken. This was done by giving students 16 exercises, which were split into four groups: listening, touching-listening, speculative-kinetic, and sounding-performing. Analogue and digital sound amplifiers such as cones, cylinders, ‘glass headphones’, and infrasound amplifiers worked well as tool-shifters. The listening practice was very effective: when listeners were no longer distracted by visual stimuli, acoustic attentiveness increased. Therefore, the exercises and tool-shifters were included in the training set, and methodological guidelines were suggested.

The method of sensitising the body was used to stimulate hearing and shift thinking from image-based to sound-based. Different methods of sensitising hearing were incorporated into the training set, such as amplification and reduction of sound. These mentioned processes facilitated the use of tool-shifters (sound amplifiers) during the exercises, with the ‘glass headphones’ being used to block out external sound.
CONCLUSIONS AND DISCUSSIONS

In addition, a greater focus on the audial was achieved by blocking the visual through wearing an eye mask. Tool-shifters heightened the experiences of the extended self, and a greater hearing range was achieved through sound amplifiers and extended bodily limits in relation to electromagnetic signals (infrasound). Therefore, key topics such as non-visual aesthetics, the extended body, and audial appearance could be further discussed.

**A sonic fashion system.** The main study of the sonic expressions of objects (sound of dress) was conducted by exploring, recording, and systematising sounds during interactions between a subject (a body) and an object (an item of dress). The study indicated two kinds of haptic-kinetic interaction when sound is emitted: (1) dress-dress and (2) body-dress. As the study results show, it is possible to categorise and subcategorise sonic expressions, which are linked to a sonic object (dress) and/or a sonic subject (human body). Nine primary categories of sonic expression were identified: (1) main material, (2) lining, (3) height, (4) length, (5) weight, (6) fit, (7) fastening, (8) decorative elements, and (9) placement. These categories, along with further ones, were categorised within a taxonomy that allowed the relationships between them to be visualised. In order to be able to ascertain all of the possible categories of sonic objects and sonic subjects, deeper analysis through further recording sessions is required.

All of the recorded sounds were collected in a ‘Sonic Fashion Archive’ of approximately 150 recordings, which was used for further analysis. The method of recording a piece of clothing was developed during the documenting process, and allowed sounds to be analysed and compared. This consisted of six steps: (1) description of the item of dress; (2) putting on the item of dress (dressing); (3) touching the surface of the item of dress with the hand; (4) wearing (moving) with the item of dress; (5) interacting with the details of the item of dress; (6) taking off the item of dress (undressing). The method of recording the sound of an object indicated the importance of bodily performance and segmented the body-dress/dress-dress interaction (dressing, undressing, wearing) with regard to the sound.

The first step of the recording method – verbally describing the item of dress – provides a new insight for possible future investigations. The case study (‘Beyond Seeing’) with people with different seeing abilities encouraged reflection on the concept of dress and its definitions. The fashion items could have been described in very different ways if we had asked those who are blind to do so. How the dress
would be defined beyond the visuality? Therefore, re-defining dress from a sonic/haptic perspective would be an interesting approach to deeper studies.

**Sensory aesthetics for fashion education.** The overall results of the research presented in this thesis are new knowledge regarding sonic fashion discourse and the identification of a ‘gap’ in our knowledge of sonic identity in the field of fashion design. As Candy and Edmonds state, new knowledge or understanding and outcomes of research must be in a form that can be shared (in: Biggs & Karlsson, 2010, p. 124). The data that was collected and analysed during the investigations could be presented in the format of a programme, which could be used in fashion education. As Findeli et. al. argue, “the researchers’ community is interested in ‘fundamental’ or ‘theoretical’ knowledge, the practitioners’ community in ‘applied’ and ‘useful’ knowledge, and educators’ community in ‘teachable’ and ‘applicable’ knowledge” (2008, p. 74). The experiments and workshops with students in which the sonic aspects of fashion were explored demonstrated the need for training in relation to sonic fashion. Thus, the experimental programme is as an introduction to sonic dimension. Within this thesis, “teachable” and “applicable” knowledge was collected during the artistic practice, and can be seen as an introductory programme for sonic fashion consisting of a training set (tool-shifters and methodological guidelines), primary terms, definitions, and taxonomy.

