MADS HOBYE

DESIGNING FOR HOMO EXPORENS

Open Social Play in Performative Frames
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The process of formulating Designing for Homo Explorens as a design perspective within interaction design academia happened through a mutually-fertile dialogue with fellow PhD student Henrik Svarrer Larsen. As a result of this informal dialogue, an overlapping conceptual understanding has developed between us (for example, Henrik will use the concept of animism to describe properties of what I consider internal complexity, etc.) I am truly grateful for this dialogue, and I encourage others who are interested in the digital material aesthetics of interaction design to read his dissertation (to be published in 2014) and to take note of how similar concepts can be applied to an entirely different context and problem framing.

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Thank you
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1. Introduction and manifesto

1.1. Introduction

The research process presented in this dissertation takes as its departure a hands-on approach to exploration through the construction of multiple interactive art installations. During the exhibitions, anywhere from one person to thousands of people have interacted. These participants held an indirect dialogue with the designers who were behind the scenes tweaking the installation's interactive properties in real time. Over the course of ten years, the focus has slightly shifted; it began as an interest in interactive technology which gradually became an interest in designing engaging experiences for social dynamics, both around and with the installations. During the last four years of research, it has become an inquiry into ways of designing for exploratory social dynamics.

This dissertation is an extension of the process in which the craftsmanlike understanding gained through the many experiments is used as a foundation for a discourse within interaction design academia. This has partly been an exercise in revisiting installations done before the PhD research period with a more critical gaze and partly conducting new experiments with new artifacts which require further experimentation to fully understand their properties and possibilities. Of the many experiments conducted, twelve interactive installations are used as case studies to gain a greater understanding of the many nuances involved when real participants engage in and explore interactive installations. The focus is on how small differences in the design have consequences for the participants’ overall experience.

This academic process has been one of composing new understandings of what it means to design for social dynamics. A programmatic approach to design research was taken, wherein knowledge gained through the installations in dialogue with new experiments has been converted into a new design perspective. This perspective can be used fully or partially as a generative way of designing new interaction potentials; fully, by acknowledging the design perspective as a generative composition that can be used as is, or partially, as a composition that can be recomposed thus creating new perspectives for design.

This design perspective is Designing for Homo Explorens. Within interaction design academia, the concept builds upon the idea of Designing for Homo Ludens by Gaver (2002). The term is borrowed from Huizinga’s (1939/1998) concept of Homo Ludens as a perspective on humans as playful creatures (further detailed in chapter 6). Much in line with Gaver’s perspective of designing for Homo Ludens, Designing for Homo Explorens is a perspective that focuses on social exploratory interaction between participants mediated through designed artifacts. What follows is an interest in enabling interaction design to move beyond instrumental use or the gamification of design, focusing instead on the qualities of the explorations solely for the experience of engaging with them. The intention is to create new understandings of how humans interact and how we can use these understandings to design for social interaction. The insights have been collected in a manifesto structured around four aspects which draw upon the academic concepts of playful interaction, situatedness, full-body interaction and performance theory. The novelty of the dissertation lies in the combination of these theories into a coherent design perspective. However, the manifesto and its aspects should only be considered knowledge contributions within interaction design academia. I leave it to other academic fields to decide whether my findings are useful to them as well. For example, playing with norms as a way of designing engaging interactions should only be seen as a generative understanding within interaction design, and not as a study of norms within a sociological framework.

Despite its name, the intention is not to prove the existence of a special species called Homo Explorens. The concept of Designing for Homo Explorens is a generative design perspective to be used in the design of explorative interactions. Its purpose is to fill a design space that I consider neglected in the current body of interaction design academia. It is not that playfulness, situatedness, performance and embodied interaction are missing from interaction design, but their combination in relationship to exploration still needs to be articulated. This is where this dissertation comes into the discourse.
In this chapter, I will introduce two experiments as vignettes to frame the mind of the reader. The vignettes serve as a basis for understanding the manifesto as an overall design perspective gained through the programmatic approach. The manifesto is presented immediately after the vignettes and consists of a general introduction and positioning, and then four approaches to Designing for Homo Explorens. Finally, I will give an overview of how the different chapters should be read and how terms are used throughout the dissertation.

1.2. Two vignettes

Before detailing the manifesto and the programmatic approach, I will present two significantly different projects within the frame of Designing for Homo Explorens. They serve as an introduction to how the socially playful nature of the designs is carried out. Furthermore, these projects hint toward new knowledge in regard to Designing for Homo Explorens. The two vignettes represent two experiments out of twelve made for this dissertation, all exemplifying how interaction designers can design for socially playful interaction.

**Ladies’ and Men’s Room Mixup**

At a nightclub in Malmö, Sweden, young nightclubbers of mixed genders converse in the public toilets; they are discussing which gender is supposed to be in which toilet. A man says, "What are you doing in the men's room?" And a woman responds, "What are you talking about? This is the ladies' room!" Many similar conversations take place about which gender should be allowed in which toilet while, at the same time, little smiles of curiosity appear on their faces as they work out how to act and interact. Some participants even act as guides, engaging with confused clubbers about which toilet is the "correct" one to use.

We, as interaction designers, were guilty of creating this confusion. We had replaced the traditional public toilet signs with digital displays which would present gender identification for the individual toilets. A sensor would detect the number of people who had entered any given toilet, and when more than five people had entered one of the toilets, the displays would switch gender signs resulting in the ladies’ toilet becoming the men’s toilet and the men’s toilet becoming the ladies’ toilet.

Typically toilets in public spaces are divided between genders, and two signs—male and female—symbolise the difference between the toilets from the outside. These signs are treated with great respect, and it would be controversial if a male entered the toilet with the sign of a female on the door. By switching the signs,
females would involuntarily walk into a toilet occupied by males and vice versa. This project explored how such confusion creates social interaction between the genders and amongst individuals.

The idea for the design stemmed from an observation of the rules of how to interact socially at a nightclub; these rules are implicit and complex. Interestingly, there was no concrete “thing” for the unwitting participants to gather around and socially interact through, and many people seemed to restrict their social interaction to others they already knew or who were friends of their friends. They immediately grouped themselves around tables and on couches or on the dance floor, forming an invisible shield of privacy which would require someone to have an abundance of courage to break into the group and start a conversation. This struck us as situationally ironic since socialising is one of the primary purposes of going to a nightclub. Social norms tend to presuppose that we need a reason to initiate contact with others, and with this installation, we wanted to create an excuse for people to engage socially. Also, we wanted to create a need for people to communicate in order to clarify a confusing situation as they were unwittingly prompted into navigating an unusual social setting.

It became an installation with multiple layers of interaction. There would be people who felt they needed to strike up conversations with others around them to decide how to act properly and there would also be those who used the situation as an excuse to engage with others, taking on the role of the innocent needing help. Further, some would see it as an opportunity to hang out in either one of the toilets—it seemed like the toilet became an attractive place to be as a consequence of the confusion and the discussions around it.

Finally, there were several people who used the situation to act as guides for others. They took on the role of showing others which toilet they considered to be the correct one or by trying to warn people entering what they considered to be the wrong toilet. What they considered the right or wrong toilet would be arbitrary due to the constant-changing signs; hence, it is our understanding that this mostly served as a way to take on the role of a guide. Many of the others embraced this and engaged in conversations with the self-appointed guides about which toilet they should enter.

What we expected to be a rather innocent installation that would facilitate some interaction proved to be one that completely altered the social dynamics around the toilets. We had designed something with significant consequences relating to how we comply with and renegotiate social norms whilst creating opportunities for people to engage socially in new ways.
Mediated Body at Burning Man

“Hey, do you want to try something cool?” Says a performer as he approaches a woman who seems curious about the lights blinking on his suit. The performer looks like an improvised cyborg with his suit made out of old motorcycle armour displaying many lights and wires. Before she is able to think through what he means, the performer hands her a pair of headphones and invites her to wear them. She only hears electrostatic noise, but as the performer touches her hand, the crackling noise turns into interweaving soundwaves. As someone who was curious and receptive from the start, she smiles and lights up her eyes when she realises that somehow her body has become electrically connected to the performer, mediated in the form of mutual soundwaves via their headphones. Soundwaves alter what she hears depending on subtle differences in the type of touch: a stroke sounds different than a tap, etc.

From this moment on, the interaction between the performer and the participant could take many forms. Usually, the interaction would become a mixture of sensing intimacy between each other’s bodies and an exploration of the sound possibilities that the interactive system enabled. Some participants would be interested in the novel properties of engaging the sound interface with their touch. However, for most participants, it became an intimately-shared moment with a stranger. The headphones prevented them from communicating verbally, so instead they did this by smiling, eye contact and mutual touch.

Most moments were quite poetic to observe, for example, seeing the heightened sensitivity in regard to the distance between each other’s bodies. However, a few extreme cases appeared as well: some would be so overwhelmed with the idea of touch turning into sound that they would run away from the performer, forcing him to also run since they were physically connected through the headphone cord. In other scenarios, the sense of bodily interaction would result in the participant throwing her body into the arms of the performer, completely enveloping him. Although this action was logical from the perspective of aesthetic experience, it would render the sensing technology useless, since it would detect the maximum amount of touch and create a rather unpleasant amount of noise in their headphones.

The simple interface created a parallel universe in which two people could engage in ways that would normally be deemed socially inappropriate. Therefore, it transformed the formal ways of getting to know someone: formal questions that would normally be a part of the initial conversation like “Where do you come from?” or “What is your name?” were delayed for later conversation after having engaged in the experience for some time.

We had designed the system from our own curiosity: what would happen if people were able to sense each other’s bodies mediated through a sound interface? The diverse interactions arising from its use could only be understood when the system was introduced with real interaction and with real participants situated in real contexts.

3. The performer engages with a participant in the Mediated Body. Together, they explore the sense of aura between them as it converts touch to sound.
1.3. Manifesto: Designing for Homo Explorens

This manifesto functions as an overarching design perspective that presents a way of designing interactive systems for exploration. It serves as a way to frame the knowledge contribution in this dissertation, and the purpose is to emphasise that the design perspective embodies a set of ideals. These ideals are based on what the author considers constructive types of exploration. This means that the author is not impartial and does not try to encompass every possible design scenario with exploratory qualities. The manifesto is a declaration of the intent of Designing for Homo Explorens.

The manifesto introduces these ideals and makes them actionable for the reader through four aspects. The aspects are dimensions of design practices that have been cultivated through ten years of experimentation, and are important dimensions to take into consideration. They are not recipes for success or a list of requirements, rather, they serve to highlight properties for the reader to be aware of in his or her own design practice. It may be that only one or two of the aspects are necessary for exploratory interaction to occur in the given design situation within the given concept. How the reader makes use of them greatly depends on the ideals of their own design process.

The manifesto serves as the basis for the overall structure of this dissertation. Each aspect has been allocated a chapter (chapters 4–7) in which further theoretical discussions and sets of insights are presented. The role of the manifesto as part of a knowledge contribution is reflected upon in chapter 3 as part of the presentation of the programmatic approach to design research.

4. The different parts of the manifesto that, when taken together, form the whole approach of Designing for Homo Explorens.
The Manifesto

For a moment, consider humans as explorers of social interaction situated in complex environments where many agendas and relationships intertwine. Here, participants have an active role in a ludic, co-experiential meaning-making process. It is possible to design for this, but I feel a new design perspective is needed: I call this perspective Designing for Homo Explorens.

This design perspective does not include everything that could be considered exploration. Embedded in the perspective and its aspects lies a set of ideals of what is considered good exploration. Designing for Homo Explorens seeks to design for a social type of exploration. I posit that one can design for social dynamics, which can create novel interaction scenarios with dynamic play between the participants and the context the design is situated in.

To facilitate the human desire for exploration, we need to design situated distortions that trigger curiosity. This can be as simple as ambiguous artifacts that generate curiosity or as intricate as designs that generate norm-bending, comfort zone-pushing dynamics. When we do this right, social playfulness occurs as a way of negotiating new, unarticulated meanings, and we find that exploration blossoms in the social space between multiple participants engaged in the same playful dialogue. The artifacts move beyond simple man/machine interactions and become mediators of the emergent social dynamics. This creates an interaction space where ludic, co-experiential, meaning-making dynamics can be explored.

Even though the designs play a large role in creating these social dynamics, the participants should be given the freedom to intuitively choose how to engage and how much to engage in the interaction. If the participants choose to stay engaged for a prolonged time, it becomes a good indicator of the quality of the design. It signifies that the design has moved beyond a mere object of curiosity to a designed space with explorative qualities. Open-ended, poetic, gentle and subtle interaction spaces tend to create such a space, whereas fixed narratives—strict, brutal or destructive interactions—tend to prevent the participants from finding their own pace and interest in the interaction.

Although there may be takeaways from the interaction, this is not the core. The core is in the aesthetic properties of the interaction itself—the joy of being in the moment with others. In this moment, the participants become performers in their collective narrative.

Through the insights gained from these experiments over a period of ten years, I have distilled a set of design aspects that can lead to social exploration. Each aspect should be considered an attempt to communicate important parts of a whole. Although the aspects are not an exhaustive list, nor a recipe for success, they are four potential dimensions that a designer can appropriate to design for exploration. The four aspects of this manifesto are:
Aspect: Create exploration through internal complexity

Our interest lies in designing artifacts that create a space for exploration. This requires us to leave behind ideals of transparency and usability that are dominant when more utilitarian purposes are at play. Instead, our interest lies in designing interactions that invite the participants to experiment and play with the design (Gaver et al., 2003). By designing internal workings with complex nonlinear states (Reeves et al., 2005), it is possible to expand the interaction space for the participants to explore. This enables us to make interfaces that may seem simple at first, but can become rich for exploration once the participants begin to engage with them.

The challenge is to create a system which is interesting to explore, but does not leave the participant confused. This is a matter of striking the right balance between vivid and responsive interactions. In this perspective, one should consider chaos and predictability to be at opposite ends of a scale; both extremes would be dull and boring in themselves. Chaotic responses would be predictably unpredictable while, concurrently, something simple and predictable would soon amount to nothing but a means to another end (e.g., controlling the light with a light switch). Within these two extremes lies the possibility of creating intriguing interaction designs that spark the curiosity (Tieben et al., 2011) of the participants. The challenge essentially becomes one of hitting the ‘sweet spot’ (Gaver et al., 2009) between the two.

Fortunately, the participants are able to make sense of these multilayered interactions. This allows us to design systems that have interaction responses with tight coupling while also creating complex interaction patterns parallel to it. This can be done by adding nuances to the dominant interaction or by dividing multiple modes of complexity into different media. In the latter case, one could create complex sound responses for certain parts of the system while, at the same time, retaining clear feedback through a visual response.

Aspect: Create experiential exploration through full-body interaction

We engage in the world with our whole bodies. It is common to say “Can I have a look?” while actually reaching out to grab the object(s) one supposedly just wants to look at. This is especially the case when we want to make sense of something we do not understand and want to figure out. A significant part of what constitutes an explorative experience therefore lies in sensing through the whole body. To design for this, it is necessary to be aware of the aesthetic experience (Dewey, 1958) of the interaction itself. The aesthetic experience does not necessarily seek beauty in the superficial sense, instead it seeks to create an engaging experience of use (Petersen et al., 2004).

An effective trick is to motivate the exploration through external goals. If the rewards are high enough, one can motivate most participants to become highly engaged in anything. On the surface, this will seem like a success, but the focus will have become a means to an end instead of a moment of shared experience. I want to put the focus on the possibility of creating rich interactions based on the pleasure of the experience of interacting in itself.

The intimacy of full-body interaction between two or more participants has proved to be an alluring (Wright et al., 2008) way of creating such moments. When the participants interact with their bodies, it enables them to explore their relationship somaesthetically (Shusterman, 2013) with each other. In this interaction, the interface (in the traditional sense of man/machine) has been removed, and we are left with the internal workings of the system as the facilitator of the experiential exploration. In this way, internal complexity enriches the interaction so it becomes more than simply an instrumental interface with an external purpose.
Aspect: Create social playfulness through distortions of situated norms

We are extremely attuned to our surroundings (Goffman, 1966). How to behave greatly depends on the space we are situated in. In everyday life, this is practical since it enables us to create good-enough assessments of what we should expect in the social spaces we engage in. However, this leaves little room for interaction which invites the participants to explore the meaning of the space and to invent new uses for it.

By playing with the boundaries of social norms situated in a public setting, one can trigger ways for people to collaboratively renegotiate their shared experience. To trigger this frame of mind, it is necessary to create some sort of normative disruption. This is where the designed objects come into play as creators of the embodied interaction (Dourish, 2004). They serve as novel pieces that create opportunities, and sometimes even excuses, to interact in ways that would be socially acknowledged as inappropriate in the given situation. The designs enable participants to sidestep social conduct that would be initially expected; for example, not needing to know the name of the person one is interacting with. Although knowledge of a person's name can be seen as a small handshake, it inherently serves as a strong inhibitor for spontaneous social interaction in a public setting. If it is done right, we move from ambiguous design (Gaver et al., 2003) to ambiguous situations. In these socially ambiguous interaction spaces, meaning emerges through the social negotiations among the participants, and the interest lies in providing open-ended exploration (Gaver, 2002), not a predefined narrative.

Sidestepping normative (Goffman, 1966) conduct does not necessarily mean that the designed object transforms the space itself. In most situations, the object creates a space within the space. This space becomes an alternative universe on its own social terms. When people step back into the situated space, it is embedded from within, and they need to revert to engagements expected there. Asking for the name of the other participants would be one common way of complying to norms outside the interaction itself.

Within this normative disruption, the designed devices become mediators (Dourish, 2004) of the interaction wherein the internal complexity modulates the interaction as the participants create their own meaning of it. For the interaction to be rich, it is necessary to allow the participants to share the experience both as a part of a physical space and through the system.

Aspect: Create a frame for performative interactions

The normative disruptions described in the previous aspect break down the predictable structures of what one should expect in a given situation; therefore, it is necessary for the participants to have a certain sensitivity towards the space and their own actions in it. They become aware (Schechner, 2003) of their own performance, for better or worse.

This performative awareness appears on two levels. The first level consists of the participants’ basic awareness of their performance in the space; they are aware of their own actions and how they may be interpreted by other participants. The second level happens when the participants actively choose to shape the meaning of the interaction based on their own desires through a dialogue with the other participants. They begin to shape the meaning by taking on performative roles which are more complex than a simple performer, observer or operator (Dalsgaard & Hansen, 2008): they can be opportunists, ambassadors, critics, victims, guides, and so on. The roles present depend on the designed artifact and the sociocultural setting the design resides in. The more roles the designs accommodate, the more entry points there are for the participants to engage in. Also, by considering participants as performers, we are able to design interactions that embrace a multilayered set of agendas and enable the participants to take charge of their own performative explorations in them (Goffman, 1959, p. 8).

This performative space is similar to the social bubble presented in the previous aspect. If the participants begin to shape the interaction, it becomes a performative frame where new interactions appear. It is a frame that evolves over time, depending on how the participants explore and shape it on their own terms. Interestingly, a paradox lies in the role of the designed objects. In one sense, they are in the background of the social interaction happening among the participants; on the other hand, they are the primary reason for the interaction to happen in the first place. The unpredictability of how the participants use the design for their own desires and the tendency of the design to fall into the background make the performative frame an emergent one (Johnson, 2001). If new interactions begin to emerge, that is a good indicator for a case of Designing for Homo Explorrens.
5. The outline of the dissertation. It is divided into three sections. 1. General introduction. 2. The four aspects. 3. Conclusion and appendices.
1.4. Readers’ guide

This dissertation takes a somewhat untraditional form compared to other dissertations within interaction design. This is a consequence of the programmatic structure (see chapter 3 for a more detailed description) and the explorative nature of the research. Within this structure, the experiments are intended to create a rich understanding of how different design choices affect the interaction happening around the installations. Therefore, this dissertation is structured around the manifesto as the presentational structure. The four aspects within the manifesto are presented as the core chapters (chapters 4–7), and together, they define the thematic dimensions of Designing for Homo Explorens.

Structure

This dissertation consists of eight chapters that are divided into three parts. The first part introduces the dissertation. The second part expands the findings with concrete examples and analysis, and the last evaluates the dissertation in relation to its overall role as a part of interaction design academia:

The first part is the general overview and introduction of the dissertation. This consists of the manifesto to frame the mind of the reader. Hereafter, the different experiments are presented in a gallery. The experiments are presented as a quick overview and a way to conceptually present the different design potentials. Finally, the first part introduces the concept of programmatic design research. The chapter on the programmatic approach corresponds to the ‘methods’ chapter present in a more conventional dissertation.

The second part is the core of the dissertation. In this part, different aspects of the manifesto are fleshed out. Each aspect uses rich descriptions of the experiments to exemplify the perspective put forward. Therefore, to get a full overview of the individual projects, one needs to read through all the aspects.

The third part is the roundoff. Since the main conclusion is presented in the manifesto, the final roundoff becomes a reflection on how the experiments, the insights and the perspective of Designing for Homo Explorens relate to interaction design academia in general. This is done by reflecting on the genealogy relating to existing design perspectives and different branches within interaction design.

Terms: we, I, them and us etc.

As a consequence of the many experiments and the collaborative nature of the design processes, many stakeholders have been involved. It would be cumbersome to list the total number of partners involved when a project is mentioned in the text; therefore, to simplify, a list of terms has been created which points to the various stakeholders and their roles in the processes. The following definitions are used throughout the dissertation:

- **We and us**: "We" and "us" are used as a reference for the multiple designers, academics and artists (myself included) experimenting within a certain project. "We" refers to "us" as designers and observers engaged in exploring the ways our designs have consequences for the social interaction happening around them.
- **I**: In the few cases where I had the sole role as the designer or had the sole role in observing or experimenting with the installations and how they were used by the participants, I use ‘I’.
- **Participants**: Although I certainly consider the participants as having an active role in forming the interaction, they are still distinct from the role of the designers. The designers have created the works and the participants have had the opportunity to engage with them without prior knowledge about the design process and the discussions behind them. We are designing for the participants.
- **Observers**: I never use the concept of the audience. Since, for the most part, the concept of an audience implies a passive consumer role which fits poorly with the idea of the works being situated. I use the concept of observers, whose mere presence in the space affects the interaction and how the active participants interact with the installations.
- **Performer**: In the case of the Mediated Body, the suit was worn by a co-designer who also had the role of a performer engaging with the participants.
- **Participants as performers**: Within certain interactions, the participants took on a performative role. When I describe the participants in a performative role, I use the plural version of performer, i.e., “performers”.
- **Them**: “Them” is used as an alternative word for participants, i.e., “Let them become performers of their own narratives”.

The rather loose definitions of “we” and “I” etc. have been compensated for by crediting everyone involved in the individual projects in the gallery.
2. Gallery of engagements

2.1. Introduction

This dissertation is not structured around the experiments themselves but around different aspects of Designing for Homo Explorens. Therefore, it is necessary to give a general overview of the projects beforehand. The projects presented in this chapter are used as examples for the aspects and insights found throughout this dissertation.

Each project has been classified with the purpose of assisting the reader in evaluating the projects in relation to the overall program. The classifications are from the perspective of Designing for Homo Explorens; therefore, a project classified as a failure in this dissertation might be considered a success from another perspective. The following are the different types of classifications:

- **Conceptual**: This serves as a conceptual prototype which explores certain elements within Designing for Homo Explorens. The prototype has been deemed unnecessary to test in the real world because of its predictability or because the creation of the object itself fulfilled its own design purpose by inspiring new design iterations. In the latter case, it has been included in the final dissertation because it serves an argumentative purpose in the text.
- **Confirmation**: A prototype which has been used in field work and has gone through multiple iterations, generally confirming design intuitions and leading to deeper insights into the intended experiential quality.
- **Failure**: A design prototype whose intended experiential qualities did not match the actual results when tested out in the field. These prototypes may still contain conceptual qualities, but in this dissertation, they serve as examples of limitations and challenges when Designing for Homo Explorens.

Out of many possible experiments, I have selected projects in which I had a primary role in the design process and made key contributions in all project phases, from the initial idea generation phase to implementation and experimentation. Thus far, I have had a primary programming role in all of the installations except Hydraphonia, Find My Twin and Barcode Beats. My hope is that after reading about internal complexity in chapter 4, readers will understand the crucial role the programmer has in affecting the outcome of the interaction and, as a result, the qualities of the overall design experience.

Before the different exemplars are presented as a gallery, I would like to dwell on the creative process of the experiments. Specifically, I would like to lay out the different creative environments that the designs were created in and to allow the reader to gain a greater understanding of some of the more tacit design choices made in the process. They also serve as a foundation to understanding how the programmatic approach presented in the following chapter was cultivated as a bottom-up process through a number of environments.
2.2. Creative genealogy

Most of the installations presented in this dissertation have been implemented through creative environments outside of academia. These environments allowed people with a diverse set of skills to involve themselves in the creative processes and enabled them to experiment without prior academic justifications. In this section, I detail the collaborative settings the projects were created within; this should enable the reader to get a general historical overview of the creative environments and where the aesthetic choices of fire explosions and rusty materials originated.

Specifically, the designs have been created in three environments (and one historically-inspired source). I will present them in consecutive order here.

The first installations were made as a part of Half Machine (2003–2008). Half Machine was a recurring live-art festival that artistically explored the relationship between man and machine. In this case, it consisted of fifty to one hundred people who used fourteen days to build a vivid environment out of scrap materials. Throughout the two weeks, aerial dancers would explore the space and engage in impromptu performances for the observers. It was inspired by the aesthetics of the yearly Burning Man festival (Burning Man, n.d.) in the Nevada desert. Visually, the space was filled with rusty machine parts from the local scrap yard which were lit up by multicoloured lamps borrowed from different theatres and schools across the city. The core ideas from Burning Man about participatory involvement and radical self-expression were carried over as a way for everyone to experiment freely with their own artistic concepts and creative processes.

The Medusae Nilfisk and the Singing Plant were created as a part of this environment. The Singing Plant was presented at the actual festival and the Medusae Nilfisk was built by artists who also had a key role in creating the Half Machine event.

After each Half Machine event, people would dream about having a place all year round to build and collaborate on such large scale installations, and different scenarios were discussed. However, housing prices at the time appeared to be too high for a non-profit community that wanted to be free to explore ideas without the constraint of traditional market-driven interests. The fundamental motivation was to create a space where people could explore technology based on their own curiosity. In this space, one does not have to justify one’s work. Instead, it is a part of the cultural understanding that somehow, one day, one’s own small-scale experiment could be used as inspiration for a larger installation in an external context, for example, in a gallery or at a festival.

One day, a member of the group, Harald Viuff, suggested we buy an old barge (three stories tall and about 800 sq. metres) to use at the collaborative working platform. This platform became the illutron Collaborative Interactive Art Studio (2007 and ongoing). The studio consists of a diverse group of people with different sets of skills and varied approaches to interaction design and technology. The studio has made many interactive installations, all of which have been deployed in real-life situations, mostly within public and socially-playful settings such as music festivals or similar public events.

From day one, it was a messy lab filled with electronics, steel and old industrial robots. Most of the materials had been found in local scrap yards or donated by other institutions, mainly because they were not viable as actual working solutions in the industry. The materials were used as inspiration for new installations and were taken apart, and then parts were combined in new ways to create new and engaging installations: an old pressure tank became the belly of a large-scale fire cannon, and an old industrial robot had its internal electronics replaced with a modern computer and became the centerpiece of a month-long museum exhibition.

Where Half Machine had a focus on the reflection of technology in relationship to humans, illutron became an ongoing exploration of the interactive qualities that the installations sparked. The social dynamics happening around the installations became just as interesting as the interactive properties of the installations themselves.
6. Timeline of the creative environments that contributed to the projects in this dissertation.
A few examples of the projects created within the illutron creative environment are N7331227, Ladies’ and Men’s Room Mixup, Explosion Village and Electrolumen.

The choices made during the process of creating the interactive art installations embody many design decisions and are, in effect, designed:

Digital artists experiment with digital technology, and their experiments are prototypes that explore various design possibilities and new ways in which the user can interact with the digital artifact. Furthermore, the digital artist operates in an environment free of some of the constraints that are felt by the commercial digital designer or even by the academic computer science researcher. (Bolter & Gromala, 2006, p. 2)

Therefore, what can be considered art installations in the context of illutron and Half Machine have thus become the basis for design knowledge within interaction design academia. These interactive art installations have given me the freedom to explore without the constraint of external justification normally expected in a design process. The assessment of the artifacts as objects with artistic qualities within the art world is left as a discourse for an entirely different setting outside design academia and outside this dissertation.

In 2009, I was invited to do a four year PhD degree at MEDEA Malmö University. This environment enabled me to add a layer of academic conceptualisation to the more tacit and craftsmanlike strategies deployed in the actual design processes. As a part of this reflection, a few new experiments have been created within the environment of MEDEA: the Mediated Body, Touchbox, the Megaphone Project and Hydraphonia. These are pieces that were created by revisiting observations in old installations which needed further experimentation to clearly reveal how the designed properties tie in to the social dynamics happening around them.

As a consequence of the collaborative nature of the experiments, the author owes a tremendous debt of gratitude to the many people who made this dissertation possible. The people are mentioned as an alphabetically-ordered stream on the first page of this dissertation. Each one has contributed thoughts, ideas, concepts and/or technical knowledge to the projects or to the dissertation itself. Furthermore, I am grateful to the many anonymous participants who dared to engage with the odd contraptions and who took the time to find their own hedonistic joy in them.
7. The illutron barge and the members of the illutron Collaborative Interactive Art Studio collaborating on a project.
The Singing Plant

An example of a novel interface with non-trivial internal complexity.
2.3. The Singing Plant (2004)

Concept
The Singing Plant installation was a living plant with a touch-reactive sensor. When participants touched the leaves on the stem of the plant, the touch would be converted into a relatively complex sound pattern.

The novel concept of a plant that “sings” when touched invited the participants to explore the biological world in a new way. This became an opportunity for them to reflect on the relationship between humans and plants.

Classification: Confirmation
Most participants who tried the installation were fascinated by the relationship the technical interface created between them and the plant. They would often anthropomorphise it by telling stories about the role of the magic plant or by starting a discussion with people around them on the fragility of nature in general. In the latter case, some participants would also criticise the installation as cruel to the plant because of the necessity to put wires on it; they associated it with the electrocution of humans.

Technology description
Touch interaction with the plant is sensed through a Theremin instrument (Wikipedia, n.d.a). The Theremin converts the touch into a harmonic sine wave. It then is modulated with Ableton Live (n.d.) to get a richer and more varied sound. Further, the sine wave is converted into a volume parameter in an Arduino board (Arduino, n.d.) which controls a DMX dimmer. The DMX dimmer changes the mood of the light in the space by lighting up the plant whenever it is touched.

Credits
Mads Hobye, Nicolas Padfield, Schack Lindemann, Thomas Jørgensen, Thor Lentz and Åsmund Boye Kverneland.

Video:
https://vimeo.com/7694741
Medusae Nilfisk

An example of reward-based motivations that can be used as an excuse for intimacy among strangers.
2.4. Medusae Nilfisk (2007)

Concept
First and foremost, the Medusae Nilfisk installation was a light installation with the primary purpose of creating an aesthetic experience for passersby at the Roskilde Festival (2007). It consisted of three huge lamps that would light up a passage between two of the primary stages in the concert area of the festival. Their aesthetic appearance resembled oversized classical Chinese lamps.

As an added element, a propane cannon was mounted on top of each of the lamps. The flame effects from the cannon could be triggered by the participants through an interbody touch interface. The interface consisted of two metal poles mounted in the soil. They were placed so far from each other that it required three participants to hold hands for them to trigger the interaction. When the participants managed to make the connection, the lamps would create a light animation, which ended in darkness. After a few seconds, the gas cannons mounted on top of the lamps would go off and light up the passage with the warm, yellow-white light from the flames while creating a loud rumble that could be heard from afar.

Classification: Confirmation
While designing the installation we worried that too few participants would understand the interaction with the poles. In reality, the understanding of how to interact with it quickly became common knowledge. The requirement for three participants to hold hands for it to work meant participants needed to invite others to join in. Therefore, the participants themselves became ambassadors and guides for other participants to learn about the installation.

Through this interaction, it became clear that the social dynamics of holding hands with strangers became just as enticing as the actual flame effects. We sensed that the participants’ attention would often be divided between the flames and the people they were holding hands with. In a quite innocent way, the interface created an excuse to transgress the norms of bodily connection in a public setting between strangers. Although there were no technical requirements for only holding hands, this became the dominant way to engage with the installation. We rarely observed participants experimenting with other ways of making a connection between each other. They could just as easily have experimented with kissing, hugging or making chains with more than three participants.

Technology description
The lamps consisted of two parachutes sewn together and dipped in glue. The parachutes were filled with air by four Nilfisk vacuum cleaners running in reverse. The lights consisted of four (red, green, blue and white) 2,000 watt halogen light bulbs. The lights were controlled via DMX by a Wiring board (Wiring, n.d.). The Wiring board shifted through Hue in HSV colour space. The signal to noise ratio between the two poles was measured so that when the two poles were connected, the wiring switched to explosion mode, where it ran through a colour cycle before setting off relays that were connected to solenoids in the three gas cannons. It then released the gas into the atmosphere while turning on a spark gap to create an explosion.

Credits
Bo Boye, Harald Viuff, Mads Hoby, Nicolas Padfield, Nikolaj Møbius, Schack Lindemann, Thomas Jørgensen and Vibeke Hansen.

Video:
https://vimeo.com/10877580

Source code:
https://github.com/Illutron/MedusaeNilfisk
Ladies’ and Men’s Room Mixup

An example of distortion of social norms as a way to trigger social engagements.
2.5. Ladies’ and Men’s Room Mixup (2008)

**Concept**

Ladies’ and Men’s Room Mixup explored the norms of gender relations in a nightclub environment. It consisted of two LED displays mounted on two toilet doors. The displays would show a male icon on one door and a female icon on the other. When more than five participants had entered either of the doors the sign would switch, consequently turning the ladies’ room into the men’s room and vice versa.

The intention was to spark inter-gender conversations between nightclub visitors. This was done by creating enough confusion for them to engage in conversation with each other about which toilet would be the right one to enter and, more specifically, spark conversations of why the toilet would be filled with the “wrong” gender when they entered.

The design was inspired by the implicit ways in which participants engaged with each other at nightclubs. Compared to other situations in everyday life, this struck us as odd. For example, the local basketball court has culturally understood norms of how to interact through the rules of the game. Similarly, folk dance has a long tradition of dance routines where social mingling is embedded in the dance. Throughout each dance, one has to switch partners until one has danced with everyone. The switching of the toilet signs served as an indirect approach to creating opportunities for participants to mingle and engage socially with each other.

**Classification: Confirmation**

The rather simple setup created a massive number of conversations between the participants. The signs created a ripple effect of social disruption that forced everyone to communicate and debate which room to consider the appropriate one to enter. The conversations seemed to be playfully engaging. Participants would smile as they approached a toilet filled with people of the opposite gender. It seemed as if the participants enjoyed being victims of a situation that they did not entirely understand. Further, some participants actively turned the situation into their own advantage by becoming guides for others who needed to resolve the confusion of the mixed genders. They became performers of their own social narratives.

**Technology description**

Two RGB LED matrices depicted a gender-specific sign. A Wiring board connected to sensors mounted on each toilet door counted the number of times the door opened and closed. When the counter reached a definable threshold, the Wiring board switched the pictograms between the RGB LED matrixes, resulting in the switch of gender signs on the doors.

**Credits**

Daniel Brynolf, Mads Hobye, Nicolas Padfield and Vanessa Carpenter.

Video:  
https://vimeo.com/35666157

Source code:  
https://github.com/Illutron/ladiesAndMensRoomMixup
Explosion Village

An example of reward-based motivation and how it dominates social interaction.

Concept
While the earlier installations engaged a few participants at a time, Explosion Village explored the possibility of creating massive audience participation. The Explosion Village could accommodate two hundred participants, and consisted of water tanks that reacted to drumming. If the participants played fast and enthusiastically together for a certain amount of time, a supersized gas cannon would go off at the top of a centrally placed tower.

The design created interaction cycles with a duration of fifteen minutes each. This happened as a consequence of participants picking up a rhythm. The rhythm would slowly grow in volume and intensity over time. Drumming would “accumulate” energy in the tower. This was depicted visually via ten light bars which lit individually in sequence as the tower moved closer to climax. At climax, the participants would passionately throw their arms in the air and create a loud uproar as the fire went off.

Classification: Failure
The system proved to be highly successful in creating massive interactions around the tower. However, from the perspective of Designing for Homo Explorans the reward-based interface diverted the interaction from intersocial exploration to a more energetic, external motivation. The installation became too massive. Our interest in mediating and guiding the drum interaction into complex rhythms failed and the sound would be rather repetitive. However, from the perspective of creating large-scale interaction with massive amounts of energy it was an extremely successful installation.

Technology description
Eight water tanks were equipped with contact microphones. The signal from the microphones was routed through a mixer into a Wiring board, which detected people drumming on the tanks. The drumming was modulated through Ableton Live and sent out to speakers located near the tanks. The amount of drumming would accumulate over time, and when a certain amount of drumming had been reached, a midi signal was sent to Ableton Live which would trigger a countdown sound. After a specific number of seconds, a relay was triggered by the Wiring board which would, in turn, trigger the canon to release gas and ignite.

Credits

Video:
https://vimeo.com/39902951

Source code:
https://github.com/Illutron/explosionVillage
Barcode Beats

An example of how internal complexity can create a vast space to explore.

**Concept**
Barcode Beats was conceived as a commentary on how barcodes have become ubiquitous in our environment. Every product has at least one barcode; many even have several. The barcodes represent numbers in obscure database systems. To play with the participants’ relationship to the barcodes and the products they reside on, we created a system that would generate music based on them.

By scanning the barcode, a rhythm unique to the specific barcode would be generated. This would be done algorithmically, resulting in the system being compatible with every barcode in the world and being able to create unique melodies for each one of them. Further, a number of barcodes could be scanned at the same time, thereby creating rather complex compositions.

Because barcodes are consistent on the same product, this became an exploration in how different consumer products sounded and how well they worked together, for example, “What does a Coca-Cola sound like?” and “How do Coca-Cola and Ketchup sound together?” Some products would work well together, whereas others would be more chaotic in their sound patterns.

**Technology description**
A barcode scanner, like the one found in most grocery stores, converted a barcode into a number. The number was run through a custom-made multilayered algorithm that created the beat sequence to be played. The sequence triggered and modulated samples from a sample bank that would result in the sound composition. The algorithm was injective, meaning that the same number always produced the same sound (no randomisation would be used). Since identical products had the same barcode on them, they would have a consistent sound even when played in combination with other products or at a later stage. This is the key to the “sound of Coca-Cola” experience; through combining many barcodes, a piece of music would be composed.

**Classification:**
**Confirmation**
The system was tried out in two different scenarios. At a grocery store in Sweden, it was used as a musical performance tool by a local hip hop group. In the second scenario at a grocery store in Denmark, participants could play around with it as a part of their shopping experience.

**Credits:**
Daniel Brynolf, Henrik Svarrer Larsen, Mads Hobye and Vanessa Carpenter.

**Video:**
https://vimeo.com/7826810

**Source code:**
https://github.com/madshobye/BarcodeBeats
An example of how multiple internal modes create a richer interaction space.

**Concept**

N7331227 is the serial number of the old industrial robot used. The robot had, for many years, been used as an industrial toilet seat grinder. Compared to the standards of modern robot technology, it had become outdated. It did not have the dynamic and flexible joints expected of a modern robot and the internal computer was only able to navigate a set of fixed points. This became apparent in its aesthetic appearance, as its movements would be rather rigid and squeaking noises were heard every time it moved.

Since its old job of creating identical toilet seats was rather repetitive, we decided to put the old robot into retirement and enable it to have a life of its own as a retired robot. We did this conceptually by programming a set of moods into the system. It would either try to replicate drawings others would draw on paper or it would try to engage with participants by observing them as they passed through the exhibitions and as they observed the robot as well. When no one was around, it would look for people until somebody came in and caught its attention.

**Technology description**

From a technical perspective, reviving an old industrial robot proved to be a challenging task. We had to replace the internal computational logic with modern, embedded microcontrollers and remap every wire from the robot to the new controller. Further, the robot was given abilities that it had never possessed in its former life. Through a virtual 3D simulation engine, it was able to navigate the physical space based on absolute coordinates instead of predefined action points. Also, computer vision was added which enabled it to detect and track faces as they moved about in the exhibition.

**Credits**


Video:

https://vimeo.com/7699705

Source code:

https://github.com/Illutron/N7331227

**Classification: Conceptual**

This project was exhibited at Kunsthallen Brandts in Odense over a six month period. The robot created the impression of being aware of the participants’ presence in the space. The installation worked quite well, but its conceptual role in the exhibition context did not create many interesting engagements from the participants. It mostly served as a curiosity.
An example of an open-ended interaction space.
2.9. Electrolumen (2010)

Concept
Electrolumen looked like an authentic lamppost. It had four street lights mounted at the top and three electrical wires (spanning four metres) attached to another lamppost. The only difference between it and a real lamppost was that it was only two metres tall, effectively bringing the electricity hanging above the streets down to a level where everyone could touch it. This created an alternative interface that played with the danger of touching high-voltage electricity components.

Instead of the participants being electrocuted when touching the lamps and the wires, they could modulate a soundscape in real time; the lamps would light up to augment their actions and create an intimate atmosphere of standing beneath a blinking lamppost.

The lamps and the wires required two points of touch to react. To light up a lamp, one had to touch another lamp as well. This could be by direct touch, but to get all the lamps to light up required four touch points and therefore required collaboration between at least two participants, thereby inviting participants to collaborate.

Classification: Confirmation
This project was exhibited at the Roskilde Festival (2010). The installation became a very engaging piece to interact with, and the lights and soundscape seemed to capture the interest of the participants who explored them.

Technology description
Touch sensing was based on signal-to-noise detection via an Arduino. 18 8-bit parameters (touch, activity, time for each lamp) were converted into midi via Max/MSP. The MIDI signal controlled an Ableton Live synthesis that converted it into sound. Further, the Arduino board converted the touch into DMX which controlled a dimmer pack controlling the light.

Credits

Video:
https://vimeo.com/35663335

Source code:
https://github.com/Illutron/electrolumen
An example of a touch interface that facilitates intimate interactions among strangers.
2.10. Mediated Body (2010)

**Concept**
The Mediated Body is a suit that embodies the essence of interpersonal touch from the other experiments. Instead of having an object to interact with or around, the touch interface was converted into a suit worn by a performer.

The performer would engage with participants by inviting them to try out the suit with him. They did this by putting on a pair of extra headphones. The headphones would turn the participant and the performer into an interpersonal touch-reactive interface. It offered a bare-skin interaction between the participant and the performer. The system would sense the distance and the amount of touch between the two which would be turned into a rather complex soundscape that they could explore through different ways of creating contact with each other.

**Classification: Confirmation**
We tried out the suit on many occasions. The first experiments were done at the Burning Man festival in 2010. It proved to be extremely enchanting both for the participants and for the performer. The performer would be energised through the many social encounters he would make, and the participants would react strongly to the experience of being sound-reactive with a person they just met.

The suit efficiently transgressed social boundaries and norms between strangers. It created an alternative social bubble where traditional conduct (like getting to know each other before physical contact) were bypassed. When the participant and the performer returned to the default world (by taking off the headphones), they had to take one step back and reconnect on the terms of the context the interaction had resided in.

The aesthetic quality of the sounds generated were rough and mostly resembled what could be considered the sounds of an old Gameboy system, and we worried that the rather lo-fi sound would not be good enough for it to create an engaging experience for the participants. However, the experience of touching someone else proved to compensate for it, and it became a point in itself that it was not the quality of sound that generated the exploration, but the actual social engagements through the system.

**Technology description**
Through a wire in each headphone the system was able to detect touch and amount of touch between two participants. This was done by measuring the signal to noise ratio. The touch sensing was converted into LED light patterns via an ULN2003 driver connected to a RGB LED rope. The sounds were generated from the Arduino board through a simple 4 wavetable synth and modulated with an external Kaoss Pad for richer sound.

**Credits**
Bent Haugland, Mads Hobye, Nicolas Padfield, Nikolaj Möbius and Nynne Just Christoffersen.

Video 1: [https://vimeo.com/28108681](https://vimeo.com/28108681)

Video 2: [https://vimeo.com/35958010](https://vimeo.com/35958010)

Source code: [https://github.com/madshobye/mediatedBody](https://github.com/madshobye/mediatedBody)
Find My Twin

An example of mediated exploration in a public setting.
2.11. Find My Twin (2011)

Concept
We designed two identical boxes which both had a lens with a virtual compass in it, with the needle always pointing to the other box. Further, each box had a compartment which was locked with a combination lock, but the combination was written on the other box. This meant that one would only be able to discover what was in the boxes if one had both boxes at the same time. Since the boxes were placed at two different locations, one had to use the needle as a compass to find the other box.

As an initial experiment, the two boxes were placed at two different locations in a park. Two participants who were strangers were invited to explore the boxes. They quickly used the compasses to try and solve the task. After many confusing moments, the two participants ended up meeting on a bridge and noticed that the other had a similar box. They managed to open the boxes, and inside they found a beer and two glasses. This represented a reward and gave them the opportunity to celebrate the completed task together.

Technology description
The system was based on two Android mobile phones, each equipped with GPS, a compass and internet connectivity, enabling the phones to know their own position and transmit it to the other phone. Through relatively simple math, they were able to calculate the direction of the arrow based on the two positions. Further, a simple algorithm was implemented that would play sound samples based on common situations; It would say things like ”You are going in the wrong direction”, “You are almost there”, etc.

Classification: Conceptual
The key quality was the experience of finding a random box and walking around with it, only to figure out that another person would be walking around with an identical one.

The system was only tested in a controlled setting wherein the participants were given the boxes instead of finding the boxes randomly. Therefore, we were not able to get an honest understanding of how the participants interacting with the boxes would play out.

Credits
Johan Bichel Lindegaard, Mads Hobye and Nicolas Padfield.

Video:
https://vimeo.com/35583102

Source code:
https://github.com/Illutron/find-mytwin
The Megaphone Project

An example of a project requiring too much courage.
2.12. The Megaphone Project (2011)

Concept
The Megaphone Project consisted of two megaphones, where the microphone of one megaphone was connected to the speaker of the other. When you talked in one megaphone your voice came out of the other, creating an odd feedback loop between two participants.

The installation invited people to play with the possibility of representing another person’s voice. The only catch was the other person would also be able to represent your own voice. This created a potentially playful situation where each person should choose their words carefully because the other could return the words just as easily.

Classification: Failure
The installation was exhibited as a part of an electronic music festival in Helsingør, Denmark. The installation did not spark interesting interactions, and they were limited to a few moments of people trying it out. It rarely occurred that there were people on both sides of the installation, therefore, most interaction occurred with one person yelling in one end without a counter-reaction at the other end.

Technology description
The two megaphones were interconnected: the microphone from megaphone 1 went to the speaker on megaphone 2 and vice versa. In between the two speakers, an amplifier was mounted with a Kaoss Pad for the modulation of the sounds.

Credits
Casper Øbro and Mads Hobye.
Touch-box

An example of an open-ended interface wherein participants could explore their own meaning of intimacy.
2.13. Touchbox (2011)

Concept
The Touchbox was an iteration of the Mediated Body that offered a play session for two novice participants. Whereas the Mediated Body required a performer to wear a suit and facilitate the interaction, the Touchbox consisted of a system encased in a box with two headphones connected to it. Two participants would put on a pair of headphones and begin to explore touch. The bare-skin sensing would react to simple touch, strokes, full contact and nearly-touching.

The physical appearance of the box was designed to spark the curiosity of people observing the interaction, with the aim of them wanting to try it out. It consisted of a wooden box with a meter and a light bulb. The light would blink when a connection between the two participants was made and the meter would show the amount of connection. It resembled a snake-oil product from the past that would measure one’s health or something equally dubious.

Classification: Confirmation
The Touchbox yielded similar results as those we had observed with the Mediated Body. The primary difference was that since it consisted of pristine participants the interaction would vary. Compared to the Mediated Body with the performer, the Touchbox required the participants to find their own energy and mood in the interaction, resulting in a wider range of interactions. Some participants would be goofy, others intimate, and sometimes the connection between the participants would be what can best be described as awkward.

Technology description
Although the Touchbox did not include a performer, it required a somewhat performative role in facilitating the initial setup. It required someone to mount the headphones on the participants and calibrate the system. This was partly a consequence of the technical instability of the system, but also a necessity for lowering the initial threshold by starting the engagement and setting the right frame of mind for the participants.

Through a wire in each headphone, the system was able to detect touch and the amount of touch between two participants by measuring the signal-to-noise ratio. The touch-sensing controlled an incandescent light bulb via a solid-state relay. The sounds were generated from the Arduino board through a simple four wavetable synth and modulated with an external Kaoss Pad for richer sound. Further, the old analogue meter was controlled via a pulse width modulator on the Arduino board.

Credits
Mads Hobye.

Video:
https://vimeo.com/35570573

Source code:
https://github.com/madshobye/touchBox
An example of a design that became too abstract for the participants to engage meaningfully in it.

**Concept**
Hydraphonia is an interactive playground system situated in three cities. Although the physical appearance of the playgrounds are quite different, their interactive properties are consistent. In each city, the interactive elements consist of ten buttons that have a set of sound samples and light patterns built into them, and the participants can trigger them by pressing the buttons. Furthermore, aside from the actual interaction, the playgrounds have a built-in personality that attempts to imitate the sound patterns the kids create when pressing the buttons.

The three playgrounds are linked together so that activities on one playground are broadcast to the other two playgrounds, creating a dynamic and explorative play area across the three cities. A player can create patterns of light and sound together with the children and adults in the other two cities; however, no single player has full control, therefore, everyone needs to explore the many buttons and collaborate with the other players to make sense of the interaction.

The system has four modes:

- **Chaotic play:** The system is quite neutral and serves primarily as a sampler or drum machine. Users can play by themselves and create their own sound interactions.
- **Wild play:** The system makes only one repetition. If a person runs quickly over the buttons, the system activates the buttons that they touched only once.
- **Duet playing:** The users can create soundscapes or sound images that play until the activity drops to a level where the playground believes that no one is present. These loops have intervals at about ten to twenty seconds.
- **Easter eggs:** The playground has other hidden interaction opportunities that can be found by exploring the possibilities of each button, e.g., theremin-like sounds can be created by hovering a hand above a button.

**Classification: Failure**
The interactive system created local engagement, but the interconnected experience across the cities seemed to be too abstract for the participants to comprehend. However, the natural ability of kids to create interaction out of most things enabled the system to be fun to interact with, despite its rather abstract connections.

**Technology description**
A processor in each button detected the distance of touch and converted it into local sound and LED light. The sound consisted of a sample soundbank embedded in each button. The buttons were locally connected with CAN bus and connected to the other cities through GSM modules.

**Credits**
Mads Hobye and Nicolas Padfield.
3. Method: A programmatic approach to design research

3.1. Introduction

In chapter 1, I introduce the manifesto as a proposition to design for exploratory interactions. Thus far, this proposition stands as a statement with limited grounding in academia or actual empirical reflections. In this chapter, I will introduce how the manifesto came to be through a programmatic approach to design research and how the approach serves as a methodological grounding.

This dissertation conveys a design perspective that carries intentions in itself. It enables designers to create designs which populate a certain design space. This space does not have a solid definition; we do not know the width, height and depth of it. Consider it as a cloud of particles in which one is surrounded, and only when one takes a couple of steps back does the fuzzy whole appear.

This space did not come from problem-driven research where the researcher (in this case, "I") had a clearly defined goal from the beginning. It materialised through a vivid cycle of experiments in which extensive observation of the interpersonal interactions created by the carefully designed artifacts served as inspiration for new experiments. Because of the explorative nature of the research process, it requires a more alternative structure for it to make sense as a knowledge contribution within interaction design academia.

This experimental approach to interaction design research can best be described as a programmatic approach, and it is therefore conveyed in a similar fashion. The key to the programmatic approach is to understand it as a frame for exploration. The experiments, at the same time, explore the space within the frame and challenge it. During the exploration, one must be open to new understandings which continuously shift the perspectives and the framing itself. At the time of writing this dissertation, the current frame of Designing for Homo Explorens should be considered a snapshot of a progression of many consecutive framings.

In the following sections, I will introduce my take on using a programmatic approach to interaction design research. Then, I will go into greater detail about how the engagements in the field played out in practice. Finally, I will present how the conceptual developments that materialised as a snapshot through the programmatic approach have been structured on four levels of abstraction. The purpose of the levels is to convey a rather complex organic whole as an academic knowledge contribution.
3.2. Program: Designing for Homo Explorens

This dissertation takes a programmatic approach to design research (Redström, 2007). In its simplest form, a programmatic approach consists of three steps. First, the program is formulated; then it is realised through experiments. Finally, through reflection which fleshes out the program, the results are reformulated leading to a possible redefinition of the experiments. In the following, I will elaborate on this programmatic approach and use it as a basis to discuss how the knowledge contribution in this dissertation is structured as a consequence.

Johan Redström should be credited as the main person who brought programs to interaction design research. He had devised the notion of a program within research for more than ten years with multiple collaborators (Hallnäs, Melin, & Redström (2002); Hallnäs & Redström (2006); Brandt, Redström, Eriksen, & Binder (2011)). His programs have been used to gain understandings of slow technology, interactive textiles and energy consumption. Redström’s idea of programmatic design research is increasingly gaining traction within the broader community of interaction design academia. Eriksen’s (2012) dissertation is the first of several upcoming dissertations within the Scandinavian interaction design community to take on this approach; this dissertation should be considered one of them.

Similar to Eriksen (2012), the programmatic approach in this dissertation was not explicitly stated from the beginning. As presented in chapter 2, the experiments evolved over a period of ten years; in the first six years they were a part of a creative environment, and in the last four years they were in an academic environment, with the program having been formulated as a part of the latter. The explicit formulation of a design program therefore emerged midway through the overall process. Through the addition of the programmatic approach, the initial understandings and framings were challenged in what Binder & Redström (2006, p. 15) would consider a drift of the programmatic frame. This drift has enabled me to convert the intuitive understandings of the creative environment to a more explicit understanding within interaction design academia.

The design researcher must in other words establish a knowledge regime somewhat similar to a discipline in order to frame and contextualize his inquiry. […] That the program is provisional means that it is not unquestionably presupposed but rather functions as a sort of hypothetical worldview that makes the particular inquiry relevant. As the design research unfolds, it will either substantiate or challenge this view and the dialectic between program and probing is in our view central to this kind of design research. (Binder & Redström, 2006, p. 4)

The dialectic between the program and the experiments neither explicitly states the three steps (formulation, experimentation, and reformulation), nor does it pinpoint an appropriate balance between open-endedness and framed exploration. Löwgren et al. (forthcoming) contemplates the dialogue between the frame and the experiments as consisting of a hermeneutic dynamic.