Fashion education could involve all of the senses, dress could be seen as multisensory, and identity could be approached as a multi-layered phenomenon. Likewise, discourse on other senses – sensory aesthetics – could be included in the curriculum of fashion design education as it opens up new aspects of dress and brings new methods for designing it. Therefore, the analysis of the subject (sensory aesthetics) in education programs in different fashion schools could be made.

**Sensory representation of a dress and dressed body.** Interactions between a subject (a body) and an object (an item of dress) involve several layers: visual, sonic, haptic, kinetic, olfactory. The complexity of dress with regard to sensorial richness invites a rethinking of fashion as a visual language. Usually, the fashion is presented using visual language: TV, fashion shows, magazines, blogs, etc. What kind of format could be used to present sonic silhouette? Could it be the radio broadcasting, audio newspaper, audio zine, live sound performance?.. What kind of format would be used to present other senses?
CONCLUSIONS AND DISCUSSIONS

If we think of a fashion exhibition, especially the historical one, it is usually 'packed' in the glass boxes. This kind of representation is unreachable for a blind person. What kind of other representation of fashion could be developed that involves other senses? How would then the exhibition change by adding sound to an exhibited object, e.g. the spectator could listen to the sound of ancient accessory? How would these kind of eyes-free interaction be designed then?

To conclude, design thinking operates predominantly in the visual realm. Designers are proficient at thinking in terms of shape, size, colour, and material. This thesis explores fashion from the perspective of hearing rather than seeing, and considers sonic auditory to be a part of identity. It opens up a discourse relating to sonic silhouette, audial appearance, and sonic persona (Schulze, 2018). This thesis opens new avenues for design thinking with ears rather than eyes. The knowledge derived from the studies could be used by fashion designers and educators at several points. A working tool – the training set with methodological guidelines – is provided, as are terms and definitions relating to sonic silhouettes. These results could serve as starting points for introducing sonic fashion and moving towards sound thinking and audial awareness. Furthermore, the primary taxonomy of sonic categories could be used as a means of analysing the sonic properties of dress, and as a tool for designing with sounds. The sonic fashion archive could be developed into the sonic fashion library suggesting different sonic expressions for a dress. As well thesis could be used as an inspirational topic for broadening the discourse on a silhouette.
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RESEARCH DISSEMINATION
Papers


Exhibitions

‘Noisy Bodies’, Beyond Seeing: Innovative ways of sensory fashion design, La Villette, Paris, France, 2018 (18th-28th January)


‘Wearing Sound’, Future Ways of Wearing, Design Transfer, Berlin, Germany, 2016 (9th December)

‘AHTT, Future Ways of Wearing, Design Transfer, Berlin, Germany, 2016 (9th December)

‘Micro-Tectonics’, 3rd Istanbul Design Biennial, Istanbul, Turkey, 2016 (22nd October-20th November)

Activating the Surface, University of Arts, Berlin, Germany, 2016 (28th February)

‘Sounding Objects’, Design Week ’16, Vilnius Academy of Arts, Telšiai, Lithuania, 2016 (2nd-4th May)
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‘Anti-ideal’, VVGŽM Tolerance Centre, Vilnius, Lithuania 2015 (2nd December)

Museum of Ignalina, Ignalina, Lithuania, 2016 (6th-30th March)

Vilnius Municipality, Vilnius, Lithuania, 2016 (19th April-3rd May)

Cultural Centre of Marijampolė, Marijampolė, Lithuania, 2016 (4th-25th August)

Cultural Centre of Jurbarkas, Jurbarkas, Lithuania, 2016 (29th August-19th September)