Jahnke (2012) considers ongoing experimentation through the program as a hermeneutic dynamic between the parts and the whole; the parts being the engagements in the sense of design interventions and constructive actions, and the whole being the overall ways of seeing and thinking which inform the programmatic frame.

It is a dialogue that moves in a circular pattern centrifugally toward understanding. In this “hermeneutic circle,” the movement starts from our own prejudices (which is part of our own “horizon of understanding”); in encountering the “other” in the interpretive process, ideally our own horizon of understanding evolves and may fuse with the horizon of the other who is to be understood—Gadamer’s central notion of the “fusing of horizons.” (Jahnke, 2012, p. 33)
Jahnke acknowledges the prejudices and assumptions embedded in the process. One such example is the initial assumption we had with the Mediated Body. We postulated that “[a] bus stop on a rainy Monday morning may not be as good a setting for playing with the Mediated Body” (Hobye & Löwgren, 2011, p. 45). As I will present in this dissertation, that assumption was wrong. On the contrary, it proved to amplify some of the playful qualities because the performer stood out from the crowd, and surprisingly enough, the participants were more than willing to engage with him even though it required them to step outside the boundaries of what constitutes appropriate behaviour in a public setting. The prejudices were therefore challenged as we tried it out. Where Redström’s notion of a program departed from a hypothesis-based approach to research, the hermeneutic perspective moved further by embedding the knowledge contribution within a more interpretive perspective in which our own prejudice is challenged. Putting an emphasis on an interpretive perspective is even more natural when one considers the strong emphasis on the social interaction perspective that is embedded in Designing for Homo Explorens.

The materialisation of the program therefore happens as a dialogue between the experiments and the frame of the program. What started out as a general interest in understanding the potential of designing for social dynamics became a provisional knowledge regime that drifted gradually until it reached the current state of Designing for Homo Explorens. In this sense, one experiment led to another, and the overall research program gained texture and knowledge over time.

As a part of the hermeneutic dynamic Löwgren et al. (forthcoming) present three elements that they consider to be at play: engagements, optics and takeaways. The engagements are the hands-on design experiments, and the optics become the lens which frames the program. In this case, the optics and engagements would be the ongoing materialisation of the Manifesto. The takeaways is the packaging of the knowledge contribution to a wider community which would be the structuring of this dissertation. This shifts the perspective from a stepwise dialectic between experimentation and reflection to the perspective of an interplay between three elements which are continuously at stake.

The rest of this chapter elaborates on these three elements and how they function together. I will introduce them briefly and then expand on them in the following two sections.

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20. This illustration is a re-interpretation of an illustration in Löwgren et al. (forthcoming). It represents three elements that are at play: the engagements challenge this frame and make it drift, and the takeaways are static snapshots of the current state of the overall program.
**Optics:** Löwgren et al. (forthcoming) use optics as “a relatively neutral word that suggests ways of seeing and ways of thinking” (Löwgren et al., forthcoming). The optics are the conceptualisations made and refined through assessing and reflecting on the engagements. They exist as a dialogue between the ideals, interests and theoretical perspectives. This dynamic dialogue is what should be considered the overall frame of the program. Within this program, the most concrete example of the optics materialising would be in the manifesto. As a design perspective, it becomes the lens through which to see the world when designing for Homo Explorens. This perspective has been sketched over time as a dialogue between the current understandings, the engagements and theoretical reflections.

Theory becomes a way to shed light on phenomena observed in the experiments, and likewise, the experiments move the theoretical discussions forward. The process of drafting the manifesto becomes an interchange between engagements and theory as an active reflection on both. The use of theory is therefore an embedded part of the optics. This is what Löwgren et al. (forthcoming) would consider a push/pull relationship to theory. It deviates from a more hypothesis-driven design perspective in which the theory tends to have a more central role of framing the experiments.

The manifesto serves a double role in this dissertation. Besides being a part of the ongoing reflection, it also serves as a communicative part of the takeaways. I will elaborate on both dimensions in the last section of this chapter.

**Engagements:** By now it should be clear that the engagements are a central part of programmatic approach to design research:

> We interpret the program through experiments. Through the way we set up the experiment, we present a certain perspective on the program. Using the metaphor of a design space opened up by the program, we might say that we use the experiment to explore this space, positioning us somewhere to be able to say “this is what the design space looks like over here”. (Redström, 2011, p. 4)

In the case of this dissertation, the engagements challenge the programmatic frame through an experimentation in digital materials. How the designed artifacts would be used and received by the participants and how the artifacts would inform the program was not predictable. The interest was in challenging assumptions of what would be considered possible; therefore, the mantra became ‘to design for the unexpected’. This notion of design experimentation is elaborated further in the next section.

**Takeaways:** The openness and experimental nature of the program result in a somewhat chaotic and complex picture. It seems as if this approach is capable of opening up and enriching more than narrowing down and simplifying. Löwgren et al. (forthcoming) suggest that it is necessary to create a snapshot that enables the broader community to engage in dialogue with the knowledge constructed within the frame of the program. Compared to the overall dynamic process, these snapshots are rather static and represent the understanding at the moment they were taken.

This dissertation should be seen as such a snapshot. It represents the state of the program at the time when the dissertation was printed. I posit that the richness of the overall process requires us to package the takeaways for a wider audience. It is therefore not a snapshot in the strict sense of freezing a moment in time, but an active process of creating a new composition for a wider audience. This resembles what Latour (2010) would consider a composition.

> Or, to use my language: we want matters of concern, not only matters of fact. For a compositionist, nothing is beyond dispute. And yet, closure has to be achieved. But it is achieved only by the slow process of composition and compromise, not by the revelation of the world of beyond. (Latour, 2010, p. 478)

This composition does not intend to reveal the world beyond as positivistic truth; instead, it is a designed composition with a set of ideals and interests embedded in it. This is what makes it a design perspective. By acknowledging it as a composition, there is room left for recompositions by peers. Other academics can discuss, criticise and recompose the snapshot depending on knowledge gained and alternative ideals.

The rather fluid definition of what constitutes a knowledge contribution requires further reflection on how it can be evaluated, and I have reserved chapter 8 for this discussion. It is an overall reflection on what makes a compositional design perspective generative and how it fits into the larger genealogy of the community it writes itself into.

In the rest of this chapter, I will detail two dimensions: how the actual engagements with the design experiments were carried out as design for the unexpected and how the snapshot is structured and packaged as a four-layered abstraction.
3.3. Engagements: Design for the unexpected

What constitutes an engagement in programmatic research greatly depends on the inquiry it intends to do. In the case of Designing for Homo Explorens we wanted to gain an understanding of the actual experiences of engaging with the designs and how they affected the social dynamics around them. To get honest reactions from the participants, we were required to experiment with working prototypes in real-life contexts.

The evocative nature of a program, thus, entails engaging in a praxis with a view towards action. Such action is generally explorative; participants engage in design activities with the intention to learn and to examine possibilities. This is an important observation in the context of a design tradition where design activities are sometimes performed to persuade, and where design is sometimes blackboxed as a deus ex machina. Engagement further implies an orientation towards initiating change, as opposed to, e.g., instantiating a theory or corroborating a hypothesis. (Löwgren et al., forthcoming)

The role of the engagements thus becomes a matter of initiating change. What makes this change interesting is the fact that it greatly depends on how the participants appropriate the designs. It is therefore a rather explorative process that should be open for the unexpected:

The perhaps most important difference between the design program and other constructs such as a hypothesis, is that while the hypothesis ideally should be quite precise and ‘testable’, a design program needs to be suggestive and open for the unexpected. Whereas the hypothesis ideally is addressed through one experiment, the design program needs to open up a space where innovation and future development is possible, thus typically requiring us to perform series of experiments to illustrate the diversity it affords.

(Redström, 2011, p. 4)

Being open for the unexpected is a property for most programmatic research projects, but it is even more important when it comes to Designing for Homo Explorens. It is not only a part of the explorative process of the program, but also as a part of the ideals embedded in the design perspective of Designing for Homo Explorens. A central point is to invite the participants to explore the designs on their own terms and make their own meaning out of them. Therefore, it is essential that the designs themselves stay open for the unexpected. This requires a heightened sensitivity toward the participants’ possibilities to actually engage and evaluate the designs on their own terms. As I will present in the following two subsections, this required us to make working prototypes for the participants to explore in real-life contexts.

Designing for the unexpected becomes a way of experimenting with the different properties of the designs. This enables us to gain an understanding of how the different elements of the designs affect the interaction dynamics, and so it is necessary to make a series of diverse experiments. By experimenting with different versions and with different settings, it is possible to gain understanding of how the elements affect the interactive dynamics happening around the designed objects. This is considered a hermeneutic way of engaging with the design space and should not be confused with more traditional comparative studies. The latter case would constitute less of an interpretive stance and more of a rigid approach to experimentation and knowledge construction.

The example of experimenting with the Mediated Body in the different contexts presented above is one example of such hermeneutic exploration; another would be design projects that failed. The Megaphone Project is an example of a failed project (this is elaborated in chapter 6). The success of the Mediated Body required me to seek the boundary of the design space, therefore the Megaphone Project was deliberately risky in its design. As a result of the socially-daring situation of yelling into a megaphone in a public setting, it did not spark any significant interactions. However, it still informed me of the boundaries of the design space and shed light on some of the more subtle qualities in the Mediated Body, with the possibility of the participants becoming victims of the design being one of them.

This experimental process presented in this dissertation could be considered one of Research Through Design (Zimmerman, Forlizzi, & Evenson, 2007) or Constructive Design Research (Koskinen, 2011, p. 1). Both argue for knowledge construction processes that
entail a close engagement with the design process. Since the programmatic approach already embodies this perspective, I do not consider it relevant to contemplate more on it here; I merely want to point to their familiarity. Furthermore, Research Through Design could just as well be a hypothesis-driven approach to design, whereas the programmatic approach already embodies a stronger argument for an explorative approach to the engagements.

The interest in honest reactions from the participants requires us to make actual working prototypes (digital sketching) and it requires us test them out on the terms of the participants (use the field as a lab). I will elaborate on those two dimensions in the following subsections.

Buxton (2007) considers the concept of sketching user experiences as a way of enacting different interaction scenarios. He advocates using easily-moldable materials: cardboard-like mockups and foam blocks. This way, the designer can easily create new sketches without the time-consuming work of building actual working prototypes which would entail many hours of construction and programming. His core point is to have as short an iteration cycle between each idea as possible.

As much as this perspective works in a more lab-like approach to design experimentation, it has severe limitations when it comes to Designing for Homo Explorens. Since the role of the sketches within the program is to challenge the assumptions of the program, it is essential that the sketches creates some level of back-talk or in the terms of Schön (1987) to create a conversation with a situation. Within Designing for Homo Explorens, it is required to get an honest reaction from the participants on the meaning and exploration they make of the designs. This requires us to enable them to engage as naturally as possible with the designed artifacts. Buxton’s concept of lo-fi prototypes thus has a severe limitation because it would be necessary to explain to the participants how they should imagine the interaction, instead of letting them engage more naturally with it, resulting in killing the spontaneity of the situation. It is therefore necessary to get as close to a working prototype as possible, requiring us to make working prototypes where the interaction is programmed into them. This is what I advocate as digital sketching.

As mentioned, one of the main concerns Buxton puts forward when it comes to sketching in digital materials is the concern of the prolonged iteration. Where lo-fi prototypes can be made quickly, it is common to
consider digital material a more tedious process that requires a higher level of technical skill and prolonged production time. Even though this was certainly true when Buxton wrote his book, the projects in this dissertation are different in two ways. First and foremost, most of the designers that were engaged with designing the projects had a high technical skill level. They were seasoned programmers, electricians, metalworkers and so forth. Secondly, current development of digital rapid prototyping platforms has enabled us to sidestep the prolonged production time that would be with such processes. Frameworks like Processing (n.d.) and openFrameworks (n.d.) have enabled us to have a rich set of interaction design libraries to piggyback on when it comes to programming the interactions of the installations. Further, the Arduino (n.d.) and the Wiring (n.d.) platforms have significantly sidestepped the challenges of getting an embedded platform up and running. What would historically require a complicated toolchain and high level of soldering skills to accomplish can now be done by downloading a cross platform programming environment and connecting a pre-soldered board to the computer via the common USB interface. This has enabled us to quickly sketch physical interaction with light and sounds as interaction patterns.

Despite the current possibility to sketch with more technical materials than were available when Buxton coined the concept of sketching user experiences, our approach aligns well with his characteristics. We consider the sketches quick to make, inexpensive, disposable and plentiful, but starting with the digital material and keeping the idea of sketch extends the possibility space in the following ways. Firstly, the transition from a quick throw-away sketch to a working piece of art becomes a fluid transition where the initial work serves as the basis for the next iteration, instead of having to rebuild in new materials and on a new platform. Further, considering sketching all the way to the final installation in the field enabled us to stay open to the unexpected and allowed us to tweak the projects based on the knowledge gained by actual user interaction. In this way, we stay on the exploration of the material level, in the sense of digital material that can be moulded into new compositions and recomposed for new potentials.

Since our goal is to generate knowledge and not create viable products for ongoing use, we are allowed to consider everything a sketch. Compared to more commercial design settings with the intention of going into full-scale production, this is a luxurious position to be in.

Example of a digital sketch. It is a working prototype that experiments with sensing touch on a plant and turning it into sound. The system is designed around the embedded microcontroller platform Arduino. It is one of many sketches used for different versions of the Singing Plant installation.
Use the field as a lab

So far, I have aligned the digital sketching perspective with Vallgård & Sokoler’s (2010) perspective of compositional materials, but as we start to explore the potential of the experience in use we have to explore their real-world usage. It is crucial that it be done in ways that empower the participants so they may freely choose how to interact. If we want to design for the unexpected, we need the participants to react honestly to our designs. This requires us to give the participants the freedom to walk away if it does not interest them. In lab-like environments, participants may feel obliged to like the system or try to comply with the expectations of the researchers. Traditional sketches in a design studio can therefore not capture emergent effects on the level of social and performative play. Therefore, we need to go outside the studio and experiment in the field.

The field would be considered the actual real-usage scenario where the interactive art installations would be deployed. This distinction between the lab and field is similar to Koskinen et al. (2011, p. 51–82). They define the lab as a decontextualised space in which one brings items of interest for experimental studies. The field becomes a contextualised place wherein one studies how the designs are used and makes sense of how they are talked about by the participants. When the sketches are taken to the field, new interaction possibilities appear. This is an ongoing conversation with the participants engaging in the installations. In practice, the field becomes a lab in which the initial designs are modulated to fit the contexts they reside in.

This dialogue between the participants and the designers would resemble the concept of Wizard of Oz experimentation (Buxton, 2007, p. 239). This concept was inspired by the Wizard of Oz story in which a small man hides behind a curtain and pretends to be a powerful wizard by pulling some levers to activate special effects. The difference between our approach and the classic Wizard of Oz approach is that without our involvement, the system would still function. The system is capable of functioning autonomously; we merely tweak the small weights defining the amounts of response in different situations. Therefore, it becomes a hybrid between a working prototype and a wizard tweaking the parameters behind the scenes. One such example is the Electrolumen installation which was an autonomous system monitored from a nearby shipping container. In this container, the designers would tweak the interaction parameters (including the sound synthesis) based on the observations of how the participants engaged with the installation. In other installations, we did not have the luxury of tweaking behind the scenes. One such example would be the Mediated Body suit enabled an extra layer of documentation. I would take breaks with the performer where I would video interview him on his experiences with the suit. Throughout this process he would develop a language that would explain the experiences in a much more nuanced way than the comments we would usually get from the participants themselves. As a part of this process, we collaboratively wrote a larger document with all of our reflections. Snippets from the video interviews are embedded in the video links in the gallery and two snippets from the collaborative writing process are included in chapters 5 and 7. It will be referred to as the “jointly-written document”.

When designing for the unexpected in the field, it was cumbersome to predict the possible interaction scenarios. Multiple factors played a role: the time of the day, who was playing, etc. would constantly change. Therefore, many of the first iterations with the system became a way of letting the different interaction possibilities unfold and learning from them. We would, for example, learn new details when we tried the Mediated Body at night when the lights on the suit would be much more intriguing. At some point (greatly depending on the complexity of the overall situation), one would get a general sense of the palette of possibilities the system possessed. It would still be unexpected and explorative from the participants’ point of view, but the designers would be able to predict a range of possible outcomes. When this situation appeared, it would usually be considered time to make a major change in setting or come up with a new prototype to experiment with.

It is worth examining briefly what research methodology would normally call “data collection” and how those needs relate to designing for the unexpected. The many tweaks of the system, the social interaction phenomena that we observed and the different experiments we made, became the elements that challenged and informed the program. We would, on an ongoing basis, document the process with images, video and notes. Our intention with this documentation would be to capture the nuances of the different interaction patterns we observed and especially when we observed phenomena that we were not expecting. Small surprises aroused our curiosity to explore further, while the participants explored the installations. For this reason, the gallery in chapter 2 links to video materials, and the source code for each project has been made available. The many versions of the source code have been preserved because they represent the many tweaks that defined the different types of interaction we experimented with. The unique situation of having a performer wear the Mediated Body suit enabled an extra layer of documentation. I would take breaks with the performer where I would video interview him on his experiences with the suit. Throughout this process he would develop a language that would explain the experiences in a much more nuanced way than the comments we would usually get from the participants themselves. As a part of this process, we collaboratively wrote a larger document with all of our reflections. Snippets from the video interviews are embedded in the video links in the gallery and two snippets from the collaborative writing process are included in chapters 5 and 7. It will be referred to as the “jointly-written document”.
22. The Electrolumen installation is one example of using the field as a lab. Throughout the setup and exhibition period, multiple parameters were tweaked to experiment with the engagement of the installation.
This represents a simplified overview of the different dimensions in the knowledge construction. It has the manifesto as the overarching design perspective. The different aspects within the manifesto are presented as annotated portfolios. The annotations within them are insights based on empirical experiments combined with theoretical reflections. Finally, actual engagements in the wild represent inspirational examples for others.
3.4. Takeaways: The knowledge contribution as a composed snapshot

As stated earlier, a consequence of the programmatic approach to the knowledge construction consists of it creating relatively rich understandings of what the frame of the program seeks to materialise. This is highly constructive in the process of the design research because it enables the program to stay open for reflections and question its own understandings; however, for a wider audience it needs to be repackaged. In this section, I will go into detail about the thoughts behind this repackaging and how it shapes the whole dissertation structure in the same fashion. It is crucial to understand this structure to be able to navigate the consecutive chapters and how the arguments are structured as a design perspective.

The snapshot of the programmatic approach is packaged as four abstraction layers. Each layer contributes to different abstraction levels of how to Design for Homo Explorens. The overall layer is the manifesto. This works as a way of creating an overarching design perspective with an embedded set of ideals. Within the manifesto four key aspects of the design perspective are presented to concretise ways of Designing for Homo Explorens. The four aspects are then fleshed out as individual chapters. Within each chapter, an aspect is grounded through insights gained from live experiments and a theoretical discussion frames the insights in the beginning. Finally, the twelve design artifacts are used as design exemplars of how one can Design for Homo Explorens. In the following, I will go into detail about each layer and their purpose as a part of programmatic knowledge contribution.

**Manifesto**

Having a manifesto as part of an academic knowledge contribution is a tendency that is emerging within the field of interaction design academia. A few such examples are the manifesto of Designing for Homo Ludens in which Gaver (2002) contemplates the potential of designing for the more playful nature of human beings and Ehn (1998), with the Digital Bauhaus Manifesto, arguing for the importance of the human side of technology in which we critically look at how it shapes our society and how we shape our society with it. Recently, Halse et al. (2010) argue in their manifesto that user-driven innovation is about rehearsing the future through design. A common trait of these manifestos is that their motivation stems from creating new understandings and new design potentials instead of merely reflecting on the role of existing designs used in the existing world. They want to add to the polemical discourse of the possibility space of design. Gaver (2012) points to the same properties when he says there is a natural connection between manifesto and design research practice.

Manifestos are a third form of theory often produced as a part of research through design practice. These go beyond theoretical treatments drawn from other disciplines or developed from reflection on practice to suggest certain approaches to design as both as desirable and productive of future practice. (Gaver, 2012, p. 938)

The manifesto in this dissertation came to be as part of the programmatic approach. In the initial description of a programmatic approach to design research, Redström (2007) argues for considering a programmatic approach similar to the traditions of manifestos. Here, he refers to the Dogma Rules (Wikipedia, n.d.b) as an example of a manifesto that frames the creative processes of the film industry as a way to create movies with a stronger focus on storytelling.

It is relevant to point out the difference between Gaver’s approach to manifestos and Redström’s. Redström emphasises the generative role of a manifesto in a programmatic research process and Gaver emphasises the communicative qualities of presenting design-led inquiries for others as a manifesto. The two are not mutually exclusive, but the difference is essential for understanding the role of the manifesto presented in this dissertation. Within the process of this dissertation, the first leads to the second.

Similar to Redström’s contemplations, a manifesto was part of the creative environment of illutron. It was published in 2009 after three years of reflection on its formulation and the role of illutron in general. The intention was to summarise the streams of interest and to use it as a way of framing future discussions within the community.

Here people are creators, not consumers. Here the audience are participants, not passive observers. Here anything can happen.

Creative thinking emerges from below, as long as a fertile creative environment is fostered, where small seeds can find nourishment and grow roots and flower.

Technological progress happens in dialog with the surrounding society and refers to both the past and the future. Our art is a joint creative process in a group, a dialog between the group members and with cultural undercurrents in society. Art involves the audience, they become actors in dialog with the work of art, with its
The manifesto consists of four aspects, wherein each aspect represents a dimension that has proven to be important for when Designing for Homo Explorens. As the installations were conducted, these aspects materialised through the programmatic experiments. The choice of aspects as a part of the knowledge contribution will be presented in the following subsection.

**Aspects**

As mentioned in chapter 1, the manifesto is comprised of four aspects. Their primary role is to ground the potential of Designing for Homo Explorens with concrete insights on how one can design for it. Secondly, the intention is to communicate how Designing for Homo Explorens is not a recipe-based design approach, but an approach that requires the sensitivity of the designer to be aware of multiple elements and how they play together as a whole. As mentioned, other aspects may be important as well, and these depend on the ideals in the given design situation and the potential ideas being explored. One such example is the surface complexity. In this dissertation it has been downplayed to a mere generator of aesthetic curiosity; however, in other situations, it may be a crucial dimension of the explorative experience. An example would be the Drift Table by Gaver et al. (2004). This case uses weight sensors to detect the weight distribution of objects on the table. By shifting the weight of the objects on the table, one is able to navigate a map of the earth. Here, the internal complexity is not significantly high, but the fuzzy interface combined with the visual feedback invites exploration.

The four aspects within the manifesto are elaborated in four main chapters (chapters 4-7). In these chapters, the aspects are presented as annotated portfolios (Gaver & Bowers (2012); Gaver (2012); Bowers (2012)). An annotated portfolio brings together artifacts that occupy a common design space into a systematic body of work. The intention is to capture similarities and differences in the designs. As Gaver puts it: “If a single design occupies a point in design space, a collection of designs by the same or related designers establishes an area in that space.” (Gaver & Bowers, 2012, p. 944). This enables us to gain an understanding of the various design properties in relationship to each other, and we can further contemplate what makes certain designs better from specific design perspectives.
Multiple examples can start to tease the individual concerns and judgements involved in a single situated design out of the particular configuration to which they were applied, making clear both the dimensions along which a designer's choices may range and the invariances among them. (Gaver, 2012, p. 944)

An annotated portfolio can be seen as a presentation device that structures the space of abstractions so that one can communicate it in an accessible and approachable way. The annotations verbalise some of the generalised qualities found in the design experiments. Their interrelations serve as a way to expand a field by showing similarities and differences simultaneously.

Each annotated portfolio/chapter begins with a section that summarises the theoretical context the different annotations stem from. This theoretical section should not be confused with a top-down approach where the theoretical concepts are the primary generators for the designed objects. On the contrary, the knowledge contribution started with the experiments and used theory as an ongoing dialogue between the programmatic frame and the experimental iterations. The prominent role of theory as the initial starting point in the annotated portfolios has first and foremost a role in the packaging. It communicates a theoretical lens by situating the insight in the existing landscape of academic knowledge for the readers.

**Insights**

In this dissertation the annotations in the portfolios are considered insights. They represent insights gained from the experiments, and point to ways to Design for Homo Explorens. They are interpretations of qualitative empirical data, based on a number of engagements and represent patterns that emerged through the experiments. They are based on rich descriptions in the form of detailed anecdotes and stories creating, as closely as possible, the sense of being there.

Although the insights stem from being engaged in the field, they also serve as a bridge to the academic community in general. The discussion of the different insights are grounded in existing academic discourse whenever the theory has a generative role for the reader to gain an understanding of the design qualities present in them.

These insights are not one-size-fits-all solutions of what it means to design for aesthetics in use. They are examples of key properties within Designing for Homo Explorens that can serve as inspiration for other designers to use when they are faced with similar problems.

**Exemplars**

Each project introduced in the gallery in chapter 2 is expanded upon and detailed through rich descriptions in the various insights. They are presented in such a way that other designers/researchers can appropriate their core ideas (or components) into their own repertoires. Exemplars therefore become an essential part of the knowledge contribution:

- Design examples are indispensable to design theory because artefacts embody the myriad choices made by their designers with a definiteness and level of detail that would be difficult or impossible to attain in a written (or diagrammatic) account. (Gaver, 2012, p. 944)

A summary of the most common interaction pattern is presented in a box as each project is introduced in the chapters describing the aspects. The interaction design pattern boxes seek to convey the essence of the interaction patterns happening around the installations. Their purpose is to invite the reader to gain a greater understanding of a typical path and typical dynamics around them. Furthermore, their interest is in enabling the reader to assess whether the claims put forward as a basis for the different insight seem plausible.

Design failures are included as well. I have even classified certain successful installations (in the general sense of creating an engaging experience for the participants) as failures in relation to Designing for Homo Explorens. The purpose of this is to explore the possibility space of Designing for Homo Explorens and to enable us to understand what it is not, whilst highlighting some of the subtle nuances in the more successful projects.

This concludes the discussion of my programmatic approach to design research methodology. The next chapter outlines the first of the four aspects from the manifesto, while all aspects continue to be elaborated on throughout the next four chapters.
internal
complexity
Create multiple interactive modes

Create exploration with rich real-time feedback

Create interfaces that guide the interaction

Create a multilayered interaction space while keeping tight coupling

Create an interaction space to explore through nonlinear algorithms

Create a 'sweet spot' between predictability and chaos
4. Aspect: Create exploration through internal complexity

4.1. Introduction

This chapter contains the first of the four aspects in the manifesto Designing for Homo Explorens. It is the most technical aspect, as it outlines how the different installations utilise the concept of internal complexity. The overall mapping of the aspects in the dissertation leaves this section a little one-sided, in the sense that it only hints at the actual interactions happening around the installations. It intentionally sidesteps the social dimension of mediation and interaction, focusing primarily on the potential for exploration through internal complexity. Nevertheless, this dissertation goes into further detail about the participants’ actual interactions in upcoming chapters.

Before I go into detail regarding my notion of internal complexity for exploration, I will start at the surface. Specifically, how most of the designs presented share the common trait of offering some kind of novelty which triggers the participants’ curiosity and leads them to explore the potential interaction space.

It is common within interaction design and HCI to design for some level of transparency, efficiency and usability when designing technical artifacts for interaction. In most design scenarios, this seems to align well with the ideal of the designs having some predefined role in the larger scheme of things. Within the perspective of Designing for Homo Explorens, the goals of efficiency, transparency and usability are not necessarily the optimal approaches to inspire people to engage in an exploratory mode of interaction.

Tieben et al. (2011) experiment with ways of triggering the participants’ curiosity. They create a model based on the work of Berlyne (1960), Loewenstein (1994) and Kashdan & Roberts (2004) who have researched the key properties of the relationship between curiosity and exploration. Tieben et al. (2011) summarise five main principles of curiosity: novelty, partial exposure, complexity, uncertainty and conflict, with most people being able to imagine these properties as triggers for curiosity. The five elements of curiosity do not seek to create a transparent interaction or some utilitarian goal; instead, they seek to open up a mode of curiosity that invites the participants to figure it out. Within the experiments of Tieben et al., there seemed to be a lack of extended exploration:

> Our assumption was that the interactive speakers would elicit short explorative behaviour. We expected students to stop and investigate the speakers, quickly understanding that a nearby movement would result in the sound of a scared animal. This shallowness would lead to a short spur of curiosity and exploration, before the student would be satisfied and walk on. (Tieben et al., 2011, p. 365)

In the process of converting curiosity into extended exploration, they seem to have faced a similar challenge to the one in this dissertation. It seems possible to design for curiosity, but how does one move beyond the shallowness of a short burst of curiosity? Through their experiments, Tieben et al. came to the conclusion that the above properties create extended exploration when multiple properties were used at the same time:

> However, combining principles in order to catch and hold the attention of the passer-by is more powerful. For example, one could create a clear out-of-context situation (novelty) to draw the attention of the user, then ‘drag’ the user into cycles of exploration and discovery (complexity). On a next visit, the system could respond in a different way, creating doubt (uncertainty) and starting a new cycle of exploration and discovery (complexity). (Tieben et al., 2011, p. 368)
This observation aligns well with the observations done as a part of Designing for Homo Explorens. In this chapter, I detail how internal complexity plays a key role in facilitating exploration by creating an interaction space for the participants to explore. Within Designing for Homo Explorens, a significant factor for success lies in creating prolonged engagement because it indicates an interest from the participants that moves beyond mere curiosity and towards an actual interest in exploration for the sake of exploration itself. My assumption is that participants naturally stop engaging with the installation when it no longer holds any interest for them.

Most work on internal complexity in relation to interaction design has been done by practitioners within the interactive art community. In this community, the internal complexity has been used as one of many methods to create more vivid or poetic interaction scenarios. However, this way of working with internal complexity is not very well grounded within interaction design academia, and few people hint at this strategy by referring to the interactive art community. Reeves et al. (2005) mention in passing:

> The use of non-linear mappings to partially obscure the relationship between manipulations and effects is common in artistic installations where it introduces a degree of ambiguity in an attempt to provoke curiosity. (Reeves et al., 2005, p. 745)

Here, emphasis is put on the nonlinearity of the mappings between action and reaction for curiosity. Moreover, this approach is even more relevant when it comes to the actual exploration because the interest moves from initial curiosity to actually exploring the interfaces. Gaver et al. (2003) argues for ambiguity as a resource for design on the level of enabling people to participate in their own meaning-making:

> Beyond noting and encouraging novel re-conceptualisations of existing technologies, however, designers can deliberately set out to create products that implicate several interpretations at once. When successful, this mingling of discourses disrupts easy interpretation of the design, and obliges users to work out ways to make sense of the new situation. (Gaver et al., 2003, p. 5)

Moving away from mere curiosity to exploring meaning while engaging in the interaction, Gaver does not directly take internal complexity into account, but points to the potential of ambiguity of information: “Perhaps the most prevalent way to introduce ambiguity of information is to display information that is physically or conceptually blurred” Gaver et al. (2003, p. 5). Ambiguity of information can be somewhat similar to nonlinear algorithms, but it emphasises the interpretation of the interaction as information from the participants’ point of view.

Bolter & Gromala (2006) argue for considering the ambiguity of interface design as a reflective interface instead of a transparent one:

> If the window is the emblem of the aesthetics of transparency, the mirror is the obvious emblem for its counterpart. The principle of transparency conceives of the canvas, the photographic paper, or the computer screen offering an objective view of what lies “on the other side.” The aesthetics of reflectivity treats the surface as a mirror in which the viewer is invited to reflect on her relationship to the work of art or on the process and the various physical and cultural contexts of production. (Bolter & Gromala, 2006, p. 4)

Throughout the four chapters regarding the four aspects of Designing for Homo Explorens, different perspectives on the interplay between participatory meaning-making, ambiguity and reflective interaction are highlighted. It is important to understand that the design of internal complexity is a key ingredient in the interplay of the meaning-making happening around the installations as a part of the social dynamics. The focus is on using internal complexity as a way of expanding the interaction space for exploration, with the intention of unfolding one part of what Tieben et al. (2011) argue as a necessary mixture for exploration and curiosity. The internal complexity thus becomes non-transparent interactions which Bolter & Gromala (2006) would consider “aesthetics of reflectivity” and Gaver et al. (2003) would classify as “ambiguity of information”.

Beyond noting and encouraging novel re-conceptualisations of existing technologies, however, designers can deliberately set out to create products that implicate several interpretations at once. When successful, this mingling of discourses disrupts easy interpretation of the design, and obliges users to work out ways to make sense of the new situation. (Gaver et al., 2003, p. 5)
This aspect is similar to the algorithmic nonlinearity that Reeves et al. (2005) mention as a way to create curiosity. Compared to state of the art artificial intelligence within computer science, the nonlinearity would be considered banal. The internal complexity needed for a car to drive autonomously (like the Google car) (Wikipedia, n.d.c) makes the internals of the systems present in this dissertation seem insignificant and serves as a point in itself. In contrast, the agenda for the computer science community is generally to enable computers to engage with the world on a higher level of abstraction, and therefore, I posit, a higher level of transparency from the perspective of the user. The agenda within internal complexity for exploration is entirely different, as it creates an interaction space for the participants to explore which is somewhat blurry or ambiguous.

The complexity within Designing for Homo Explorens is therefore relative to the number of test points needed for the participant to determine causality. It is complex compared to an interface with a clear reaction to an action, but compared to state of the art artificial intelligence, it would be considered a rather simple system. According to the technical specifications of the system, it might not be complex or intelligent, but according to others’ perception and relational engagement it might seem so. In most of the designs in this dissertation, nonlinearity is the dominant way of creating such apparently complex systems. Therefore internal complexity is designed through a combination of nonlinear parameters, which together create a whole more complex than a mere action-reaction interface. The interest in creating such an interaction space lies in creating the basis for an experiential exploration space wherein the participants engage with the installations.

The following six insights have emerged from the experiments. They elaborate on ways to create certain interaction spaces for the participants to explore and discuss the problems of creating overly-complex interactions.
4.2. Insight: Create an interaction space to explore through nonlinear algorithms

As introduced above, I posit that we need to acknowledge the internal workings as a crucial aspect when designing the interaction for Homo Explorens. In the interaction design community, the internal workings have a tendency to be overlooked, with the focus seemingly directed to the immediate surface that the participants engage with. I want to move away from a black box tendency in interaction design and towards a white box approach, where the internal workings are revealed for the academic audience as an essential part of the design contribution.

When I describe the internal workings as a black box, I am inspired by the tradition of black box (Wikipedia, n.d.d) testing within informatics. Black box testing aims to analyse the workings of a system by using the interface without peeking into the actual source code. In this scenario, the code is considered a black box, and one has only the inputs and outputs to detect its functionality. Although a programmer can deduce quite a lot about the internal workings just by interacting with the program, it is of limited use for an interaction designer wanting to understand it or communicate how the internal design affects the interaction to his peers. It seems to be of limited value to reveal the code, as in white box testing, since the code itself does not communicate well how to interact with it.

One such example is the code for the interaction processing part of the Electrolumen installation seen in figure 24. Although a programmer would have a greater understanding of the workings by reading the code, it requires a somewhat high level of knowledge about the system and the technical strategy to be able to imagine how the different parameters affect the interaction. Therefore, I doubt that this is an efficient way to illustrate the internal dynamics in interaction design. To illustrate this problem, I will elaborate on the internal workings of the Electrolumen installation.

Electrolumen looks like an authentic lamppost with the main difference being it is significantly shorter—so short that the participants can reach the normally forbidden parts of the pole (which houses the lamps and the cables extending from it). This presents a disconcertingly dangerous object within reach; however, instead of near-death electrocution, the participants can create music and affect the light by creating connections between the different parts of the installation. Since there are more connection points than what is achievable with only two hands, participants can collaborate in creating a soundscape by connecting through each other’s bodies. Multiple participants can create human chains or simply hold hands to connect the two parts of the installation. The installation does not have an extrinsic goal, nor come with instructions; therefore, it is up to the participants to figure out how to engage with it based on what makes sense to them.

It became an installation with a rather poetic atmosphere; the soundscape and the feeling of being enclosed by the light seemed to create an enchanting interaction space to explore. Although how to touch each other was not predefined, almost all the participants chose to connect the lamps through each other’s bodies, mainly by holding hands or shoulders. Only a few participants experimented with kissing or more intimate connections.

24. Example code converting the input from the four poles to eighteen parameters.

25. How do we expose the inner workings of the system in an interaction design language?
The system is analogue in the sense that the amount of touch affects the amount of sound. Holding more than one lamp creates more overall light in the individual lamps. Each combination of the four lamps creates different sets of sound, allowing for six different combinations of touch points. The amount of touch, length of the touches, and changes in touch were measured and turned into "energy levels". Through the six touch-point combinations and the different types of touch, a relatively simple interface was created, and through nonlinear algorithms a more complex interaction was achieved.

The qualities of the installation were partly due to the novelty of touching something forbidden (the electric lamps and each other) and figuring out how to interact with the installation in a concrete, physical sense. However, I argue that a much more complex answer lies hidden in the inner workings of the system. What made the system successful was also the exploration it enabled through the relatively complex sound patterns. Instead of having a one-to-one relationship between connecting and creating a sound (ultimately turning the installation into a six button interface), the system created a real-time analysis of the touch activity, the amount of touch and the six combinations.

26. Participants interact with the Electrolumen installation while observers watch nearby.

27. Behind the scenes in a nearby shipping container, computers process touch and convert it into MIDI notes and sound through a complex set of digital instruments and effect filters.

28. Two participants explore the possibility of changing sounds by holding hands.
29. Simplified view of the internal workings of the system
In a shipping container nearby, multiple laptops processed the incoming data and converted it into a set of rather complex MIDI notes that were transferred to Ableton Live (Ableton Live, n.d.) where the notes controlled virtual instruments, and their scores and filters modulated the individual channels. In this case, it is important to explain the technical side; if we were to create a diagram of the Electrolumen installation, it would look something like Figure 29. What can be seen in Figure 29 is the relatively complex mapping consisting of the following steps:

- The amount of touch is read on the four lamps. This amount is converted into six “analogue” parameters for each possible touch combination (four poles equals six pairs of combinations: ab, ac, ad, bc, bd, cd).
- For each combination, the system processes the amount of touch, the amount of activity, and the amount of change. This results in 18 parameters (3 x 6). The algorithm making the conversion can be tweaked by the interaction designer in real time, enabling him to tweak the parameters based on the observations of the participants’ reactions.
- The 18 parameters are mapped as MIDI control values (0–127 range) in a sound processing interface (Ableton Live).

What initially consisted of four simple contact points became eighteen nonlinear parameters creating an 18-dimensional interaction space to unfold temporally. The 18-dimensional interaction space created a soundscape in which not even the designer had experienced every possible combination. It is a system that unfolds a more complex space for interaction than just a basic action/reaction interface. Through the combination of multiple nonlinear parameters, it is possible to expand the interaction space to include audible nuances based on subtle differences in the way the participants touch, tap, hold, and hover around the different touch points. Put simply, the interaction space was large enough to require exploration for the participants to cover it. This is what I consider the internal complexity of the system. The interface itself was surprisingly simple; it consisted of a few touch points with limited direct control, and there would be no control-interface types of ways to define parameters. Due to the internal complexity, the simple interface became a complex interaction space to explore. One could use the metaphor of an iceberg where only ten percent of it is visible above the water, the rest is hidden below. To discover the last ninety percent, one has to dive into the interaction. Thus, the simple interface has the role of downplaying the potential experience present within it, triggering the exploration of the participants when interacting with it. For the participants, the amount of possibilities they had with the system and how they could use it to engage socially came as a surprise to them once they began engaging with it.

The Electrolumen installation gives us a generic understanding of what is meant by internal complexity within the frame of the interaction design projects present in this dissertation. Similar strategies have been deployed in projects like the Mediated Body, Touchbox and Hydraphonia. To summarise, it consists of a set of variables representing different beliefs on how participants interact with the installations, putting emphasis on the amount of touch, the amount of activity (tapping, holding, etc.) and the amount of overall activity over a longer period of time.

**INTERACTION PATTERN OF ELECTROLUMEN**

- **Making the first connection:** The participants would make their first connection between two lamps. This would usually create a smile, representing the joy of figuring out that something is happening.
- **Exploring different connections:** When they had figured out how to control one set of lamps, they would try out different sets. At this point, they would realise that their actions affected the sound coming from the nearby speaker. They would further understand that different combinations made different sounds.
- **Exploring multiple connections:** At this point, they would start to explore how they could create multiple connections. This would normally require collaboration between multiple participants since it required two arms per connection (a few figured out how to stretch their fingers across the lamps to make the connection with one hand).
- **Exploring variations of the sounds:** In this newly-created, multi-touch soundscape, the participants would realise that some variation would be interesting. They would start to tap their fingers on the lamps to create rhythms.
- **Exploring interbody touch:** When multiple participants were engaging with the installation, they would at some point start to touch each other. Usually this would be caused by one person touching lamp A+B and another wanting to touch lamp A+C. In this way, they would realise that only one person needs to touch lamp A, and the other person could simply touch the hand of the person who touched lamp A. Although this could be considered a simple observation, it would usually lead to an extended interaction where the lamps were triggered by holding hands, putting a finger on someone’s nose, and so on.
4.3. Insight: Create a ‘sweet spot’ between predictability and chaos

It can be alluring to think that the more internal complexity, the greater exploration space one can create for the participants. However, throughout the design process of the installations, it became a recurring challenge to find the right balance between complexity for exploration and simplicity for understanding. In a simple model, one can put a completely predictable interface at one end and complete chaos at the other end of a scale. For the sake of argument, one can imagine the predictable end to be an on/off light switch and the chaos end to be the white noise you see on an old TV screen when it is not receiving a signal. The light switch quickly becomes a taken-for-granted way to control the light in a room; one is only aware of its functionality when something malfunctions. On the other hand, consider that one would be able to affect the random noise on the TV by touching the antenna. Although this would change the pattern somewhat, it would quickly be deemed too random to be interesting to interact with. One could say it is so random that it becomes too predictable to interact with—it becomes predictably unpredictable. I posit that between the two ends lies a grey zone that can be utilised to trigger curiosity among the participants.

Finding this grey zone which invites exploration can be explained by the concept of the sweet spot put forth by Gaver et al (2009, p.2215). Simply put, the sweet spot is the evocative point between tight coupling and loose coupling. Tight coupling, in this context, should be understood as a clear connection for the user between action and reaction. This is a quality that one strives for when designing for usability and transparency (See Ahlberg & Shneiderman (1994) for an in-depth discussion of the concept). Loose coupling thus becomes a situation where the interface’s reaction to the interaction is harder to deduce for the participants engaging with it. The loose coupling invites exploratory interactions, but if it is too loose, it quickly becomes too unpredictable for the participant, and she fails to understand that she plays a role in it. Striking the balance between the two is not a simple matter, as Gaver points out when he reflects on the failure of the Health Horoscope (Gaver et al., 2009):

Thus our failure to demonstrate a ‘sweet spot’ for interpretation with this system does not disprove the User Appropriated Inference concept. It does however indicate that establishing an intriguing middle ground between randomness and accuracy is not always a simple matter. (Gaver et al., 2009, p. 2220)
In the case of the Electrolumen installation, we were able to tweak all the parameters in real time from the shipping container while the participants engaged with the installation. The primary goal was to find the sweet spot where the participants would understand the fundamental concept of the interaction, while at the same time, enough complexity was present for them to explore it further. It was clear from our observations that action/reaction-based interaction patterns quickly became uninteresting, while an overly-complex soundscape left the participants confused about their role in it and how they affected the parameters. In the latter, the participant would be left thinking there is no interaction at all and the system is entirely pre-scripted or composed. Therein lies the dilemma of creating a low-enough threshold for the participants to engage in the interaction while keeping the interaction complexity high enough for it to be interesting over time (Salen & Zimmerman, 2004).

Striking the right balance between predictable and chaotic interaction for exploration becomes even more complex when time is taken into consideration. In figure 31 we have a constant level of complexity and an imagined curve of mastery over time for a participant. The time dimension represents the ongoing involvement with the piece as the participant learns to master the different properties of the installation. If the mastery is above the level of complexity in the beginning, the interaction quickly becomes boring. Alternatively, if the complexity is too high above the mastery, the interface will initially be perceived as confusing. The curiosity appears when one understands enough to navigate the system, yet has more to explore.

Striking the right balance between low and high complexity proved to be one of the most challenging dimensions to design for (see figure 31). This often resulted in the compromise of seeking a lower common denominator instead of catering for the ones who comfortably took the time to navigate the complexity and find the nuances of how they affected the installation. In Mediated Body, the way pristine participants would interact with the suit proved to be significantly different from the way the designer and the performer would engage with it. Pristine participants are participants who had not previously engaged with the installation and therefore had a limited understanding of how to interact with it. The programmer and performer knew exactly how the suit worked and would therefore interact with it in a more subtle and elegant way. They would be looking for interesting sound nuances in small movements and experimenting with elegant ways of stroking and touching. On the other hand, the clumsy interaction by the pristine participants would normally result in harsh and noisy sounds, creating graceless interactions. It was clear that finding the right balance between a rich and complex soundscape versus easily understandable sounds for novice interaction proved to be a challenge. As a consequence, new versions of the code controlling the internal complexity had to be tried out before the right balance was struck.
In an ideal scenario, one could imagine a system in which the complexity would increase with the mastery (see figure 32). This is similar to a common strategy within game design: The enemies are harder to beat as one moves to the next level. Although this would be considered ideal, it would require the system to gain quite a complex understanding of the interaction and the mastery of the participant. With both the Mediated Body and the Electrolumen installation, such knowledge would be hard to implement because of the relatively fluent exchange of participants. In the case of the Electrolumen installation, the actions of the participants overlapped as groups of people would try out the installation together. This was also the case in the Mediated Body, where it was not uncommon for a group of people to try it out. Also, the initial participants often wanted to retry it as they grew more comfortable with the bodily interaction.

In its simplest form, we observed this property when we applied an echo delay effect to an output signal. Most effect processors have a wet and dry parameter; the wet parameter represents the volume of the processed signal (the one with echo delay) and the dry parameter represents the volume of the raw signal coming into the processor. If the volume of the dry signal was lowered to zero, a skilled participant would still be able to interact with it, whereas a pristine participant would only get confused. We found that it was the combination of wet and dry that created the most interesting balance. The question then became how to create a maximum amount of complexity while still maintaining the direct coupling. This approach will be explained in further detail in the following section.

I have yet to figure out how to convert the game strategy of moving the threshold (level of complexity) to Designing for Homo Explorens. The inherent mix between pristine and novice participants creates a rather complicated environment for the system to adjust the complexity threshold accordingly. However, as the next insight will convey, it is possible to use a multilayered approach in which simple and complex interaction can coexist in the same interaction space.
4.4. Insight: Create a multilayered interaction space while keeping tight coupling

The hunt for the sweet spot described in the previous insight quickly became a frustrating trade-off between complex interaction patterns and maintaining tight coupling. To solve this problem, the concept of a multilayered interaction space was created. The strategy of a multilayered approach was to create clear and instantaneous feedback for the pristine participants, while keeping a larger interaction space to explore for the more experienced ones. In practice, three approaches to the parameters were applied to create the multilayered interaction space:

Firstly, we created a clear distinction between interaction and no interaction: Throughout the many installations, we repeatedly observed participants moving away from the installation to observe what it would do when they were not interacting; it seemed as if they were interested in establishing a baseline. To enable participants to understand how their actions affected the system, it was necessary to emphasise the difference between no activity and activity. In its simplest form (which we used in most cases) nothing would happen when no one was interacting with it, and the participant would get a clear feedback when they started to interact with it. This created the clear understanding of something happening as soon as a participant engaged with it.

In the case of Mediated Body, this strategy significantly contributed to what I would classify as a “sparkly eyes reaction” from the participants. The performer would approach a participant asking if she wanted to try out the suit, and if she was interested, the performer would put a pair of headphones on her head. The headphones would only relay a static hum from the simple circuit; however, as soon as the performer touched the participant’s skin, a clear reactive sound could be heard through the headphones, indicating to the participant the connection between touch and sound. Because of the novel synthesis (bare skin touch to sound) the participant would react strongly to the first touch—her eyes would light up and become sparkly in a sense. I posit that this experience would have been much less intense if the sounds were present when the headphones were first placed on her and all she would hear when touched was a mere modulation of the sounds.

This strategy would only work in the cases where there actually would be a situation of initial participation. In the case of Explosion Village, we had made quite poetic visual patterns when no one was interacting with the installation, and even went so far as to install specific lamps in the water tanks to visualise this. In the five days we ran the installation, we rarely saw this pattern emerge; there would always be someone engaging with the installation.

Simple interactions for instant feedback: The internal complexity became a basis for this approach via the parameters: the amount of change, amount of touch and amount of activity. To preserve a sense of coupling, we would create a few dominant sounds that would only be affected by the parameter that related directly to the amount of contact to the object sensed. The other parameters would then affect more subtle nuances for more exploratory interaction. This would enable the pristine participants to quickly gain an understanding of affecting the installation. When the participants had explored the basic properties of touching for a while, they would start to notice the more subtle nuances and wonder how they affected them as well.
This enabled the interaction to be sustained for a much longer period of time than the initial touch-to-sound experience and also resulted in more poetic and delicate qualities of the interaction. In the case of Mediated Body, these nuances created a seamless integration between curious explorations of the sounds and the body. They became an integrated way to explore each other’s bodies by trying out different kinds of touch, e.g., stroking, holding hands, tapping, grabbing, and hovering.

*Distinction between sound and light (see figure 33):* Most of the installations consisted of a combination of light and sound. The sounds were usually chosen as a way of creating a complex soundscape and the light was used to create a visual understanding of the interaction. The lights became a way to directly represent the visual feedback when making a connection or touching something that was sensed. This could be seen in the Electrolumen installation wherein the lamppost would light up, visualising the connections made.

In the case of the Mediated Body, the performer was wearing a suit with RGB diodes embedded in it, which lit up according to the amount of touch. Furthermore, we made the lights blink depending on the length of touch, thus visualising the amount of “energy” the touch had built up between them. Since the length of touch would physically come after the initial touch, the two did not collide but complemented each other in a way that made the lights have a dual interaction feedback purpose.

34. A participant realises for the first time that inter-bodily touch creates sounds.
4.5. Insight: Create multiple interactive modes

As a way of extending the interaction space, one can utilise multiple interactive modes. Interactive modes should be considered a fundamental change in the way the system responds to the interaction. This created (although artificially) a way to expand the interaction possibilities. In two specific cases, the strategy was deployed for two different reasons:

Hydraphonia was designed to be a dynamic and explorative play area across the three cities. The interactions at each site were shared with other cities, and this allowed for interactions across cities via the system’s “built-in personality”. One created patterns of light and sound together with children and adults in the other two cities. No single player had full control but needed to explore the many buttons together in order to understand it.

Each playground had ten buttons that would emit sound and light when touched. The buttons connected in threes across the cities. Hence when one button in one city was pressed the two other buttons in the other cities would light up and create sound accordingly. The motivation behind this would be that participants would be able to co-play with the interface across the cities. They could create a collaborative musical experience or use the open-ended interface to invent interactions with each other virtually present across a great distance.

We expected the level of interaction to vary greatly depending on the time of the day and the position of the playgrounds in the three cities, hence we needed a way to create different modes that would accommodate everything from one child to a whole kindergarten. We chose to tie the activity meter (it was based on the amount of activity on all the buttons on a single playground) to a set of modes. These modes would change based on the activity level. Put simply, one can define the modes in the following way:

- **Chaotic game**: Lots of interaction happening. The system is quite neutral and serves primarily as a sampler or drum machine. Users can play by themselves and create their own game with the sounds.
- **Wild game**: Medium amount of interaction. The system makes only one repetition. If a person runs quickly over the buttons, the system activates the buttons that he has touched only once.
- **Duet playing**: Low level of activity. The participants can create soundscapes or sound images that play until the activity drops to a level where the playground “believes” that everyone has left it. These loops have intervals of about 10–20 seconds. The playground has other hidden interaction opportunities that you can find by exploring the possibilities of each button.

Another example is N7331227. It was an old industrial robot which was given a new life and a new home at the art museum Kunsthallen Brandts in Odense. N7331227 had been used to grind toilet seats into shape—a repetitive, monotonous and precise task. Each of them perfect, all of them identical. With its working days over, we equipped N7331227 with new attributes, highlighting the robot’s limitations as a machine and the human need for emotional attachment to objects. The internal complexity was designed to create the sense of the robot having its own life. We wanted the audience to anthropomorphise the robot by creating different interactions depending on what it detected from its surroundings. It had the following interaction modes:

- **Idling and looking around**: When no one was present near the installation, the robot would go into an idle mode where it moved around randomly as if it was looking for people in the exhibition.
- **Looking at passersby**: When people would come up to the installation, a camera mounted on the nose of the robot would detect their faces. This would enable the robot to lock into the position of their faces as if it was looking at them. This created a feeling of it being aware of their presence in the space. When people moved, the robot would adjust its head accordingly. If people moved too close, the robot would move back and if people moved away the robot would move forward.
- **Looking at the drawing**: If people made a drawing in the drawing area, the robot would detect this and start looking at what they had drawn.
- **Turning the drawing into a light pattern**: If something new was drawn, the robot would start pushing a button matrix that would turn on lights in a matrix of light bulbs, thus representing a crude interpretation of the drawing made by the audience.
The strategy of using different interaction modes served as way of expanding the interaction space, enabling the installation to become something with hidden depth or personality that the participants could explore.

One crucial challenge in this approach was to make sure that the transition between the different states was as seamless as possible. In the case of the robot, we made an animation engine that would make a smooth, curved movement from whatever it was doing to what it was supposed to do in the other mode. The change in states resembled an animal that would change its mind and start doing something new. Within the Hydraphonia installation, the different modes would overlap so patterns created in duet mode would loop a couple of times even though the overall mode had switched.

The strategy implemented for changing modes was different in the two installations. The Hydraphonia installation changed modes based on the activity level of the overall installation. Therefore, the chosen mode was based on the amount of buttons pressed over time across the cities. The N7331227 installation changed its modes through observing the actions of the participants. A camera mounted on the ceiling would detect the amount of movement in specific areas around the robot. If there was a lot of activity in the drawing area, the robot would look for new drawings to copy and if there was a lot of activity in the area where you could observe the robot, then it would start to look for faces to follow.