Cultural Centre of Panevėžys, Panevėžys, Lithuania, 2016 (20th September-31st October)

Raudondvaris, Kaunas, Lithuania, 2016-2017 (4th October-5th January)

Cultural Centre of Šiauliai, Šiauliai, Lithuania, 2016 (9th-30th November)

Cultural Centre of Trakai, Trakai, Lithuania, 2016 (17th January-13th February)

Design Week of Šiauliai, Šiauliai, Lithuania, 2017 (2nd-6th May)

Artifex, Vilnius, Lithuania, 2017 (12th-30th July)

Workshops

Soundtopia III, two-day workshop at Vilnius Academy of Arts, Vilnius, Lithuania, 2017 (13th-14th February)

Fashion Beyond the Sight, three-day research workshop at The Textile Museum of Sweden, Borås, Sweden, 2017 (March 7th-9th)

Bioplastic, two-day workshop at Vilnius Academy of Arts, Telšiai, Lithuania, 2016 (5th-6th May)

Sounding Objects, three-day workshop at Vilnius Academy of Arts, Telšiai, Lithuania, 2016 (2nd-4th May)
Sound, one-day workshop at the Swedish School of Textiles, ArcInTex Network meeting, Borås, Sweden, 2016 (15th May)

Soundtopia II, two-day workshop at University of Arts, Berlin, Germany, 2016 (24th-25th November)

Soundtopia I, one-day workshop at Vilnius Academy of Arts, Vilnius, Lithuania, 2016 (22nd October)

Collaborations

Sonic Identities with Ugne Metzner, Deutscher Blinden und Sehbehindertenverband, Berlin, Germany, December 2016-present (on-going)

Sonic Identities with Jean-Luc Pening, VIEWS International, Brussels, Belgium, October 2016-present (on-going),

Listening to Surroundings in the Open Space: City with Irma Jokšytė, Vilnius, Lithuania, 2016 (28th October)

Sound Mapping with Linnea Bågander, The Swedish School of Textiles, Borås, Sweden, 2016 (22nd June)

E-ink Coating with Melkie Getnet Tadesse, The Swedish School of Textiles, Borås, Sweden, 2016 (March-May)

On Listening with Linnea Bågander, The Swedish School of Textiles, Borås, Sweden, 2016 (March)

Sonic Identities with Irma Jokšytė, New Theater, Vilnius, Lithuania, November 2015-present (on-going)
Projects

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Posters

‘Sonic Fashion’, MSCA16, Research and Society, Manchester, Great Britain, 2016 (28th-29th July)

‘Wearing Sound’, Future Ways of Wearing, Design Transfer, Berlin, Germany, 2016 (9th December)

‘Aesthetics of Invisible: Sonic Identity in the Field of Fashion Design’, ArcInTexETN Mid Term Review, Borås, Sweden, 2016 (21st-22nd November)

Lectures

‘Design Methods’, Vilnius Academy of Arts, Vilnius, Lithuania, 2017 (13th February)

‘Smart Textiles’, Vilnius Academy of Arts, Telšiai, Lithuania, 2016 (4th May)

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Press

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'New Project on Fashion Beyond Sight', interview, UB, Borås, Sweden, 2016 (18th November)

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Blog Posts

'Beyond Seeing', ArcInTexETN blog, 2016 (11th November) 'Sonic Identity', ArcInTexETN blog, 2016 (11th November), 'Bluedot', ArcInTexETN blog, 2016 (11th November)

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'MSCA16', ArcInTexETN blog, 2016 (8th June)

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‘Stereo Haptics’, ArcInTexETN blog, 2016 (18th February)

‘Our Body is Our Manual’, ArcInTexETN blog, 2016 (11th February)

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‘New Geographies’, ArcInTexETN blog, 2016 (18th January)

‘Growing the Second Skin’, ArcInTexETN blog, 2016 (18th January)

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‘Weaving the Sound’, ArcInTexETN blog, 2016 (16th January)