The primary point of the examples is to exemplify ways of creating multiple interactive states similar to the way game design utilises narratives to elaborate on a story. The difference is that we did not force the participants to go through a linear narrative, but made the system react to the mood of the participants instead. This preserved the sense of exploration for the participants. Instead of them having to figure out what they felt was the proper interaction, the system adjusted to their interests.
The N7331227 weighed about one tonne and was a classic industrial robot used in a factory for automation of grinding, welding etc.
4.6. Insight: Create interfaces that guide the interaction

It should be clear by now that expanding the limits of the interaction space is a constant challenge. One way of coping with the limitations of the system is to design the physical properties in such a way that the participants naturally engage with it within the limits of the system. Although this is not directly about the internal complexity, it has become an essential strategy for inviting the participants to get involved with the interaction in such a way that the internal complexity did not, in a sense, drown in the many people trying to engage with it.

We learned this the hard way with the Singing Plant installation. The Singing Plant consisted of one single antenna that read the amount of capacitance from its surroundings and converted it into sound. Humans can affect this capacitance because of the high water density within their bodies. If two people touched the plant, the person closest to the plant would be the one affecting the sound—therefore the second person would not get any reaction from the plant matching their movement. This problem became especially present at big exhibitions where up to twenty people tried to interact with the plant at the same time. The sensing system was simply not capable of accommodating an engaging experience with that many people touching the plant. This demonstrated how important it is to consider the interface and interaction in conjunction with reaction and real-time response.

In the subsequent installations, we would design for this problem from the beginning. First and foremost by designing sensors that would sense multiple people at the same time. In the case of the Electrolumen installation, we created four touch points with six combinations therefore enabling multiple people to interact simultaneously. With the Mediated Body, the limitations of two headphones entirely removed the problem of multiple people interacting simultaneously. Since it is only natural for one person to wear the headphones at a time, only one participant would naturally engage with the touch-sensing system. Therefore, the limitation of the sensing system itself would not be revealed and the participants engaged with it would have their own space in which to explore. Meanwhile, the other participants would be waiting around patiently for their turn. Through the headphones, we designed an affordance (Norman, 1999) that guided the participants in the direction of the proper interaction.
4.7. Insight: Create exploration with rich real-time feedback

One quality, which is easily-overlooked when it comes to enabling the participants to explore, is the dimension of having real-time feedback on the interaction. If the reaction to the interaction would be delayed, the耦pling would be harder to understand. The participants would not get a response fast enough for them to make an assessment of their role in it. Direct and immediate feedback is one key dimension that I suggest contributed to the failure of the Home Health Horoscope (Gaver et al., 2009). The system consisted of multiple sensors monitoring the activities in a house. Every day, these activities were converted into an ambiguous horoscope meant to create reflections of the overall state of the home and the people living in it. I posit the non-real-time quality of the interaction did not create enough feedback for the participants to relate to the wordings of the horoscope. The delay between participants doing something during the day and getting a response the next day became too abstract for the participants to make anything meaningful out of it. They could not create a connection between the horoscope and their actions.

The Hydraphonia project possessed similar problems to the Home Health Horoscope. The system consisted of three playgrounds placed in three different cities. Each playground had ten buttons that would emit sound and light when touched. The buttons were connected in threes across the cities, so when one button in one city was pressed, the two other buttons in the other cities would light up and create sound accordingly. The motivation behind this was for participants to be able to co-play with the interface across the cities, either by creating a collaborative musical experience or by using the open-ended interface to create games with each other virtually present across distance.

Although the system had clear real-time feedback when the buttons were pressed, the understanding of being connected between cities did not work well. The participants had difficulty understanding the connectedness, and the playful intercity connection did not present itself. The children participating mainly became confused about the interaction and thought of it as an oddity when buttons started to blink, although they did not press them even when the children in other cities did. It was clear that the sense of connection did not appear between the cities. One part of the problem could be the latency of the network between the cities. Since this would limit the possibility of a dialogue between two children standing in different cities—they would not consider the sounds a reaction to their own actions. Another would be that the children did not have a conceptual idea of people being virtually present; therefore, they were not able to consider it collaborative play between the cities and were unable to understand how to engage with it. At best, the interaction between the cities became a ghostly experience, making it possible to mix complex and curious patterns between cities.

Within the Mediated Body and Electrolumen installations, the sense of flow was much more present. It was as if the real-time feedback enabled participants to explore in a rhythmic experience and enabled us to create a higher complexity of interaction.
4.8. Interlude

Through the design experiments I have unfolded the concept of internal complexity. First and foremost, to give the reader an understanding of how the rather simple interfaces offered non-trivial interaction exploration scenarios for the participants. This has proven to be a crucial part of the interaction and how we as designers tweak the reactive parameters to create as engaging an interaction space as possible for the participants.

The qualities of internal complexity are key components in understanding ways of Designing for Homo Explorens. It is important to understand that these qualities facilitate interesting interactions when combined with the contextual understanding of social play in public settings. This concept should be understood as one dimension of the four aspects conveyed in this work. The aspects thus become a way of slicing a holistic perspective into a linear structure which is able to fit into the traditional format of a dissertation.

The aspect of intimacy within full-body interactions (presented in the following chapter) expands upon this concept of internal complexity by exemplifying how the designs used the internal complexity to explore the social boundaries of full-body interaction. This puts a focus on the experiential qualities of the somaesthetic engagement with the full body.
experiential
engagement
Create an open-ended interaction space

Create sensitivity through full-body interaction

Create enriched kinesthetic experiences

Create a space for exploration without justification

Avoid reward-dominated interaction
5. Aspect: Create experiential exploration through full-body interaction

5.1. Introduction

In the previous chapter, I introduced the concept of internal complexity as a way of creating an interaction space to explore. The experiments have made it clear that this space is not necessarily explored as a cognitive exercise in which the body is a mere tool for the brain to navigate a physical space. Instead, it has become apparent that the experience of sense-making is bodily in itself. This bodily way of exploring can best be classified as an experiential notion of somaesthetics (Shusterman, 2013):

For the moment, we can briefly describe somaesthetics as concerned with the critical study and meliorative cultivation of how we experience and use the living body (or soma) as a site of sensory appreciation (aesthesis) and creative self-fashioning. [...] The term “soma” indicates a living, feeling, sentient body rather than a mere physical body that could be devoid of life and sensation, while the “aesthetic” in somaesthetics has the dual role of emphasizing the soma’s perceptual role (whose embodied intentionality contradicts the body/mind dichotomy) and its aesthetic uses both in stylizing one’s self and in appreciating the aesthetic qualities of other selves and things. (Shusterman, 2008, p. 1)

Somaesthetics is the interplay between somatics and aesthetics. Somatics is the “necessary medium of our being, perception, action and self-presentation in the world” (Shusterman, 2013). The aesthetics of the soma thus “aims to improve the meaning, understanding, efficacy, and beauty of our movements and of the environments to which our actions contribute and from which they also derive their energies and significance” (Shusterman, 2013). Throughout this chapter, I will use the concept of somaesthetics as a starting point to a wider discussion on the aesthetic experience of bodily interaction within Designing for Homo Explorens.

Petersen et al. (2004) have used Shusterman’s (2000) concept of somaesthetics as a way of gaining an understanding of the aesthetic experience of our bodies in relationship to interaction design. From this perspective, the mind and the body should be considered interdependent in the aesthetic experience:

[Pr]agmatist aesthetics insists on their interdependencies in the aesthetic experience. In a pragmatist perspective, aesthetic experience is closely linked not only to the analytic mind nor solely to the bodily experience; aesthetic experience speaks to both. (Petersen et al., 2004, p. 271)

How we see the body and the mind shifts the way we design for it; where traditional interface design would focus on the cognitive interaction with the interfaces, we now begin to see the actual usage of the body as an integrated part of our aesthetic experience of the interaction. The aesthetic qualities are therefore not limited to visual input and material properties, but a consequence of engaging with the whole body. One simple example is in finding the thread of a bolt; by twisting the nut in the opposite direction one can sense a small bump that indicates that the bolt and the nut have aligned their threads and may now be screwed onto each other. There is no way of doing this visually without holding and feeling the nut, and you can do it perfectly well in the dark or outside your line of vision. It is by interacting with the material that we can gain an understanding of its properties, and it is the interaction itself that should be considered aesthetic, not necessarily in the conventional sense of aesthetic beauty, but more in line with Dewey’s ideals of considering aesthetics an everyday experience felt through engagement with it. “An experience is a product, one might almost say by-product, of continuous and cumulative interaction of an organic self with the world” (Dewey, 1958,
What is important to point out is the lack of instrumental validation. In this context, ‘non-instrumental’ should be understood as the design not necessarily having an intended outcome. Instead, the focus is on the unanalysed totality as a holistic approach in which the intellectual, sensual and emotional come together as continuous engagement and sense-making.

I will return to the argument for non-instrumentality as a part of the aesthetic experience at the end of this section when I summarise my perspective on aesthetics of exploration. Until then, I must introduce one more reflection on the role of somaesthetics within Designing for Homo Explorens. I will do so through two cases done by Schiphorst (2009b).

Schiphorst has, through a series of experiments and designs, explored somaesthetic experience from a research-through-art perspective within HCI academia. Her designs are not instrumental and therefore align more closely with the designs present within this dissertation. I will highlight two of those projects because although they have similar agendas they end up with two different outcomes. They can therefore highlight an important difference between what I consider the use of predetermined somaesthetic categories as a design guideline versus using somaesthetics as a design framing in which the aesthetic experience appears in its usage.

The first is the Soft(n) installation. The installation consists of many pillow-like, interactive elements that participants can engage with. The interactions were designed based on Laban & Lawrence’s (1974) effort shape system:

- A holistic approach to experience wherein the intellectual, sensual, and emotional stand as equal partners in experience.
- Continuous engagement and sense-making wherein the self is always already engaged in experience and brings to each situation a history of personal and cultural meanings and anticipated futures that complete the experience through acts of sense-making.
- A relational or dialogical approach wherein self, object, and setting are actively constructed as multiple centers of value with multiple perspectives and voices and where an action, utterance, or thing is designed and produced but can never be finalized since the experience of it is always completed in dialogue with those other centers of value.

For her, it “presents a definitional framework of somaesthetics that can be applied to interaction and links the concept of somaesthetics to a specific design case in which tactile interaction is applied to the design.” (Schiphorst, 2009a, p. 1). As a consequence of this justification, the somaesthetic dimension lies in a prescriptive/analytical perspective of applying a certain taxonomy of elements to a design. For the design to be somaesthetic, one needs to apply x,y and z features to the design. The academic account does not verify whether it was an actual somaesthetic experience for the participants. For me, this is problematic, because the somaesthetic dimension of a design is in the experience itself and can therefore not be justified through the features of the design alone.

Schiphorst’s second design is closer to my focus on the actual somaesthetic experience of the participants. Schiphorst, in collaboration with others (Sang Mah, Susan Kozel, Robb Lovell, Norm Jaffe, Jan Erkku and Pablo Mochcovsky) designed the Whispers project. In this installation, the participants wore a set of sensors that projected their breath (and other biofeedback responses) onto their immediate surroundings for the participants to sense in real time. What is normally hidden becomes visible, both for the wearer herself and the observers. Instead of mechanically embedding somaesthetic properties in a designed artifact, its strategy was to enhance what is already present. This approach aligns much better with the strategies of the designs within this dissertation than Soft(n). I will use this chapter to exemplify that technology can not replicate a somaesthetic experience as embedded in it (which I consider the strategy applied to the Soft(n) project) but merely artificially augment the aesthetic space of the participants and create a frame where participants can explore their bodies somaesthetically.

Based on the above reflections on some of the current positions around somaesthetic experience within interaction design and HCI, it is time to frame this subject within Designing for Homo Explorens:

Firstly, this means that Designing for Homo Explorens seeks to create exploration, not just a cognitive process of figuring out, but as an actual physical engagement in the world and the felt aesthetic experience of doing so. It is an exploration that requires the participants to...
touch, stroke, hit, hug, hold, or make gestures both with interactive artifacts and other people engaged in the installations. Since this should be considered an aesthetic exploration in the moment, it moves away from an instrumental perspective and, instead, towards a perspective where use happens as a continuous engagement and sensemaking (Wright et al., 2008). It is completed in dialogue wherein self, object and setting are actively constructed. Therefore, the outcome plays a secondary role to the aesthetic experience felt as the body engages with the designed interactions.

Second, designing for exploratory experiences becomes one that leans towards the qualities of the second project by Schiphorst. My interest does not lie in making a taxonomy that can be mapped onto designs as labels inspired by somaesthetic concepts. Instead, my interest lies in enabling somaesthetic explorations for participants and among participants based on an understanding of somaesthetics as full-body interaction. This is done either by creating an embodied frame through which they can make sense of their own body or by enhancing/augmenting their own body state and senses through technology. They can both be considered ways of designing interaction spaces with somaesthetic affordances, and they can be applied simultaneously. The difference lies in the strategy applied to the design.

As a consequence of this framing, I move slightly away from a part of the agenda of somaesthetics and a general discourse around aesthetics and beauty. Firstly, a significant part of somaesthetics focuses on the inner-body states and how one’s awareness of this forms one’s aesthetic experience of the surroundings. As much as I agree with this notion and acknowledge that this is at play when it comes to engaging with the designs in this dissertation, it is not the primary focus of the designs found within it. The design intentions are to create experiential exploration with a focus on the aesthetics of bodily engagement. As a side effect of this, there may, hopefully, appear actual somatic transformations or experiences. Secondly, as stated above, when aligning my notion of aesthetics with Dewey’s notion of it as experience, it is not my intention to create beauty in itself or define beauty. Instead, it is my intention to create vivid experiences that people want to engage in. This enables me to encompass designs that are experienced as scary, boundary-pushing, tantalising, etc. When Petersen et al. (2004, p. 270) argue for “Don’t think beauty in appearance, think beauty in interaction (Djajadiningrat et al., 2000)” I agree with them in the sense that the focus is on the interaction and not its physical appearance. It is important to consider beauty as a wider scope of experience and acknowledge the diversity that can stem from it. This version of a somaesthetic experience therefore builds upon Shusterman’s work by acknowledging that aesthetic experiences are often an integrated part of a bodily engagement with the world it resides in.

Petersen et al. (2004) point out that somaesthetics are also socioculturally embedded. That is, the aesthetic experience is “in dialogue as we experience the world; it is based on valuable use relations influencing the construction of our everyday life” (Petersen et al., 2004, p. 271). It is therefore necessary to understand aesthetic experiences as an integrated part of a sociocultural perspective. The proposed insights presented later in this chapter therefore have to be understood from the perspective of designing for a socially explorative social setting. I am aware that the rather generic definition of the sociocultural frame leaves room for criticism; it seems as if I do not acknowledge the diversity and complexity when it comes to understanding situated interaction in real-world settings, and I ask for the reader to be patient as I will expand upon this perspective further in the following chapter. For the purpose of understanding somaesthetics in relationship to Designing for Homo Explorens, I believe this definition is sufficient for a generative conversation.

Based on my framing of aesthetic explorations through full-body interaction I will present the following five insights. These insights verbalise how the aesthetic exploration played out in the different experiments and how the design choices affected the interaction. I start out with an insight that serves as a criticism of reward-based solutions for aesthetic exploration, because it substantiates the inherent risk embedded in utilitarian or instrumental strategies when it comes to Designing for Homo Explorens.
5.2. Insight: Avoid reward-dominated interaction

The most extreme version of a reward-based installation is the Explosion Village.

During the fall of 2008 we experimented with percussive interfaces for the Roskilde Festival in Denmark. We were wondering how one could create an installation that would allow a larger number of festival participants to create rhythms together. By creating such an installation it was possible to utilise the massive energies of participants engaging with the installation together in real time.

We came up with an installation that looked like a mixture between the Eiffel tower and an old oil tower. The installation managed to accommodate about two hundred people at the same time. They would drum on drums made out of large water tanks, while they cheered and, in some cases, danced around the tower. When the participants had drummed for a certain amount of time, they would be rewarded with a massive fire explosion. This would create a loud uproar. Each of these cycles would last for about fifteen minutes and took place over five consecutive days.

Throughout the week, the atmosphere around the installation felt energetic. People would drum the same few simple rhythms much like when the spectators begin to stomp on the floor and clap their hands in a football arena. The rhythm would often be quite similar to the rhythm that can be tapped out from “We Will Rock You” by Queen. While the participants drummed, they would shout “Louder! Faster! Wilder!” It was clear that the installation was able to interest the participants enough for them to create as much sound-energy as possible in order to see the explosion go off.

The installation was a huge success from a massive-interaction perspective. Everybody loved interacting with it, but behind the scenes we wanted to create a greater sense of playing together. As a result, we put a great deal of energy into designing each individual water tank into a unique instrument that would enable the participants to create interesting compositions together.
37. Images presenting the interaction around Explosion Village. Left: The participants drum on the water tanks and cheer as the tower explodes. Right: The fire tower which explodes when the participants drum for a certain amount of time.
Andreas Bennetzon plays his contrabass atop a container to create new rhythms with the participants. The music is amplified via speakers mounted on the explosion tower.
During the week of the exhibition, we tried to tame the beast we had created. We tried different strategies to guide the participants into a more relaxed mood where they could start listening to each other playing and create a more collaborative experience. We tried the following:

- Having an electronic musician play rhythms on top of their music to give them a common rhythm to follow.
- Having a conservatory musician play his contrabass instrument to add classical music.
- Inviting famous musicians playing at the festival to perform on the drums to give the participants a chance to see their potential when taking a more percussionist approach.
- Telling people that they had to play well together for the cannon to go off. We did this by asking the guards to tell them and by writing it on the water tanks. In reality, this was a lie since the system did not implement the concept of playing well.

The overall conclusion was that it was possible to affect the BPM (beats per minute) of the participants drumming. This was especially the case when an underlying beat was created based on actual sound samples from the drumming. In this case, the participants did not know that background sound processing was going on. The musicians would create a beat based on the rhythms already present. They would then sync the BPM of the designed beat with the beat which people played on the drums. When they were in sync they were able to control the BPM of the participants playing by slightly changing the BPM of the sample based track. The musician described this as a way of riding with the energy of the participants. They compared it to classic DJ-ing wherein the DJ would speed up the BPM of the soundtrack to get the audience energised. Concretely, they could move the BPM from 120 to 170 as the time moved closer to the explosion. Thus creating a dramaturgical (Freitag, 1894/2008) experience of the participants getting more and more engaged in the drumming experience until they got to the final release of the explosion.

Although it was impressive, it was also a brutal sight to see the energy around the installation. Brutal, in the sense of the extreme amount of energy put into getting the gas cannon to go off. This became an overwhelming collective energy casting aside all notions of exploration. I posit that the primary reason for this extreme interaction was the reward-based interface in the form of the massive oil tower; quite simply, it was extremely exciting to make enough energy for it to explode. What would start out as subtle nuances of playing together for the first few minutes of each session quickly turned into this brutish energy as more and more participants joined in the drumming. The subtle nuances of playing together were simply drowned out.

Quite a few people came to us and said that they did not believe that they were generating the energy for the explosion. At first, we were confused because we simply did not understand what they meant. After some conversation, we realised that somehow an understanding was floating around that the drumming created real energy that was converted into the explosion. They somehow thought that we were literally harvesting the energy from the drumming—hence making a closed, energy-neutral system. We tried to explain to people that we only meant it symbolically. That them playing well together created a symbolic representation of energy in the tower. The reason I point this out is to explain how the designed setup created a motivation for extreme interaction. If one believed that we harvested the energy from the drumming, then they would naturally think that harder and faster drumming would create more energy, hence enabling the tower to go off faster.

It was clear that the installation proved to be highly engaging, but from the perspective of Designing for Homo Explorens, it left little space for participants to socially explore the interaction space between them. It resembled more of what I would consider a gamification—the same way that a point counter in a game can turn even the dullest game into a fierce competition for the highest score. In this case, the gamification was represented by the lights on the tower, and the explosion became a reward for completing the level—a completion that focused on the reward instead of the path leading up to it. It was my impression that very few participants left the interactive space saying “Wow! It was amazing how we managed to play so well together”, etc. Most people were in a more excited state, making statements more like “Wow! It was amazing to play together to create the explosion”. Although it may seem like a small nuance, the difference serves as a good contrast to what I consider the experiential qualities of exploration one is able to create with more intrinsic motivations.

39. Three people hold hands in the Medusae Nilfisk installation. Their attention is divided between holding hands and observing the flame effect.
Another installation that had a reward-based motivation embedded in the design was the Medusae Nilfisk. The embedded reward in this installation was more subtle and enabled participants to engage more with each other. The Medusae Nilfisk installation represents one of the first installations where we could observe multiple layers of interaction.

As described in chapter 2, the installation consisted of three lamps each made out of two parachutes that were sewn together to create a balloon-like shape. The shape was kept inflated by four antique vacuum cleaners in each lamp. We placed a gas-based flame effect on top of each of the lamps and within the three lamps we had four coloured light bulbs (red, green, blue and white) that would enable us to change the colour of the lamps. To get the audience to interact with the installation, we created two interactive poles. They were designed in such a way that one had to make a connection between them to trigger the installation. The catch was that the two poles were placed too far from each other for one person to create the contact. At least three people were needed to make the connection. They had to do this by holding each other’s hands and holding the poles at each end.

When they managed to make the connection an animated sequence would start with a simple coloured sequence that would eventually fade the lamps into bright white and then fade into pitch black. After a few seconds – long enough to build suspense – the flame effects would go off on top of each of the lamps. This would create a huge contrast to the darkness seconds before.

To allow the system to recharge with gas and in order to preserve it, the fire cannons would pause with a random time interval ranging from three to ten minutes. To indicate the recharge, the two poles would switch from green to red. This meant that the participants could only interact with the installation when the light on top of the poles was green. As a side effect, this preserved the flame effects as being novel. The participants either had to wait around to fire the gas cannons or they had to keep an eye on the poles whenever they passed by them.

The poles themselves were unobtrusive to the surroundings. They were two rusty, grey metal poles that would stick out of the dirt in a dimly lit area off to the side of the passage. The only thing that indicated that there was something to interact with were the coloured lights on top of them and a pictogram mounted on a wall behind them. We worried that the possibility of interaction would be left unnoticed by the passersby.

**INTERACTION PATTERN OF MEDUSAE NILFISK**

- Through word of mouth, people would look out for the colour of the poles.
- When they turned from red to green they would yell, “It’s ready!” and run to the poles to fire off the cannons.
- This would usually consist of one or two participants. Therefore, they would need one or two more to make the connection between the poles. As a result, they would run around asking people if they wanted to set off the cannons, saying things like “Come here and hold my hands” or “Come here and help me make fire explosions”.
- The invited party would be confused as to what was going to happen.
- This would result in conversations where the knowing participants would try to explain the system: “When we hold hands we create a connection between the two poles that will set off the cannons”. The novice participants would be somewhat critical asking if it were some kind of trick or if they would be electrocuted.
- When they sensed that the invitation was sincere, they would hold hands and set off the fire.
- This would result in excitement and a sense of accomplishment or energetic joy.
- At this point, the lights on the poles would turn red indicating that they needed to be recharged again.
- The participants would usually have a conversation about the role of the light and a conversation about the time it would take before they could shoot it off again.
The participants got a first glimpse of the installation days before the actual area opened. The passage was located right up to the camping area. Every time we tested the gas cannons, the fire effects would reach high enough up in the air for the people on the camping area to see them. This would create cheering and uproar every time we tested them.

When the gates finally opened and the participants entered our area, the passage was flooded with people who ran to the various music tents. It was in the daytime and the participants only saw our installation as three large ovaloids situated on the ground through the passage. Although rather large in scale, they were not visually dominant and it seemed like they mostly went unnoticed. In contrast, at nightfall the lamps began to light up and fill the space with different colours. The aesthetics resembled huge Chinese paper lamps, and the participants started to notice them and enjoy the atmosphere.

We had assumed that guidance would be imperative in getting the participants to engage in the interactive part of the installation. Therefore, we made an illuminated sign explaining how to engage with the interface and we also encouraged the guards to show others how to interact with the installation. The guards were young volunteers whose job it was to make sure that the participants did not climb on or abuse the lamps in other ways.

At first, no one noticed the poles and tried to figure out how to engage in the installation, so we began to introduce participants to the interaction. The first evening, we constantly encouraged people to try it out and were left wondering if we would have to do this throughout the exhibition period. The next day, we started to observe some of the participants coming back to try it out again. The requirement of needing to be at least three people forced them to find others to hold hands with. Because of this, the interaction quickly went viral (in the sense that it became common knowledge) and during the second day, we rarely had to explain anything. The only thing that seemed to go unnoticed was our illuminated sign with the instructions on how to engage with the installation.

Lively discussion would happen around the installation as the participants ran around trying to convince others to try it out. “Come here and hold my hand!” would be shouted out as they would approach somebody nearby. The person who was invited would be hesitant; it was clearly an uncommon situation to be invited to hold hands with a stranger. It would often take a quite a bit of convincing for the person to engage in the installation. He feared that it may be some kind of trick. It did not help that the poles would sense their connection—it was quickly translated as some kind of electrocution.

The relatively complicated details about the light indicators would be conveyed virally as well. Whenever the lights turned green, participants would notice from afar and run towards the polls while yelling “The lights are...
green!” On the third day with 80,000 participants at the festival, enough people knew about the installation to be able to introduce it to others. We had reached critical mass.

This was our first installation that played with the concept of human-to-human touch. Through the motivation of getting the impressive pyrotechnic display, the participants had to engage socially with other participants around them. Although holding hands is a relatively safe, non-transgressive form of tactile social interaction, it still seemed to create a level of intimacy between the participants. Although technically it was possible to explore other types of touch, e.g., kissing or hugging, it was rarely done. However, normal social-interaction interest did apply, and we found that the participants would use the installation as an excuse to engage socially with people around them. Furthermore, we observed that the person one would be holding hands with mattered, and quite often the explosion became secondary to the simple experience of holding hands.

The reward-based interaction presented in Explosion Village becomes a good reason to challenge an externally-goal-oriented design strategy. I am not arguing that the Explosion Village did not create an aesthetic experience. On the contrary, I believe it created an overwhelming experience all the way down to the sore hands people must have had after banging the same hard surface as fast as they could for fifteen minutes straight. As Shusterman (2008) puts it:

> The psychology of sensory perception means that intensification of pleasure cannot simply be achieved by intensity of sensation. Sensory appreciation is typically dulled when blasted with extreme sensations. The most intensely enjoyed music is not the loudest. A gentle grazing touch can provide more potent pleasure than a thunderous thrust. Shusterman (2008, p. 37)

The installation fell prey to an instrumental, reward-design paradigm that shifted the focus from somaesthetic sensitivities to the reward of getting the gas cannon to explode. It became an overwhelming experience in itself, therefore leaving little room for being present in the moment and having that as the primary focus.

Medusae Nilfisk managed to move closer to this sensitivity. The somatic difference between banging drums and holding hands affected the mood of participants (collective, sweaty energy and rhythm versus silent anticipation mixed with social/sensual excitement) in what I would evaluate as a positive way. The participants were more aware of each other’s presence and holding hands triggered a feeling of being together that lies closer to somaesthetic sensitivities. However, the reward-based interaction still posed a limitation to the possible levels of exploration. The gas cannons created the affordance, but did not leave room for the participants to explore it on their own and create their own meaning to it. The external reward became the dominant reason for interaction.

If we compare Medusae Nilfisk to Electrolumen, we can see that they are technically the same. It is exactly the same technology used for sensing the touch connection. However, with the Electrolumen a much higher level of aesthetic exploration happened. Here, people would explore different ways of making a connection through the bodies. Holding hands became one of many ways to touch each other. In principle, a twenty person chain could also have worked with Medusae Nilfisk, but the promise of a cool explosion and the single-track interaction sequence (connect-explode) turned people more instrumental by wanting to get to the climax as quickly as possible. So even though Medusae Nilfisk possessed more explorative experiential qualities, neither Explosion Village nor Medusae Nilfisk made really good use of the potential in aesthetic exploration.
5.3. Insight: Create a space for exploration without justification

The social engagements which occurred as a side effect in the Medusae Nilfisk installation inspired us to experiment further with the qualities of interpersonal touch. With the Electrolumen installation, we kept the touch based interaction, but replaced the flames with light and sound patterns. Further, we implemented analogue properties (described in Chapter 4) into the system. This turned the system into an interaction space for exploration, instead of a binary reaction interface. It became a system with a varied set of reactions based on the different kinds of touch from the participants.

Medusae Nilfisk and Explosion Village had a clear purpose; one could easily communicate what one was supposed to do with it. With the Electrolumen, the non-existent reward required the participants to create their own sense of what the exploration was about. We did not supply them with instructions on how to use it and why they should engage with it in the first place.

We observed that it would take a little while for them to understand that they needed to touch multiple lamps for it to create a reaction. When this connection was made, they would start exploring it. First, by holding on to two lamps at the same time, then by tapping the lamps and then trying to combine different lamps for different sound effects. As an aid, there was instantaneous light feedback when they got it right.

Learning from others engaging with the installation became the primary way of getting to understand the interaction. This also became an initial facilitator for the participants to engage with each other and explore the interface together. What at first became an exploration of the light and soundscape, turned into an exploration of the touch reaction through each other’s bodies. They would touch each other’s noses and they would start to kiss each other. This would create light sparks pointing down on them each time their lips met.

This created a stronger correlation between the physical interaction and extrinsic goals of the interaction. Different ways of interacting appeared when no external motivation (like gas explosions) were present. One could say that it became a more poetic interaction where richer nuances could emerge. The participants were able to engage at their own pace and connect to their own tacit interests in interacting with the installation. They had the freedom to find their own experience and reason to engage. This enabled the participant to engage with multiple interests: The possibility to explore the interaction as a sound interface, the possibility to explore body contact and the possibility to engage in the concept of dangerous interactions through the lamppost lights.

The lack of clear meaning and purpose created a more low key interaction compared to the Medusae Nilfisk and especially the Explosion Village. The participants would engage in the installation slowly and they would hang around and play with it until, at some point, they decided it was time to move on. This was without any overly-ecstatic moments, but instead with smiles and prolonged eye contact between the participants.

INTERACTION PATTERN OF THE MEDIATED BODY

(Hobyte & Löwgren, 2011, p. 38)

- First contact is initiated, either by the performer making a playful comment to someone or by someone making a comment to the performer (often regarding the lights on his chest). The performer then says something like “You wanna try something cool?”, “Are you in a playful mood?” or simply “You wanna play?” These questions are not intended to be answered, but suggest a playful tone and energy in the interaction.
- The performer then takes out the spare headphones and says something like “Let me just put these on you.” At that moment, the person on the receiving end becomes a participant in the Mediated Body experience.
- The performer’s first step is to give the participant a gentle touch to communicate the connection between touch and sound. This usually brings an expression of joyful discovery to the participant’s eyes. Verbal communication stops at this point, since both the participant and the performer are wearing headphones.
- When the participant understands the fundamental principle of the concept, they begin exploring it together. The participant concentrates on discovering the possibilities for creating sounds, trying different ways of touching and in different places.
- After thirty seconds to one minute of highly immersed touch-play exploration, the participant grasps the possibilities of the concept. If the session continues beyond this point, it suggests that the performer and the participant are playing and enjoying the moment.
5.4. Insight: Create sensitivity through full-body interaction

I posit that the interaction qualities of exploring without justification and without externally defined goals made room for a heightened sensitivity. This sensitivity was heightened even further as soon as they started to engage with each other. In the Electrolumen installation, it happened when they began to touch each other’s noses and in the Medusae Nilfisk, the moment of getting the permission hold hands with a stranger became a daring moment to transgress. To explore this further and to take this bodily interaction to the extreme, we designed an installation with interactions that would remove the middleman, so to speak. In this case, the middleman would be the actual object between the two participants (the lamppost, in the case of Electrolumen).

We did this by creating a wearable body suit, where all the electronics were embedded on the person wearing it. This required us to have a designated performer wear it while he engaged with different participants. The suit was worn by him as a week-long experiment at the Burning Man 2010 festival. It is a festival and social experiment for interactive art, fire art, self expression and self reliance in Black Rock Desert, Nevada, USA.

The suit consisted of a reactive touch system that would turn the performer and one participant into antennas. One would be the receiver and the other would be the transmitter. By measuring the signal strength between the two antennas, the system would be able to determine the distance between the two. The distance was then turned into a rather complex sound pattern similar to the system designed for the Electrolumen installation. The main technical difference was that the system had to be wearable, which required us to use a much simpler sound engine. While the Electrolumen installation used a laptop with complex synthesis to generate the sound, the Mediated Body used a simple and homemade 4 voice wavetable synthesizer to create the sounds. The sounds can best be described as crude 8-bit Game Boy-type sounds. To make the sound a little more vibrant, a portable effect filter was applied before the sounds reached the headphones of the performer and the participant.

The system created the possibility to explore bare-skin connection between the performer and a participant. The touch was converted into sound that would be heard via the headphones. The lights on the performer’s chest offered immediate visual feedback on the tactile input.

On the first evening of Burning Man, we set out to debut the suit on the festivalgoers. Initially, we were apprehensive about engaging with the participants, wondering whether they would be receptive to the experience or not; however, to our surprise, it quickly became a pleasant experience. The suit functioned as a perfect ice-breaker, with observers wanting to figure out what the lights were for and the smiles on the participants’ faces attracted others to try it.

The intimacy of the full-body exploration created a sensitive awareness between the participant and the performer. What could be considered as small difference between creating a reactive touch interface around a plant versus a touch interface that plays with full body interaction proved to be highly significant when it comes to sensitivity of the interaction. Intuitively, it makes sense that people are more interested in touching each other than touching, e.g., a lamppost, but it is relevant to reflect a little on what created this heightened sensitivity. Shusterman argues that somaesthetics can be a sharpening of our sensory perception:

Somaesthetics connotes both the cognitive sharpening of our aesthesis or sensory perception and the artful reshaping of our somatic form and functioning, not simply to make us stronger and more perceptive for our own sensual satisfaction but also to render us more sensitive to the needs of others and more capable of responding to them with effectively willed action. (Shusterman, 2008, p. 43)

The inter-bodily interaction seemed to kickstart this somatic awareness. It invited the participants to be sensitive to their own presence and just as much to be aware of the people they engaged with. I posit that this sensitivity was partly a consequence of the untraditional intimacy between strangers and partly because it was augmented as a kinesthetic experience. I will go into detail with the latter in the following section.
5.5. Insight: Create enriched kinesthetic experiences

With good reason, Shusterman (2008) argues that our everyday experience is somaesthetic. Touching a stranger can be an enchanting embodied experience, without any technical augmentation of the touch through sound. What the interaction design enables us to do, is to enrich this experience in ways that turn it into a novel experience, encouraging further exploration. If we stroke a surface it will naturally create sound, but when the sound becomes something out of the ordinary, it invites participants to explore the soundscape and get new understandings. Wright et al. (2008) build upon the notion of sensibilities as a basis for their concept of enchantment within aesthetic experiences:

Enchantment relates to experiences such as being charmed and delighted, and carries with it connotations of being bewitched by magic and of being caught up and carried away. Interactive systems designed to enchant should offer the potential for the unexpected, giving the chance of new discoveries and new ways of being and seeing. (Wright et al., 2008, p. 10)

The novelty of touching a Singing Plant and the intimacy of experiencing the sounds of touching another body created enriched and unexpected discoveries that enchanted the participants and sparked their curiosity for more exploration. Wright and McCarthy go further and argue that “Each act relates meaningfully to the total action and is felt by the experiencer to have a unity or a wholeness that is fulfilling” (McCarthy & Wright, 2004, p. 58). Meaningfulness thus becomes a crucial dimension to understand in relationship to Designing for Homo Explorrens. Meaningfulness within somaesthetics must at some level relate to the kinesthetic experience of engaging with the installation.

Our kinesthetic sense therefore conditions the manner in which we experience the world in framing our embodied actions, by providing a sense of spatiality and bodily-motor potential in our relation to the physical and socio-cultural world. (Fogtmann et al., 2008, p. 3)

In other words it has to make some kind of sense kinesthetically to engage with the installation. The kinesthetic experience is not static, but a consequence of sensing while being in motion. While we engage with it, we experience the interaction through our body. Therefore somaesthetics is also not a static state, it constantly changes with the movement of the body and a body in a social context among other bodies.

Let us, for a moment, compare Electrolumen and the Mediated Body. With the Electrolumen installation the internal complexity generating the lights and sounds facilitates a rather ambiguous (Gaver et al., 2003) interface where the participants could engage and make their own sense of the interaction. It was possible for the participants to create meaningful interactions, but it was very much up to them to give meaning to it. The design itself did not have a clear connection between the interaction and the physical properties of the lamp-post. It was primarily a novelty playing with lights and sounds around an old light pole. As mentioned earlier, what created meaning in the interaction was when the participants moved beyond playing with the light poles and started to play with each other’s connectedness. On the contrary, the Mediated Body gave a higher sense of kinesthetic enrichment, because the interaction space aligned well with the actual interaction space of two people sensing each other’s bodies. Technically, the suit had the following properties:

- Tapping: When the participant would tap the body of the performer they would get a clear and distinct sound.
- Holding: When the participant would hold the performer there would be an engine-like sound that would raise in intensity until they let go. When they let go the sound would fall off slowly.
- Aura: When the participant and the performer were almost touching there would be a low level humming sound. This could be controlled by slowly waving the hand above the body part. This created the impression of sensing the other person’s aura.

One could easily imagine more interaction parameters where the sound depended on which part (finger, elbow, etc.) one touched. In reality, the internal complexity only enriched the interaction possibilities from a simple binary touch interface (touch = sound, no touch = no sound) to something where one could explore a few more possibilities. However, this proved to be just enough for the performer and the participant to engage in a dialogue about the different ways of touching and what they meant. What it meant depended greatly on the performer’s ways of unfolding the space that the system detected between them. This is what Dourish (2004) would consider meaning on a symbolic level.
F: It was pretty wild when you ended up not touching, but almost touching.

42. Participants explore levels of aura with the Touchbox. Image Bottom: Excerpt from video where a participant says, “It was pretty wild when you ended up not touching, but almost touching”. 
Together with the participant, the performer made up stories about the suit and how it should be understood. This could involve the suit detecting how well two people connected or the level of aura between them, but mostly it was about the specific interactions. The performer would ask the participant to stroke the veins on his forearm. Technically the suit did not have a way to detect this, but the stroking motion required the participant to keep her finger on the forearm for some time, triggering the engine sound in the same way as if she was holding him. This enabled them to explore the suit together and create stories about heartbeats, love auras and connectedness. The notion of aura described above as a part of the interaction space may seem like a simple, almost minute, observation to make. In reality, with the Mediated Body, Touchbox and even the Singing Plant, the aura became an important quality that many people wanted to experience; it enhanced the magical perception. In the words of the performer in the Mediated Body, the aura created a certain sensitivity:

Aura is the best description, and one that really facilitates a great interaction. Once people hear it is about aura, they intuitively become really slow and start working in the area of almost touching. MB has a background noise that is there all the time and changes slightly, so even without doing *anything* people already then have the impression that they hear their aura. Starting from such a sensitive state of mind, even the smallest touch is really a great experience. How can I formulate this – telling the aura-story makes the sound effects last a lot longer and have a much higher impact. Its amazing how important the story or frame of mind is! I cannot stress this enough. (The performer’s description from the jointly-written document)

As indicated, the performer felt that the concept of aura worked well, set the right kind of mood and therefore guided the participants into a state of exploration where they explored the enriched kinesthetic experience together. In the case of the Singing Plant, people would get excited about the fragile properties of the plant and the sense of interacting with it without touching it. It seemed that the augmentation of the space in between people gave a higher or just as high aesthetic experience as the sense of actually touching. The interactive quality of sensing each other’s aura became a way to kinesthetically sense the intimacy of being close to another person.

The kinesthetic perspective might also explain why the participants thought they actually had to apply real physical energy (through hitting the surface of the drums harder and faster) for the Explosion Village to go off. This means that one would naturally assume what the installation symbolises. If the installation plays with the concept of collecting energy for an explosion, it is only natural for them to think that physical energy is the type being collected.
5.6. Insight: Create an open-ended interaction space

My initial criticism of reward-based interaction requires me to go into further detail about a possible alternative. I consider this alternative an open-ended interaction space. Within the Mediated Body, the open-endedness enabled the performer to create impromptu stories about its usage and its role in the given situation. As I will detail further in the next chapter, the participants began to make up their own narratives of the role of the Singing Plant. In short, it became a magic tree that they had to worship by making up songs about it and playing them on their guitar. Within the Electrolumen installation, the participants chose their own small focus to explore, and we observed that the participants would interact with it for longer periods of time compared to the amount of complexity that system actually possessed. It was as if they enjoyed the lightspace underneath the lamppost and the poetic moment of playing with passersby who would try it out. When they left, it did not become a moment of relief, but simply a quiet way to move on.

This was in stark contrast to the dramaturgical patterns observed with the Explosion Village where all the participants experienced a collective moment of relief when they observed the cannon going off and the resulting fire explosion. From the premises of Explosion Village, it was really well designed—however, it was not well designed from a Homo Explorens perspective. It lacked nuances, sensitivity and the shared moment of exploring on one’s own terms together, and therefore, it became a simplified version of Freytag’s (1894/2008) dramaturgical structure. Firstly, getting an understanding of what the exposition is all about. Then, the rising action of drumming together and yelling “Louder! Harder! Faster!” This resulted in the climax of the gas cannon exploding and finalising with the falling action. While the dramaturgy proved to be highly efficient in the Explosion Village, it also became a fixed narrative leaving little room for people to create their own dramaturgy, although they did to a certain extent by dancing around the fire tower. In contrast, the more open-ended installations like Electrolumen did not have the same sense of dramaturgical release that the Explosion Village achieved.

Although the more open-ended design strategy did not follow Freytag’s (1894/2008) dramaturgical structure, it is still possible to abstract a generic structure that fits most of them. This structure is similar to what Khaslavsky & Shedroff (1999) consider a seductive experience:

One way these objects do so is by going beyond the obvious and the efficient, being not only original but more of everything than they need to be. Whether elaborate or simple, seductive objects need to promise to be more than what is expected of them. They stimulate the imagination on many levels and seem to espouse values or allude to connections with what a person wants to have or to be. The customer’s imagination is where the first connection is made. (Khaslavsky & Shedroff, 1999, p. 46)

As they posit, it is necessary to move beyond mere functionality and instead spark the imagination of the user. Seduce them to get involved with the promise of an extraordinary experience. The initial seduction then turns into a relationship between the participant(s) and the artifact. This relationship can, in principle, be infinitely long and shows a diversion from the crests and troughs of Freytag’s structure. Let us consider a four-step structure that fits most of the designs in this dissertation and reflect on how it connects to the seductive structure:

- Curiosity: Either lured by observing people interacting with the installation or by being invited to participate by a performer or another participant. This would, in Khaslavsky & Shedroff’s (1999, p. 47) terms be considered something that entices you to divert attention.
- First experience: The installation creates an initial spark. This would in Khaslavsky & Shedroff’s (1999, p. 47) terms be considered something novel or something that goes beyond the obvious, e.g., the spark appearing from the first touch in the Mediated Body. This is tied to tight coupling—one needs the initial direct feedback to be able to understand one’s own control of the system.
• Exploration: Here, the installation is explored on two levels:
  • The actual interaction space is explored: The internal complexity functions as a way to create prolonged exploration and multiple interaction possibilities.
  • The social interaction space is explored: The inter-social relations to the installation and the other participants is explored, i.e. “What happens if I touch your nose while I hold this lamp?” etc. It becomes a meaning-making exploration about the social relations in the space. For this to be seduction, it should in Khaslavsky & Shedroff’s terms, lead to something deeper than initially expected. In the case of the Mediated Body, this experience was present when the participants were seduced by the intimacy of the interaction.
• Post interaction: When the exploration has been exhausted, the interaction is either complete or a direct/genuine social interaction takes over. In the second scenario, the actual design tends to fade into the background of the participants’ awareness. At most, it becomes a conversation piece. Khaslavsky & Shedroff (1999, p. 47) considers this final step one in which the participants should have the experiences fulfilled in a memorable way. Since there were a limited amount of promises given, the interactions mostly turned into what I consider a decompres- sion. In this, the participants reflect together on the role of the interaction and use the time to find a connection with each other outside the designed interaction.

With non-reward based interactions, it is necessary to provide as big an exploration space as possible for the participants. First and foremost, through the internal complexity and, secondly, on the level of social interaction and the social meaning-making. The first I have described in the previous chapter and the latter I will describe in the next chapter. Lastly, in chapter 7, I will go into further detail about the dramaturgical elements, reflecting on the performative role of the designed artifacts and the possibility of considering the participants as performers of their own narratives.
Through the descriptions of the installations I hope to have exemplified how Designing for Homo Explorens can open up an experiential exploration space through a bodily sense-making sensitivity. This requires one to engage with the installations in order to understand the qualities in them. Their appearances do not tell the whole story. For this to be actual exploration and not simply a somaesthetic experience, it is necessary to leave room for the participants to engage with it based on their own curiosity. Therefore, the designs need an open-ended interaction space instead of a fixed dramaturgical structure. External rewards (such as large explosions) should be replaced by more subtle explorative qualities like those which internal complexity can provide.

In this open-ended bodily interaction space, a certain sensitivity can appear. This is especially the case when the interaction becomes inter-bodily. Through the touch-reactive bodies, the interaction becomes more of a shared somaesthetic experience than the mere exploration of a designed interface. This sensitivity is not something that should be taken for granted, but rather a consequence of the detailed design choices made in the installations. As I will mention in the next chapter, the Mediated Body suit had to go through multiple iterations before the participants engaged with this sensitivity. Previously, the performer became a target to hit rather than part of a shared experience of exploring each other’s aura, which it later would become.

Although I frame this as full-body interaction, the design cases merely represent a limited set of bodily actions and interactions (touch and kinaesthesia, skin and contact). Taste, smell, internal body state, breath, etc. are examples that are not directly covered (although one could argue that they appear as side effects in some use cases. For example, close contact with another person activates some level of smell and even taste). The reason for this is partly because of the primary focus on interaction as a physical interaction with one’s body, but a more honest answer would be that it is a consequence of the limits of my imagination at the time of designing the experiments. My point is that there is nothing that prevents Designing for Homo Explorens to be expanded to other senses as well (like smell and taste).

In this chapter, I have intentionally left out reflections on the aesthetic appearance of the installations. This will be described in the performative chapter 7 as part of staging the experience. In the following chapter, I will detail how the sociocultural dimension as a setting for the somaesthetic exploration played a significant role of framing the sense-making and the active engagement.
disruption
Create a magic circle as a social bubble
Create a space for negotiation of meaning and appropriation
Create normative disruptions for social play
Create an excuse to interact and transgress norms
Create hybrid mediators for rich, explorative interaction
Exploration is situated
6. Aspect: Create social playfulness through distortions of situated norms

6.1. Introduction

Before we explore the social dimension of Designing for Homo Explorens, I would like to summarise the path leading up to this chapter. In chapter 4, we looked into the internal complexity of the systems which emphasise the ways of designing internal behaviour that facilitate curiosity and exploration. This served as the basis for an interaction space that could augment the somaesthetics of use for experiential explorations in chapter 5. In this chapter, I simplify the sociocultural dimension as situated in an exploratory environment. This move was enough to gain a general understanding of the relationship between internal complexity and full-body interaction, but it downplays the role of the interaction being situated in real-life contexts. In this chapter, I take this discussion further by creating a greater understanding of design for exploration as a part of meaning-making in real life, as it is negotiated among the participants.

Dourish (2004) intends to create such a bridge between full-body interaction and interaction situated in real-life contexts. He defines this bridge as embodied interaction, arguing for considering tangible interaction and social computing as two sides of the same coin.

The idea that underlines each of them is what I will call embodiment. Embodiment is the common way in which we encounter physical and social reality in our everyday world. Embodied phenomena are ones we encounter directly rather than abstractly. For the proponents of tangible and social computing, the key to their effectiveness is the fact that we, and our actions, are embodied elements of the everyday world. (Dourish, 2004, p. 100)

Dourish makes further insightful observations that embodied technologies participate in the world they represent and that meaning therefore arises on multiple levels. This notion of embodiment as situatedness, in turn, implies that it is users rather than designers who create and communicate meaning. Or, to reframe the observations in terms of my design perspective, meaning is not only embodied in the objects themselves, but rather formed in a wider dialogue between the participants, the designed objects, and what Dourish would consider the situated backdrop.

However, although not explicitly stated, the agenda in embodied interaction seems to focus on understanding the role (and perhaps even meaning) of the object or the affordance of an object as situated. Thus, it falls within the same agenda as traditional usability seeking to facilitate the possibilities of the users to engage with the object. The embodied perspective therefore mainly becomes one in which meaning is developed in relation to a task-oriented and utilitarian design perspective. What I find missing for it to be generative in relation to Designing for Homo Explorens is meaning-making in relation to an experience-oriented dimension. Dourish’s perspective needs to be modified somewhat to encompass the aesthetics of exploration. In the previous chapter, I introduced the significance of aesthetic—and even somaesthetic—experience in the context of somatic exploration. Combining this aspect with Dourish’s notion of embodied interaction, new experiential qualities appear in connection with exploring the situated through the social. This is a major insight that needs to be explored further in the direction of social play.

Within Designing for Homo Explorens, elements of play contribute to moving from a task-oriented embodied interaction to a more playfully-embodied way of engaging with the installations. Gaver (2002) introduced the interaction design community to the perspective of Designing for Homo Ludens. It is a term originally coined by Huizinga (1939/1998) as a way to describe humans as playful creatures. As observed by Gaver (2009, p. 165 - 166) Designing for Homo Ludens entails viewing humans as:

...characterised not just by our thinking or achievements, but by our playfulness: our curiosity, our love of diversion, our explorations, inventions and wonder […] “Play.
however, offers satisfaction, not in some stated practical outcome, some immediate accomplishment, but rather in continuous participation as its own end.” (Kaprow & Kelley, 2003)

For Gaver—and from the perspective of Designing for Homo Explorens—play is not about rituals, power or general game design, but rather in-the-moment exploration and meaning-making. On a fundamental level, and completely in line with Dourish, meaning-making is something that appears through the engagement with the materials in a social setting. However, there is a key difference with respect to the incentives for engaging. Whereas Dourish’s embodied perspective seeks to enable “the user to understand the tool and understand how to apply it in each situation” (Dourish, 2004, p. 173), the point of Gaver’s perspective, as well as Designing for Homo Explorens, is to design something where exploration is needed for the participants to create their own meaning.

The creation of such exploration spaces is still a rather open endeavour, however. Gaver’s work on ambiguous interfaces (Gaver et al., 2003), as well as the work on curiosity by Tieben et al. (2011), illustrate interfaces serving as conversation pieces for participants to explore and create meaning. Designing for Homo Explorens, on the other hand, draws on Dourish (2004) and his notion of embodied interaction to shift the focus from ambiguous interfaces towards social ambiguity arising from engaging with the design. Social ambiguity thus becomes a way to create a playful situation for the participants to explore.

What has proven to be a fruitful approach to designing for social ambiguity is some level of discrepancy between what is expected in a given situation and what action the designed artifact actually invites in the situation. Goffman (1966) argues for considering every situation normative in the sense of possessing some situational expectations. Depending on the context, different situational codes are present which regulate the behaviour of the people present. Goffman exemplifies how it is necessary to maintain a proper presence in public settings:

That is, there is typically an obligation to convey certain information when in the presence of others and an obligation not to convey other impressions, just as there is an expectation that others will present themselves in certain ways. There tends to be agreement not only about the meaning of the behaviours that are seen but also about the behaviors that ought to be shown. (Goffman, 1966, p. 35)

These expectations and meanings attributed to the behaviours of others is what I consider situated norms, referring to norms that we in our everyday life take for granted as the proper way of interacting in certain situations. Even though norms can be efficient tools for coping with everyday situations (enabling one to predict the behaviour of other people), they also limit the space of interaction possibilities. One such example is the common notion of wanting to talk to a stranger of one’s preferred gender in public transportation, but not daring to transgress the tacit norms that prescribe leaving fellow passengers alone.

In the course of my design experiments, I have found that successful examples of socially playful interaction often rely upon defusing the need to maintain this “presence.” Done right, a daring situation is presented which invites the participants to reflect on their own roles, their boundaries and their incentives. In Dourish’s terms, we create a design that fits poorly with the backdrop it resides in, hereby deliberately creating the need for social meaning-making.

This intentionally poor fit between a design and its backdrop in a social setting amounts to what I earlier called social ambiguity. In order to create a playful environment for the participants to explore, it is thus necessary to move from an interface design perspective to a mediating perspective. This is what Dourish (2004) would consider computation as mediation instead of computers as mediators. For him, computation becomes a way of transforming and modulating the information in real time as the participants engage with and through the installations. The modulation and transformation are conceptually and technically what the internal complexity does when it converts the different interactions to rather complex soundscapes (refer to chapter 4).

Up to this point, the design perspective of Designing for Homo Explorens can be summarised as follows: To use internal complexity to create an interaction space for participants to explore and physically engage with through somaesthetic experience. This is done in such a way that the designed artifact distorts or plays with the norms of the backdrop it is situated in, enabling participants to renegotiate the social meanings of the interaction happening in the interaction space.

In the following, I will describe how this way of designing for exploration has been done in practice. This is done through six insights that represent ways of Designing for the social dimension of Homo Explorens.
6.2. Insight: Exploration is situated

As mentioned in chapter 4, Tieben et al. (2011) experiment with out-of-context connotations to trigger the curiosity of the students passing by in the hallway. They keep their context constant and offer no further elaborations on its role. However, I find that for the concept of out-of-context to make sense, it is necessary to reflect on the role of the context in which the artifacts are situated. Based on Dourish (2004) I posit that it is necessary to acknowledge the dependence of the exploration on the context. As banal as this may seem, it is a necessary point to make as it serves as the basis for a deeper understanding of social interaction and how the relation between artifact and context is a key component for going beyond curiosity-driven exploration triggered by immediate novelty.

I have experimented with several contexts in the course of my work. In this section, I will describe two of the more extreme cases to give the reader a general understanding of how the contexts affects the interaction design.

**The Singing Plant at the Botanical Garden and Roskilde festival**

The Singing Plant was the first experiment exploring novel connotations and touch interfaces. It was based on the Russian instrument called a Theremin (named after the Russian professor Léon Theremin (Wikipedia, n.d.a)). The Theremin consists of an analogue FM modulation synthesiser reacting to capacitance through an antenna. Since human bodies have a substantial amount of water in them, the capacitance between the Theremin’s antenna and the body would change in relationship to the distance between them. Through this change, one can create violin-like sounds by waving one’s hand in the air around the antenna. In the Singing Plant installation, we replaced the antenna with a living plant, hereby inviting people to interact with the plant and hear it react to touch and movement. As with the traditional Theremin, the pitch becomes substantially higher when one touches the base of the antenna, which is, in our case, the stem of the plant. This created the impression of intimacy with the plant, since a gentle stroke of the tip of a leaf would create a subtle and deep hum whereas a touch directly on the stem would elicit a high pitched scream. The novelty of a plant that sings when stroked invited the participants to try it for themselves and figure out the different nuances in the interaction. The plant has been presented on several occasions, but two contexts stand out as the most interesting ones to compare.

*In the Botanical Garden:* The Botanical Garden is a unique oasis in Copenhagen where one can walk around in a greenhouse filled with colourful variations of rare and exotic plants. On a normal day, it is easy to enter a meditative and peaceful state (in contrast to the context of the Roskilde Festival that will be presented next).

A gardener from the Botanical Garden had, with great pride, picked a rare plant from their collection based on our description of a plant with the right size of leaves. We warned him that people had to touch the plant, but he seemed surprisingly confident that the plant would be okay with it. The plant was positioned in the centre of one of the main greenhouses. We placed a spotlight in the ceiling that would light up the plant whenever it was touched, giving the participants an impression of a special plant coming into focus.

The presentation of the plant installation happened during a culture night in the city. The Botanical Garden was open all night, and people could walk around in the garden and the greenhouse. Around 11 p.m., the garden was filled with people wanting to see the place at night and a substantial number of visitors passed by the plant and tried it out. We estimate that around 2,000 people had played with and touched the plant by the close of the event. After the event, the physical state of the plant was as good as before, and even though many people had engaged with it, every single one had been gentle and respectful to it.

*At Roskilde Festival:* Roskilde Festival is one of the biggest music festivals in Europe. Approximately 80,000 people participate as an audience over the period of a
The core entertainment at the festival is the live music from five main stages. The concert area opens three days after the camping area, leaving a period of limbo where people spend most of their time organising the camp in the daytime and in the night they create their own parties. During the night they drink what would, in most cultures, be considered a substantial quantity of beer.

We were asked to install the Singing Plant installation in the camping area for people to play with. We were expecting it to be a rough setting to have an interactive installation in (both because of the harsh weather and because of the rather energetic crowd of people), so we took great effort in securing the installation as much as possible. We created a house for the plant to be in and created an room where the electronics (Theremin, light controller, computer, effects processor, speaker, etc.) could be hidden. Further, guards were booked to make sure that participants behaved properly and to guide the participants to a proper interaction.

When I arrived after the first night, I was met by two frustrated guards. They had spent the whole night running after people who had tried to steal the plant and bring it back to their camp. I realised that I had not thought of securing the actual plant, but merely placed it in a hole in the ground, expecting people to only touch it. We made a construction that would secure the plant just enough to make it clear that one would actually be considered a thief if one attempted to steal it.

On the second day, the guards were much happier. They told me that there had been no attempts to steal the plant, and it had been running all night with a massive amount of people trying it and playing with it. However, when I entered the shed which housed the plant, I was met with only the stem of the plant—the rest was completely gone. My first thought was that the leaves had been ripped off, but the stem actually looked more like the plant was worn down from a very large number of playful and energetic interactions. I decided to buy six new plants, one for each remaining day of the festival.

For the remainder of the festival, I walked down to the installation every morning and replaced the used plant with a new one. Most mornings I would be greeted by people hanging out around the plant. Since nobody could touch the plant while I was calibrating it (I needed to find the baseline without touch), I had to ask people to move away from the plant and ask the most sober people to block the entrance. This became a recurring morning ritual where the participants would greet me as the caretaker of the magic tree.
45. The rudimentary securing of the Singing Plant at the Roskilde Festival.

46. Participant rubbing his crotch against the Singing Plant while eating a lettuce sandwich.

47. The Botanical Garden from the outside.
People started making up songs about the magic tree, singing or playing them while sitting around the plant; some even used the plant itself as a flute to play on, and sometimes this would be accompanied with other instruments such as a guitar. Others complained that I was torturing the plant because they had seen me connect a wire to it and they felt concerned about me electrocuting it. The most absurd scenario I experienced was witnessing a man eat a lettuce sandwich while rubbing his crotch against the plant so hard that it would scream loudly as he simultaneously synchronised his movements with taking bites out of the sandwich.

Comparing the two different contexts, it is my impression that the festival context (not surprisingly) proved to be the least-inhibited one from an interaction perspective. I enjoyed experiencing the level of engagement amongst the participants, but it was also clear that this level of engagement required a significant amount of maintenance on the installation. This maintenance was not a consequence of vandalism, but merely a consequence of vivid and sometimes brutal engagements. This assumption is supported by the observation that the plant was not stolen after it was mounted in the ground and none of the other elements (computers, speakers and lights) were removed or tampered with; if the participants wanted to actually take some of the other things it would not have been hard to do.

**INTERACTION PATTERN OF THE SINGING PLANT**

- The first thing the participants observed was a plant that was lit from above.
- If others were interacting with it, the participant would observe how the light changed in intensity and how the sounds would vary in pitch depending on how close the others would be to the plant.
- The participant would then approach the plant and try to figure out what was happening. This would normally consist of reaching out and touching one of the leaves. This would create a deep hum as a sound response.
- Sometimes it would require multiple attempts to make the connection between the sounds and the touch.
- Once the participant figured out that touch created the sounds, they would smile and start to engage with it more vividly.
- At this point, the participants would experiment with different kinds of touch: a dab, a stroke and touching the stem.
- When they touched the stem, a high pitch would appear as a consequence of the high capacitive connection between the participant and the plant. This would result in them pulling their hand back quickly and laughing as if they were covering their own chock.
- Some participants would notice that it would be enough to wave one’s hand around the plant without actually touching it. They would then experiment with two hands and start to sense the aura of the plant.
- If more than one participant would engage with the plant, they would at some point become confused about who was making the sounds. This would result in one participant asking the other to wait a little while the participant would engage with it. They would then start to take turns touching it.
- It would be common for the participants to have general conversations about the life of plants and what it means to touch a plant. It would not be surprising to hear them tell anecdotes of so-called scientific experiments which sought to detect the feelings of plants.
The Mediated Body at a conference

The second project to describe the significance of the context is the Mediated Body. In this case, the Mediated Body was presented at the new media conference Emerge and See in Berlin. Whereas the Mediated Body proved to be a success at Burning Man, we had a surprisingly hard time getting the same experience when we presented the suit at a conference. The setting was a rough industrial complex turned into a new media exhibition with artworks that used technology to reflect on mediated experiences. The audience consisted of individuals typically seen at exhibition openings: a mix of creatives (of varying ages) and intellectuals with a passion for art, new media and an interest in the ongoing debate about the role of new media art in society. We were invited to become a part of the opening evening where we would present the Mediated Body. It was our job to engage with the visitors in a playful way. We chose to use this as an experiment to see how the system worked in a gallery-type setting.

It was clear from the beginning that the performer stood out from the crowd. The participants gave him the nickname “the 90’s robot”. He stood out in the dark room because of the lights on his body. We sensed that the nickname was a compliment; all the while he stood out as odder than the rest. The performer engaged with several people and quickly became something that more people wanted to try out. Similarly to before, queues formed and people would wait their turn, although this was even more noticeable than normal. The performer described it as if the second person knew what to expect: “The second person is much more patient—he really wants the experience” and has time to wait while the headphones were adjusted, etc.

People would be interested in trying it out, but after a few sessions it became clear that the interactions were entirely different. They would try it out with almost mechanical precision. First initial touch, then prolonged touch, then a little play with aura. In the end, they would take off their headphones, take one step back and say something along the lines of “That’s nice—how does it work?” The intimate engagements where participants would laugh and smile were replaced with examination and evaluation.

After a couple of rounds, the performer wanted to try out a different setting. We tried moving outside to catch people before they entered the space, with the idea that people would take a different approach to it if they were not inside the actual room. However, once outside, we got the same rushed feeling wherein people would try it, be polite and ask about how it worked rather than engaging in the actual experience.

The performer became uncomfortable in the space. He felt as though people were sapping his energy and therefore was not at peace in the space. This was in contrast to the way he described the suit at Burning Man where the participants would, through the suit, enable him to feel energised even when he was tired and wanted to go back to his tent.

At the time the formal programme was coming to an end, we concluded that the system did not work very well in this kind of setting. The performer described it as if he, himself, was an art piece—a thing to be tried out like the other installations. He felt as though he became an entertainment piece and not an actual human being with whom others could relate. It was as if he had lost his magic power of disruption, and instead, became a performer who was expected to entertain the guests. This impression was further substantiated by where he was mentioned in the programme. He was listed under the category of performers, much like the musicians standing on the rudimentary stage in the corner.

When the formal show was over and the people started to pack down the equipment, a change in energy began to happen. In a sudden change, the performer had several constructive sessions where participants engaged with him, and at times, even quite loudly. This was partly due to the participants getting louder as they engaged in it and partly because the music was turned off at this point. The suit started to take over the space, and people allowed themselves to interact with it. The performer was back in his game.
Based on the different contexts presented in this section, it is apparent that the amount of exploration and the way participants engage with the installation greatly depends on the context they are situated in.

It is embodied in the way that it happens in the world, through the engaged participation of two equally embodied people, and against a backdrop of an equally embodied set of relationships, actions, assessments and understandings. This background situates the activity of the conversation. (Dourish, 1999, p. 8.)

As Dourish says, it is not the designers who determine its actual usage, it is a dialogue between the designers, participants and the situated backdrop. The Singing Plant became a fragile exhibition piece at the Botanical Garden much in contrast to the Roskilde Festival where it became a vibrant way to engage energetically with other participants. The Mediated Body suit proves to be highly effective in transgressing norms when it comes to playful settings and everyday public settings (see section 6.4), but it failed in the setting of the conference probably because the performer's transgressive role were nullified as a consequence of him not being out of the ordinary with what could be expected from the space. The situated “backdrop” was not a static entity, but a dynamic entity that changed over time depending on the formal programme, etc. What, in the beginning of the evening, would be considered an exhibition piece that people should assess more than experience became a playful experience as soon as the formal programme had come to an end. Therefore the backdrop should be considered much more than a static scenery in which the interaction unfolds, but rather a product of a multilayered mix of engagements, intentions and expectations that changes over time.
6.3. Insight: Create normative disruptions for social play

The Singing Plant gave the participants an installation to play around with, but it did not push the social boundaries of the space in any significant way. It tended to embed itself within the norms of the interaction space in which it was positioned. In the festival context, people would engage in vivid interaction with and around the plant, while in the Botanical Garden, it became an artifact of curiosity that one could try out with tender care.

The Ladies’ and Men’s Room Mixup installation proved to be significantly more efficient at creating a wider scope of interaction space for the participants to explore. The installation emerged as a comment on what we considered a tricky dynamic when it comes to engaging socially at a nightclub. Previous observations (and our own general experience) had led us to conclude that nightclubs in general lacked a common set of understandings of how one could engage in conversations with other people attending the nightclub.

People seemed to interact socially with others whom they already knew or who were friends of their friends. People immediately grouped themselves around tables and on couches or on the dance floor, and an invisible shield of privacy was created; requiring someone to have an abundance of courage to break into a group and start a conversation. One has to approach, begin a conversation, and somehow justify their interaction. The problem lies herein, since privacy, even in a crowded public venue, is a respected virtue and a stranger approaching and beginning conversation disrupts that privacy. (Carpenter et al., 2008, p. 4.)

Compared to other social activities there were limited opportunities for conversations about the rules and the setting in terms of participation. When one goes to a basketball court to play basketball, the ball and the game represent the social thing to gather around. One can openly ask what is the basis for participating and how to engage in it. For example, one could ask “What are the rules?” or “What team can I be on?” etc. Within the nightclub environment, one was left without such a “thing” to gather around and instead had to create one’s own opportunities to strike up a conversation.

To create something for the participants to gather around and engage in, we came up with the Ladies’ and Men’s Room Mixup. The system took a somewhat alternative approach to social interaction. Instead of explicitly re-defining the space, we went for the strategy of creating some kind of disruption requiring people to engage socially. This was inspired by the dynamic that happens when public transportation breaks down, and passengers immediately strike up a conversation about it; a conversation that would have been deemed inappropriate beforehand.

We approached this strategy of disruption by switching the gender signs on the female and male public toilets. The system consisted of two LED signs mounted on the female and male toilet doors. The sign at the male door would show an icon of a male and the sign at the female door would show an icon of a female. When five people had entered either of the rooms the icons would switch so the sign on the male door would show an icon of a female and vice versa. This would result in mixed genders in both toilets. The intention was to create confusion and facilitate communication between the genders.

We situated the installation at a nightclub called Inkonst in Malmö, Sweden. It is a place that hosts arts and cultural events during the week. While on the weekends, it is used as a discotheque. Inkonst has made it a part of its agenda to create a space in Malmö which embraces clubgoers with mixed backgrounds; everyone from local Swedes to second generation Muslim immigrants from Turkey, Iran, etc, are welcomed there. The system generated a wide array of interaction. As a consequence of the participants’ need to comply with the gender separation norms they were forced to engage with others. Whereas the participants would normally choose the toilet consistent with their gender, they now had to figure out which one would be deemed appropriate to enter. The mixed genders in both toilets made this process an unsolvable task based on normal conduct. This forced the participants to create alternative approaches to it. Commonly this would involve conversation and negotiation with people around them. The participants did not seem to mind the confusion. The situation would bring up a smile as they would engage in conversation with a group of mixed genders waiting to use the toilets with them. Quite a few participants even used it to their own advantage, by using the confusion as an opportunity to engagements with other participants.

I consider Ladies’ and Men’s Room Mixup the installation which most explicitly disrupted norms. Therefore I consider it a good basis for reflection on the role of norms and how norms should be consider as situated in a context. Most norms are tacit and not as explicit as the ones representing the “formal” signs placed on public toilets to separate them between genders, but nonetheless Goffman (1966) posit that most humans are skilled in decoding contexts we are situated in and
figure out what is considered the expected conduct within it. The appropriate conduct becomes the norms of that situation.

The significance of maintaining an occasioned main involvement can be seen, in relief, by examining what happens when an individual is insufficiently knowing to “catch” the meaning of what is going on. At such times he will have great difficulty in sustaining attention and hence proper involvement within the situation. (Goffman, 1966, p. 50)

If one loses the meaning in which one is situated, then it is becomes significantly harder to keep one’s involvement in the situation. Goffman’s example of this is that foreign students can have a tendency to doze off during lectures because of language difficulties. What is interesting to point out is how this deviates from the observations made with the Ladies’ and Men’s Room Mixup. What became apparent in the Ladies’ and Men’s Room Mixup experiment is that the participants wanted to decode the norms of the given situation. The main difference between the experiment and the example put forward by Goffman may be the socially playful nature of the situation. What Schechner (2006, p. 102) would call “this is play” is picked up by the participants in the situation and therefore embraced as such. I am aware that in the specific example of Ladies’ and Men’s Room Mixup one could argue that the need of using the toilet forced the participants to engage in meaning making. While this is certainly true, this does not explain extra engagements happening around them or the similar properties present in the other experiments such as the Mediated Body when used in the Berlin metro. With the Mediated Body, the strangeness of the suit communicated a playful vibe around the performer which invited the participants to approach him in a playful manner.

The moment of decoding the appropriate conduct becomes a moment of exploration, both in the sense of understanding the situation, but also for exploration of new possibilities within the space. When some of the participants took on the roles of guides for other participants, they were piggybacking on the situation for other interests than mere re-stabilisation of norms. If re-stabilisation would have been the primary motive for the participants, I would suspect that somebody would have disabled the interactive gender signs on the door and instead have written the right gender definition on them. Instead the disruptions became an opportunity to engage socially and playfully with other participants at the nightclub.

INTERACTION PATTERN OF LADIES’ AND MEN’S ROOM MIXUP

- Most participants would be confused when they encountered the mixed up situations inside and outside the toilets.
- They would then go into an exploratory mode with the intent of deducing the appropriate way of choosing which room to enter. This would either result in peeking into both rooms or approaching someone outside to get an idea of which room to pick. This resulted in different action patterns:
  - The toilet with the most of the same gender as the one peeking in would be chosen.
  - Often one could observe a smile on the face of the person trying to choose. At this point, they seemed quite happy to enter one of the rooms. It was as if they entered a forbidden space.
  - When they entered one of the spaces, they would usually try to make eye contact with the people around them saying something like, “Excuse me, this is confusing”. This would create small talk while they were waiting for access to the actual toilets.
  - Some participants who were hanging out outside the toilets would pick up on the confusion because people would ask them which room to enter. They would use it to their own advantage and hang out outside to strike up conversations with the opposite gender. They became local guides to the proper toilets. They were rather inefficient because their intention did not seem to be fixed on solving the problem. Instead, they would turn it into a longer conversation about which toilet to pick. The participant who needed the guidance did not seem to mind this.
  - The installation worked best when there was a balance between the amount of participants who were unknowingly victims of the design versus those who had understood the mix up and played along with it. If everyone knew about the installation, then the toilet gender separation would return to normal.
We as design researchers may not know the exact motivations behind the participants’ engagements, but it became clear through most of the projects in this dissertation that the disruptions of social norms became an efficient facilitator for what Gaver (2002) would consider designing for Homo Ludens:

In order to truly leave work behind, we need to embrace an open-ended, self-motivated form of play. This is an engagement that has no fixed path or end, but instead involves a wide-ranging conversation with the circumstances and situations that give it rise. (Gaver, 2009, p. 167)

He elaborates further with “Rules may emerge and goals may be sought, but these will be provisional inventions, makeshift tools to help the advance of curiosity and exploration.” (Gaver, 2009, p. 167). This exploration became a self-motivated exploration on its own terms. In this perspective “pleasure comes before understanding, and engagement before clarity.” (Gaver, 2009, p. 176). In comparison Explosion Village was a way of playing within a defined frame of play. The goals and the expected incentives (shooting of the gas cannon) were given by the designers for the participants as they entered the interactive space. The Ladies’ and Men’s Room Mixup, through the lack of purpose and incentive, moved into the space of what Sutton-Smith (2001, p 148) would consider playful “...would be that which plays with the frames of play.” Playing with the frame itself becomes a core property of Designing for Homo Explorens. The frame itself is thus explored for new and unexpected interaction potential for the participants.

To test the extremes of this boundary-pushing way of designing interaction, I created a rather simple interactive interface which invited participants to socially experiment with their own presence in the space. The concept consisted of two megaphones placed about 25 metres apart. The utterances that a participant would speak into one megaphone would come out through the megaphone at the opposite end and vice versa. This way the two participants would represent each others’ voices and use it as a way to engage playfully with each other. The installation was presented at the Click Festival in Helsingør. During the event, the installation was mostly untouched and rarely used for its purpose. Some participants would try it out but quickly leave. Further, it was rare to find participants at both megaphones at the same time. It was later used as part of a three-month-long exhibition wherein children would engage and have fun with it, yet it rarely moved beyond a mere artifact of curiosity to a more prolonged exploration.

I assume multiple factors contributed to the failure of the design (as a design for exploration). First and foremost, the symbolic artifact of a megaphone was much too intimidating to approach. It is common knowledge that using a megaphone draws significant attention to oneself in a social space. Further, whenever a participant dared to engage with it, it became difficult to achieve an actual dialogue simply because it was unlikely another person would be at the other end, leaving the engagement rather unresolved. Lastly, in a noisy space, it was surprisingly hard to pinpoint the source of a sound; this meant that sensing one’s own voice coming from another location than one’s own position did not have the desired experiential effect. What this exemplifies in relation to Designing for Homo Explorens is twofold. First and foremost, the social norm-breaking threshold of engaging with the design was too high for the participants to dare to go into a boundary-pushing mode of interaction. The system did not create a social distortion in the space for the participants, but merely gave them an opportunity to create it themselves. Secondly, the action forced the participants to put themselves on the spot. As I detail in the fourth insight in this chapter, there was no excuse to interact. They knew that a megaphone would create loud noises in the space and they had nothing to justify this action other than what could be viewed as childishness.

This boundary-pushing exploratory approach to social play is a type of play where the participants also put themselves as risk when engaging in it. The playfully innocent boundary-pushing situation around the Mediated Body became much more saturated when the same suit was used in the Berlin metro instead of at Burning Man. I will in the following section elaborates on what makes this possible.
After the experiments at Burning Man, several critics brought up the possibility of the suit only working in a socially-playful setting. A common comment would be that the suit would not work on a Monday morning on a bus. This became such a recurring theme in the feedback that we had to try it out for ourselves to get a sense of its properties within a space that would not normally be considered socially playful. We decided to try it out in the Berlin metro and on the streets of Berlin. Much to our surprise, we got a largely similar response as we had observed at Burning Man.

Our first experience happened when we were traveling to a predefined destination to try out the suit. The performer decided to wear the suit during transport in order to not have to carry a change of clothes. Upon entering the metro train coach, a girl immediately jumped up and asked the performer what he was wearing and why. The performer took this as his cue to jump into character and show her how it worked. Before I could take out my camera and film the session they were playing around with the suit. She was laughing loudly, asking him many questions that he could not answer partly because she was speaking in German and partly because they were both wearing headphones. For a few minutes, they became an odd couple in the everyday setting of the metro. It was clear that they were now the centre of attention, as the other passengers looked curiously upon the interaction. They became observers of something they did not understand because they could not hear the sound coming from the headphones. All they were left with were the laughs, the smiles and the touching.

What in the beginning we had considered awkward—the performer wearing his strange costume in a normal setting—made him stand out even more than at Burning Man, where it would be common to see people dressed in strange costumes. It was clear that the costume managed to strike the right balance between being out of place, yet not so much out of place that people would not engage with him. The suit managed to start the conversation, and the aura detection system guided the interaction from the beginning, even before the performer was mentally prepared for the interaction.

This became a recurring experience. We would walk around the streets and jump from coach to coach playing with people we would encounter by chance. Sometimes, people would engage on their own and sometimes the performer had to take the initiative to start the bodily exploration. Occasionally, we would see people entering the same metro coach as the one we were entering just to look at the suit. As soon as the train rang the bell to indicate it would start moving, they would jump out as if they never actually intended to ride the train. Above ground, it seemed as if he were a moving bubble walking through the street. From a distance, others would detect that something extraordinary was happening in his presence. If you chose to step into the bubble, you were no longer in the grey, mundane atmosphere that surrounded him and everyone else. He would be radiating playfulness.

To challenge the suit’s potential to engage with strangers, we looked for people who we figured would be the most hesitant to engage with the performer. The performer chose to engage with an old Turkish man sitting outside a café and asked if he wanted to try out the experience. Although he decided to try it out, it did not create an interesting energy. At another point, we approached a group of young, cool-looking guys who were hanging out in a park who managed to appropriate the system by focusing the discussion on creating beats. One guy would try it on and talk about how he was making music, and then the others looked interested and thought it sounded like a cool idea. Overall, it became impossible to predict the level of engagement depending on demographic properties. The performer had plenty of random experiences with all kinds of people (gender, age and cultural heritage). The most common denominator for high level engagement was a result of the participants who took their own initiative. In the situations where the performer took the initiative, it required more work for him to engage them.

Females seemed to be more comfortable with engaging than males. This was similar to the dominant intergender relationship we had observed with the suit at Burning Man. It can be assumed that this property is a consequence of a cultural norm on intergender intimacy in public spaces. It may be that intergender intimacy is deemed socially more appropriate than same-gender intimacy. This reflection has a potential for a larger discourse around gender roles in society that I do not intend to tackle within the frame of Designing for Homo Explorens, but must acknowledge its presence. I invite other academics to further contemplate this based on the designs presented in this dissertation.

When the performer took the initiative to engage with people, he often needed to unfreeze the situation. This was especially common when the performer approached a group of people. In this situation, he would announce his presence to the whole group, then he would engage in a conversation about the magical properties of the suit and how they should try it out. Usually everyone would be hesitant, but at some point, one person in the group would step forward. The
50. The Mediated Body in the Berlin metro. A participant is highly engaged in the interaction while others in the metro observe.
participant would smile as he realised that his body was reactive to sound. This would normally result in a short play session where the participant would take off his headphones and say something like “This is cool!” This would trigger somebody else in the group to try it out, as the first person had endorsed the experience. In a group of three to five people, most people would experiment with it. The interactions would become more vivid for each session, as the participants grew more and more comfortable with the performer’s presence. Throughout the experiments, it would spark small conversations about its possibilities and how it worked. When half of the group or more had tried it, the person who tried it first would ask to try it again. It seemed as if they had missed out on all the details about aura and different ways of touching the first time around. One could say that the first person provided approval for the rest to do their exploration which, in return, would inspire him to dare to be more immersed in the experience.

A session would usually end with the participants wanting to talk to the performer. When this happened, they would consistently have to take a step back as if they physically moved out of the intimate bubble and back into the default world. In this change of mode it would be necessary to retrace the steps of what would be considered appropriate in the space they were in. This would result in the participants asking what I would classify as traditional first-impression hand-shake questions like “Where are you from?” and “What is your name?” It became what I would consider decompression from the intensity of the interaction they had just experienced. This is the same effect as the one we observed when we first tried out the suit at Burning Man and the effect described as “post interaction” in the generic interaction pattern description in chapter 5. The high contrast between the playful atmosphere around the performer versus the everyday life norms it was situated in enabled the suit to create a parallel universe in which people were allowed to engage much more intimately. This parallel universe can best be described as what Salen & Zimmerman (2004) has named the “magic circle” within game design. The concept of the magic circle comes from a quote from Huizinga:

All play moves and has its being within a playground marked off beforehand either materially or ideally, deliberately or as a matter of course. Just as there is no formal difference between play and ritual, so the “consecrated spot” can not be formally distinguished from the play-ground. The arena, the card-table, the magic circle, the temple, the stage, the screen, the tennis court, the court of justice, etc., are all in form and function play-grounds, i.e. forbidden spots, isolated, hedged round, hallowed, within which special rules obtain. All are temporary worlds within the ordinary world, dedicated to the performance of an act apart. (Huizinga, 1939/1998, p. 10)

Much criticism (See Stenros, 2012, for a discussion on this topic) has been put forward by the game community about Zimmerman & Salen creating a too strong distinction between the inside and the outside of the magic circle. Zimmerman (2012) later described it as a tendency to read the concept too literally. Within the Mediated Body and Touchbox, it is clear that the designs managed to expand the social norms of the possible interaction space. However, this does not include an all-encompassing parallel world. I will go more into detail about this in chapter 7 in relation to performative frames and performative immersion.
6.5. Insight: Create an excuse to interact and transgress norms

When designing to distort social norms, there is always a concern for ethical boundaries and whether a certain design would go too far. One could imagine scenarios that would push the boundaries of the participants’ comfort zones. Very few people would be comfortable with exposing their body on a Monday morning on their way to work or maybe even exposing their own arousal in the form of a too-long laugh when touching the biceps of the performer. For this reason, the performer was hesitant to use the Mediated Body in the beginning. He was worried that the headphones would prevent the participants from comfortably exiting the interaction since the wire would tie the two together physically. He argued for a redesign in which we would mount speakers on his body instead and broadcast the sound to the two and their surroundings. After a day of experimenting with the suit, he came back and told me that he loved the headphones for their immersive qualities and that he did not see them as a problem anymore; he had found a way of engaging that reconciled with his ethical boundaries. In general, there were two types of situations in which the participants would want to exit because their comfort zones were pushed too far.

1. The performer would naturally sense when the boundary had been reached and take off the headphones so the participant could exit. Sometimes this would lead to a small conversation in which the participant asked to play further and wanted to wear the headphones again. The performer would always encourage the participant to engage with him instead of he engaging with them. He would do this by holding out his hands so the participants could touch him. In this way, he left it up to the participants to guide the interaction and the level of intimacy at their own pace.

2. On rare occasions, the participant would be so shocked to hear the sound of his own touch that he reacted by moving away as fast as possible. These situation happened rarely and would normally lead to what the performer described as comical rather than an awkward situation. Since the performer and the participant would be connected through the wire of the headphones, the performer would have to run after the participant and try to gently pull off the headphones. This scenario often ended in smiles and laughs, rather than actual boundary-pushing experiences.

Gently pushing the participants’ boundaries through the installations became apparent as a necessity to trigger social dynamics happening around the installation. From the beginning of our exploration with the Medusae Nilfisk installation, we observed how the interaction of holding hands and meeting new people became just as interesting for the participants as actually triggering the gas cannons. It became an excuse for interactions that could not otherwise be articulated. In most of the installations the participants were willing to trade in some of their control over the situation for the chance to engage with people without having to rationally justify their interaction. This resembles the qualities present in teenage games like Spin the Bottle and Truth or Dare (Salen & Zimmerman, 2004). In the case of Spin the Bottle, the participants can use the game to masquerade their own intentions. Kissing someone is not a matter of their own desires, but merely a matter of following the rules. This property was even more immediate with the Ladies’ and Men’s Room Mixup, where the participants would become victims of our design. They would be forced to engage in the situation simply because they had to figure out the norms of which toilet to use. We had broken down the tacit norms of gender separation in a way that forced them to engage socially.

Awkward situations create the need, rather than the desire, to communicate. This can be used as an excuse for creating contact. Normally restrooms in public spaces are divided between genders. Only two signs, male and female, define the difference between these two rooms. These signs are treated with great respect; it would be controversial if a male entered the room with a sign of a female on the door. By switching the signs females would involuntary walk into a restroom filled with males and vice versa - they would unknowingly and unwillingly be victims of our design. (Carpenter et al., 2008, p. 2)

Through our experiments, it became clear that by becoming victims of our designs they were allowed to explore much more freely, and they did not feel as if they had to justify their actions. The social disruption gave them an excuse to interact. Another excuse became the internal complexity of the systems in cases like the Mediated Body. Touching someone else’s body could always be justified by the fact that they had to figure out how the system worked and what to do with it.
6.6. Insight: Create a space for negotiation of meaning and appropriation

Although the Mediated Body proved to be a success in the sense of creating highly immersive and intimate interactions, it left a key question for further exploration. I wondered about the role of the performer: could it be that our success was due to the charming and engaging personality of the performer more than the touch/audio technology itself? Since a person had to wear the suit, there would always be a discrepancy between the roles of the two. The one wearing the suit would always have extended knowledge of how to interact with it and how to stage the interaction.

To explore this question, I created the Touchbox. Touchbox was based on the same technological principles as the Mediated Body, but instead of it being designed as a suit for a performer to wear, it was designed as a box that let two novice participants (through a pair of headphones) engage at the same time. The box looked like a cross between a vintage snake-oil commercial and an Electropsychometer used in Scientology.

Overall, the Touchbox possessed similar qualities as we had observed with the Mediated Body. The participants would have the same spark in their eyes when they realised that they were sound-reactive. The qualities of aura would be explored greatly and the participants commented that the aura was one of its most enchanting qualities. Further, the sensation of touching without touching became a recurring joy for the participants, and it seemed as though the lack of a performer (and his potential influence) created a somewhat more honest interaction. The participants had to find their mood together instead of going along with the mood of the performer. This created varied interactions, from daring and intimate boundary-pushing interaction to more silly interactions. Occasionally, I observed participants who did not feel comfortable in the situation; they would usually turn it into a more critical reflection on the technology itself.

Acknowledging that meaning is constructed collaboratively by people in situated contexts has been one of the arguments for the 3rd paradigm in HCI (Note that the concept of the 3rd paradigm is distinct from, and slightly more precise than, the better-known notion of ‘third-wave HCI’ coined by Bødker (2006) at approximately the same time):

The 3rd paradigm, in contrast, sees meaning and meaning construction as a central focus. It adopts the stance that meaning is constructed on the fly, often collaboratively, by people in specific contexts and situations, and therefore that interaction itself is an essential element in meaning construction. Meaning derives from information, of course, but in this perspective cannot be summed up by mapping information flow; it is, instead, irreducibly connected to the viewpoints, interactions, histories, and local resources available to those making sense of the interface and therefore to some extent beyond the reach of formalization. (Harrison et al., 2007, p. 7)

The meaning of the Touchbox was not embedded in the actual design. The meaning was created as a negotiation between the participants interacting with it (and the observers, but that will be discussed in the next chapter). From a social science point of view, this may be a well-established concept, but we still need to understand how to design for it. From the perspective of Designing for Homo Explorens, the meaning of the exploration is left to the participants to figure out. Designing for it then becomes a way of creating opportunities for them to explore new meanings. When the situated norms are disrupted, we leave room for new meanings to appear. As Dourish (2004, p. 116) puts it “meaning […] is to be found in the world in which we act, and which acts upon us”. For it to be explorative it is necessary to create ambiguous situations where the answers are not hidden, but need to be negotiated by the participants.

Tieben et al. (2011) made cow sounds in the hallway to create curiosity, but the cow sounds did not make an ambiguous situation. At most, it made an ambiguous sound in the current context. This is similar to Gaver et al.’s (2003) notion of ambiguous interfaces creating exploration with the interface. By moving from ambiguous interfaces to ambiguous situations, it is possible to create more-complex exploration patterns that do not end with an “Aha!” moment but instead, end with a new, shared understanding or a new experience for a group of people. In this context, the “Aha!” moment should be understood as a consequence of exploring an ambiguous interface. At some point, one figures out the workings of the system and there is nothing left to explore.

In the case of the Ladies’ and Men’s Room Mixup, the agendas and interests among the participants were socially ambiguous: some wanted attention, some wanted to peek into the private space of the opposite gender and some wanted to use the toilet. This socially ambiguous situation seemed to create a rather alluring experience for the participants involved. This is similar to the Mediated Body, which created a dialogue between the participants on multiple levels: exploration of the interaction aesthetics of the sounds of touch, plus the...
Two participants explore the sound possibilities of the Touchbox. The focus is on the sound their touch generates. The Touchbox was designed to look like a snake-oil device from a retro steampunk world. The meter would react to the amount of touch and the light bulb would change its intensity of flickering.

experience of transgressing intimate boundaries with a stranger. One can therefore design socially-engaging spaces that transgress the norms usually situated in the space and open up new exploration possibilities. These may, at first, seem daring to the participants, but gentle enough that the alluring experience becomes an engaging takeaway for them.

A key part of sense-making is relating an experience to previous and future experiences. In appropriating an experience we make it our own. We relate it to our sense of self, our personal history, and our hoped-for future. We may change our sense of self as a consequence of the experience, or we may simply see this experience as "just another one of those." (Wright et al., 2008, p. 7)

It is up to the participants themselves to find their own appropriations of the experience, and the question then becomes one of how the designs mediate this role, which is elaborated in the next insight.
TOUCHBOX IN USE

(Hoby, 2012, p. 1025)

In this section, I provide an account of the Touchbox in use. The style is that of a personal narrative, in order to better convey the experiential qualities of the Touchbox.

Setting: I brought the Touchbox to an underground-style costume party with the theme of ‘Art in Heat’, in which 150 guests gathered in flamboyant costumes on an old barge in Copenhagen harbour.

The setup: Finding the right spot involved striking a balance between being a part of the party and being far enough away for the music to not interfere. However, the spot I picked turned out to be too indistinct. People were not naturally engaging in the installation nor asking questions about it simply because they didn’t notice it. This may have had something to do with the tiny size of the box compared to the noisy space it was placed in. I was required to ask someone to grab random people and pull them over to the box to try it out.

First experiment: The first people to appear were two females, both quite hesitant and uncomfortable in playing with the box. It became an odd moment where I didn’t manage to make a good and playful situation, and they did not take on the challenge on their own initiative. They played a little, but it seemed as though they were just being polite rather than having an enjoyable moment.

Putting on a show: When the next two people came, I decided to take on a performative role and tell an elaborate story about this being a scientific experiment in which the box would read their aura and how well they connected with each other. After careful calibration, they played with the box for a while, and seemed to thoroughly enjoy the moment. This scenario consisted of two men, and they were surprisingly comfortable playing with each other. It was a joyful moment between two people exploring the possibilities of the box as if it were an instrument.

Becoming viral: At this point, people had heard about the experiment or seen other people try it out, and new participants began to show up voluntarily. It was tried out with six more pairs; all of them had an engaging experience exploring the system. Occasionally, people would move from innocent to more sensual play: kissing, coming close and even touching more intimate parts. This usually resulted in laughs and moments of time out, where they would just look into each other’s eyes.

I had put significant consideration into creating possibilities for aura in the Touchbox, and it turned out that many participants started playing by touching the air. Some noted that it was amazing to play without actually touching. The aura clearly sustained the interaction and gave a more magical feeling to it.

Some participants played for a long time, and most participants needed a conversation afterwards. They needed to decompress and come back to the outside world, understanding how the box related to them and the meaning they gave it; however, I noticed that they often seemed to lack the vocabulary to say what they wanted to say. Therefore, I took the time to explain the inner workings of the system and how other people experienced it.

Most importantly, the Touchbox showed that it is possible for two pristine participants to get an engaging experience together in a manner similar to how a performer knowing the system would play it with a participant.

However, it must be noted that the role of the performer was not completely out of the equation. The participants needed to be introduced to the system in a way that also set the mood of the experience they were going to have. To this end, participants who tried the Touchbox for the second time tended to take on the role of a guide, showing their partners different ways of playing and the more subtle nuances of touching the air.

Another tentative conclusion is that the interaction seemed more honest and fragile than with the Mediated Body. With Touchbox, it was entirely up to the participants to set the mood and energy of the interaction which went from fragile, passive moments to energetic and playful moments of joy.
6.7. Insight: Create hybrid mediators for rich, explorative interaction

As argued in the previous section, Designing for Homo Explorens focuses on creating socially-ambiguous situations instead of simply ambiguous interfaces. If the emphasis is on the social interaction, what are the roles of the designed artifacts and how do we design for these scenarios? The internal complexity and the experience in use, and how these play heavily on the context they are situated in, turn them into more than mere interfaces for interaction. I posit that it is more generative for the design process to consider them mediators of the interaction. However, they are not mediators in the sense of a classic information transfer paradigm (Shannon & Weaver, 1948/1998), but instead in the sense of the installation becoming a mediator or co-player in the playful interaction—with it, around it and through it. Dourish (2004) shifts the focus to consider the computation as the medium instead of the computer.

Because meaning is being transferred and shared through interactive technologies, the first principle that can be drawn out from the model of embodied interaction is that computation is a medium. […] What I want to do here is to consider the idea of computation, rather than computers, as a medium. Meaning is conveyed not simply through digital encodings, but through the way that computation enlivens those encodings with semantic and effective power. (Dourish, 2004, p. 162 - 163)

By considering the computation a medium, it becomes an active part of the interaction, where the computation can modulate and transform the data transferred. In this perspective, the computation is able to modulate, amplify and transform our own activities instead of merely being a medium of information transportation. The internal complexity present in most of the installations can be seen as such computation of the medium. To understand the designed artifacts from the perspective of computational mediators requires us to discuss the different types of roles in the exemplars presented in this dissertation.

1. Exploration with and around the installation (see figure 53): The simplest type of mediation is direct interaction with the installation. Here the non-trivial, internal complexity serves as a way to explore the possibilities of interaction. In social settings, this can enable playful scenarios where participants play with the installation as well as around it.

A simple example of such an installation would be the Singing Plant. The participants explored the installation to understand the novel connotation of the installation. The interaction became one of engaging with the installation and sensing how it responded to different types of touch. The sound responses to the touch would invite the participants to reflect on their relationship to it. Therefore, the type of interaction depended on the responses the participants got from it. The sounds could (as mentioned in chapter 4) invite gentle or more aggressive interactions depending on the type of sound responses the participants received. Since touch could be modulated in such a way, the design becomes a mediator of the interaction in the sense of Dourish (2004).

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2. Exploration through the installation (see figure 56): Playing through the installation resembles a traditional media perspective in which the participants are not able to interact any other way than via the interface. The difference is in the incentive. It would normally be in the interest of making the communication as transparent as possible; however, within Designing for Homo Explorens the interest is in limiting or distorting the information in such way that it creates curiosity for exploration. Two cases within the portfolio have played with such a strategy:

In the case of Hydraphonia, the installation consisted of three installations placed in three different cities, and each installation would broadcast some of the interactions to the other cities. This broadcast intended to create a mediated presence between the participants in the respective cities; they could play together.
across inter-city boundaries. In reality, the interaction became more like parallel play or ghost play than direct engagement. The participants would focus on the interaction at the playground they were present at, while some of the responses from the installation would stem from people playing in another city. The concept of mediating and the internal complexity across distance did not prove to be a success, most likely because of the inherent challenge of understanding what they were interacting with, and participants never got a clear sense of the connection between the cities.

In the case of Find My Twin, we designed two identical boxes. They both had a little lens on top of them. Through the lens one could see a small display that would show a virtual arrow that looked like a compass, but it did not point north, instead the arrow would point to the other box. Therefore if one walked in the direction of the arrow one would eventually end up at the same place as the other box. The boxes each had a compartment that could only be opened when the two boxes were together, because the codes for the respective combination locks were placed on the opposite box. The compartments served as prizes or treasures that could be accessed when the two participants carrying the boxes had found each other.

To try out the boxes we placed them at two different locations in a relatively large park. We had invited two persons to engage with the boxes. The two did not know each other and they did not know the purpose of the boxes themselves. Instead they were asked to explore the box in whichever way they wanted. After a couple of rounds around the park the two participants ended up meeting each other at a bridge in the middle. They realised that they had identical boxes and they started figuring out if they could share the codes to open the boxes. Inside the boxes they were presented with the reward of a beer and two glasses. This represented the reward and the opportunity to celebrate having solved the task.
The design possesses conceptual qualities on interactions that invite strangers to find each other in public spaces and how to create a shared experience, but significant dimensions were left out for it to become a viable design solution. The whole setup of the boxes required a rather tedious preparation. They had to be placed apart from each other and “reset” to new positions every time two participants had engaged with them. Further there was no guarantee that two participants would start to engage with the boxes at the same time. This could result in situations where a single participant would find another box instead of meeting a stranger. Finally, the mediation is in the best case scenario limited to finding another person. The exploration itself as an open-ended sense-making and meaning-making is not present in the properties of the design. Similar to the argument put forward in chapter 5 the interaction became more of a structured narrative with a reward (the opening of the boxes) in the end, than a social exploration of meaning making.

Find My Twin and Hydraphonia did not spark a level of engagement and exploration that would classify them as successful within Designing for Homo Explorens. It was clear that the abstract interaction through the installation prevented the participants from engaging in a way that would make sense of each other’s exploration in real time.

3. Exploration through and around the installation (see figure 57): Allowing the participants to interact through the installation in a shared setting proved to be the most fruitful approach to an engaging exploration. In this setup, they still had the visual (and sometimes physical) understanding of what the other participant was doing, all while letting the installation act as a mediator of the interaction. The physical setup with the Mediated Body suit and the Touchbox proved to be ideal for this double-layered scenario. The suit and the box served as a soundwave interpreter of the physical connections and auras of the participants. The headphones forced them to interact through the sounds of the device, which left body language as the only way to interpret each other’s comfort zones. This hybrid setup enabled rich physical contact, whilst allowing the designed artifact to mediate the interaction with sounds through internal complexity. To understand the qualities of hybrid mediation, it is necessary to elaborate further on the role of mediation. Dourish’s argument for computation as mediation is relevant, but leaves little space for understanding engagement with the artifact and the effect it has on exploration. As he later points out, Verbeek & Crease’s *What things Do* (2005) is “one component that I would most certainly want to incorporate, seeking as he does an account of mediated interaction that discharges the sense of inauthenticity that is manifest in Heidegger” (Dourish, 2013). Verbeek & Crease introduces an account on mediation with a more experiential perspective:

From a hermeneutical perspective, artifacts mediate human experience by transforming perceptions and interpretive frameworks, helping to shape the way in which human beings encounter reality. The structure of this kind of mediation involves amplification and reduction; some interpretive possibilities are strengthened while others are weakened. From an existential perspective, artifacts mediate human existence by giving concrete shape to their behavior and the social contexts of their existence. This kind of mediation can be described in terms of translation, whose structure involves invitation and inhibition; some forms of involvement are fostered while others are discouraged. Both kinds of mediation, taken together, describe how artifacts help shape how humans can be present in the world and how the world can be present for them. (Verbeek & Crease, 2005, p. 195)

This defines mediation as part of a general meaning, whereas sense-making is an active component situated as a part of a context. What is most important for our reflection is to look at it on the two levels of micro- and macroperception:

What is usually taken as sensory perception (what is immediate and focused bodily in actual seeing, hearing, etc.), I shall call microperception. But there is also what might be called a cultural, or hermeneutic, perception, which I shall call macroperception. Both belong equally to the lifeworld. And both dimensions of perception are closely linked.
and intertwined. There is no microperception (sensory-bodily) without its location within a field of macroperception and no macroperception without its microperceptual foci. (Verbeek & Crease, 2005, p. 29)

The microperception is the actual embodied engagement. The macroperception becomes the actual engagement as situated in the world. It is necessary to look at the mediation on both levels and it cannot be separated:

While it is true that microperception and macroperception can be distinguished from each other, they cannot be separated. A bodily perception can no more exist without being interpreted than an interpretation can exist without something to be interpreted. (Verbeek & Crease, 2005, p. 123)

On the level of microperception, it is about engaging explorative interaction. Chapter 4 elaborates on this, by looking at the interaction possibilities of internal complexity, and in chapter 5, I argue for full-body engagement as a significant part of this exploratory experience. The internal complexity plays a significant role as a mediator of the social dynamics around the interaction. As argued for in the internal complexity chapter, we went through multiple iterations of the code before we found a reaction pattern that matched the ideals of the type of interaction we found interesting. Specifically, we tried to add a complex-enough interaction space for the installations to be interesting to engage with. With the Singing Plant, it became an interest in creating enough variations for the participants to be interested in different ways of touching. Similarly, we were not satisfied with the code for the first version of the Mediated Body. It invited the participants to explore the frequency of hitting, which quickly turned into a rather violent experience; it was as if the participants had forgotten that the object they were hitting was another human being. This resulted (for obvious reasons) in the performer not feeling comfortable in using the suit and we had to redesign the software patterns to engender more subtle interactions. The second version of the software was designed to create softer nuances when almost touching or touching gently. Technically, this was done by changing the sound qualities of the different parameters so the activity parameter did not play as important a role in the overall soundscape. With the second version of the software, we managed to change the overall experience and the performer had countless experiences of interacting with people where the internal complexity guided the mood of the interaction in a more intimate and poetic direction.

On the level of macroperception, the mediation becomes one of mediating the actual setting the design is situated in. On this level, the designs within Designing for Homo Explorens distort the situated norms of the space. With the Mediated Body, the macroperception level becomes the novelty of visual presentation and interaction as it deviates from what is expected in a metro train car. Similarly, the strength of the Ladies’ and Men’s Room Mixup is a consequence of the mediation on the level of macroperception, in that it distorts the social gender norms based around public toilets.

The reason the hybrid form of mediation described above seems to work better is because it simply accommodates both the micro- and macroperception of mediation. Some of the interaction is mediated through the system, but meaning is created as a hybrid of interactions happening through and around the system situated in a complex environment. Without the double layered approach of the hybrid mediation, the system does not create a rich-enough interaction for it to be interesting for the participants to explore. On a similar note, this aligns well with why designs across distance (Hydraphonia and Find My Twin) did not spark the same level of exploration. On the level of microperception, they became too abstract and did not create an interesting coupling. On the level of macroperception, the participants had no way of creating a shared understanding of each other’s involvement in the interaction space, and they became disconnected from each other. What this means in relation to exploration is that the richness of being situated in a shared space becomes crucial to the emergence of exploration as a part of the interaction.
6.8. Interlude

In this chapter, I have defined exploration as something that is situated within a context filled with as many agendas as there are people in it. In this mix of situated agendas, meaning is created as a constant negotiation between the people, the setting and the norms. I have used norms as a way to describe common expectations within a situation; they are not directly embedded in the context, but a consequence of a social and cultural construct. I have argued that disrupting the norms can lead to new openings for meaning-making and new opportunities for exploration. This has enabled me to move beyond a purely individual perspective of curiosity and instead see it as something that happens in a social situation.

For exploration to happen, I have argued that one needs to design for social ambiguity instead of only ambiguous interfaces. Although this distinction can be seen as minute, since ambiguous interfaces can lead to social ambiguity, I hope that the different cases presented exemplify the power of designing from this perspective. The explorations exist as part of an overall social playfulness; therefore, I align myself with the concept of Designing for Homo Ludens. However, the main difference is that Homo Ludens focuses primarily on creating play for the sake of play itself, whereas Designing for Homo Explorens has exploration for the sake of collaborative meaning-making as its primary motivator. The play aspect therefore becomes a constructive side-effect of the actual exploration.

Finally, I argue that the designs take on the role of mediating the interaction. In this mediation, many people engage with, through, around and parallel to it. This is a hybrid type of mediation where micro- and macroperception is concurrently at play. If the mediation becomes too abstract, the richness disappears leaving the participants confused instead of engaged in the exploration.

This serves as a basis for the final aspect of my manifesto in which I detail the performative role of the participants. Of particular interest is the possibility of enabling the participants to take control of their own meaning-making situation and play out their own narratives based on their own agendas.
performativity
frames
Create performative artifacts that convert initial curiosity into exploration

Create multifaceted roles for potential engagement

Create a frame for performance

Create a frame for performance
7. Aspect: Create a frame for performative interactions

7.1. Introduction

We have now reached the fourth and final aspect within the manifesto. It seeks to gain a greater understanding of the performative role of the participants in relation to social exploration, building upon the previous chapter’s argument for social exploration as a part of an ambiguously-situated meaning-making process. In this meaning-making process, the participants create their own performative roles, and explorative dynamics emerge around the installations as a consequence of this. In this chapter, I want to unfold what this performative dimension means in relation to Designing for Homo Explorens and how one can design for it. I argue that it is necessary to be aware of two performative dimensions: the participants taking on a performative awareness and some participants taking on performative roles which actively shaped the meaning of the interaction in dialogue with the other participants.

As Schechner points out, everything is not a performance, but “[a]ny behavior, event, action, or thing can be studied ‘as’ performance.” (Schechner, 2006, p. 40). Therefore, the designs presented in this dissertation can be studied as such, even though they are not performances in the traditional, theatrical sense. They are performances in the sense that Goffman would consider “performances of everyday life”:

The legitimate performances of everyday life are not “acted” or “put on” in the sense that the performer knows in advance just what he is going to do, and does this solely because of the effect it is likely to have. The expressions it is felt he is giving off will be especially “inaccessible” to him. But as in the case of less-legitimate performers, the incapacity of the ordinary individual to formulate in advance the movements of his eyes and body does not mean that he will not express himself through these devices in a way that is dramatized and pre-formed in his repertoire of actions. In short, we all act better than we know how. (Goffman, 1995, p. 59)

The performative elements present are not rehearsed or scripted; instead, they are a consequence of the social interaction happening with the installations, wherein the participants invent new ways of engaging with the situation based on cues from others and their own repertoire of actions. Goffman argues for the inaccessibility of the performative dimension from those that exercise them. This makes sense when the performative element is embedded in an everyday routine, but within Designing for Homo Explorens, a certain level of awareness is present and is a consequence of the novelty of the situation that the participants are engaging in. This awareness is described by Dalsgaard & Hansen (2008). They make a distinction between three roles a participant can have when present in an interactive space: the participant can be a spectator, a performer or an operator, and possibly all at the same time. The participants take on a performative role when they become aware of their own actions:

[...] we will argue in this article, the ways in which the user perceives and experiences the act of interacting with a system under the potential scrutiny of spectators greatly influences the interaction as a whole. We will argue that it is precisely this awareness of the (potentiality of a) spectator that transforms a user into a performer. (Dalsgaard & Hansen, 2008, p. 6)

This pinpoints a couple of important distinctions when it comes to the performative roles of the participants within Designing for Homo Explorens. Firstly, one can have multiple, simultaneous roles and the performative dimension is a consequence of being aware of others observing one’s actions. The second point requires a little more reflection to make sense within Designing for Homo Explorens. Although it is true that some level of awareness can be a significant part of the participants in a performing role, it is too broad a perspective for it to be the only performative dimension within the realm of Designing for Homo Explorens. Since most of the designs within this dissertation play with some level
of discomfort to push the participants’ awareness of their own actions, most participants could be classified as performers. Participants who are only aware of their own actions are not necessarily interested in being performative; for example, a participant who might try to sneak into one of the toilets in the Ladies’ and Men’s Room Mixup installation might have the agenda of raising as little as possible awareness of their own presence. The participants would therefore be very aware of their own performative role, yet not actively shaping the interaction with other participants. In contrast, a few of the participants took on a more active role which shaped the social dynamics happening around them. Goffman takes us closer to a definition of the performative patterns observed in the designs present in this dissertation:

A ‘performance’ may be defined as all the activity of a given participant on a given occasion which serves to influence in any way any of the other participants. Taking a particular participant and his performance as a basic point of reference, we may refer to those who contribute the other performances as the audience, observers, or co-participants. (Goffman, 1959, p. 8.)

Therefore, the performative role within Homo Explorens happens on two levels: one is a general performative awareness of navigating the space, and the other appears when the participants take the performative action of actively shaping the social dynamics happening around them. They engage in meaning-making with the other participants which becomes more than simply figuring out which public toilet to use; instead, it becomes an active negotiation with the norms of the space. Who is allowed in which toilet? And is it okay to mix the genders in them? In this discourse, their motivation stems from altering the situation for the sake of their own desires in them. The participants would put themselves at risk while shaping the meaning with other participants on what to do, how to do it, and why one should do such a thing. This is expressed verbally and physically, but mainly it is expressed by shaping the situation itself. The performative action of shaping the space becomes a social one as a consequence of it being a part of a shared meaning-making process with the other participants; however, it is not for everyone to become performative, but for the active few. Within this active role, they are simultaneously performing and being themselves as a part of actively making their own meaning of the situation.

Since this performative role consists of the participants’ own impulses and desires, it is not a set of predefined narratives embedded in the designs themselves; however, it would be remiss to not give some credit to the designs as the prime movers of the synergies happening around the installations. It emerges from the normative disruptions that the designs create and, as such, has some relation to approaches to performance that are based on emergence:

Emergence is an openness, not a guarantee of results. It is ‘a shimmer of forces’ (Thrift, 2007) that may or may not produce. A shimmer is distinct from a judder, a shiver or even a ripple. It is not just a kinetic oscillating pattern, but a particular combination of kinaesthetic, perceptual, imaginative and affective that has a quality of unpredictability or magic. Like performance. (Kozel, 2012)

Kozel (2012) reflects on performative emergence from the perspective of affect whereas the emergence within Designing for Homo Explorens comes from actions and social shaping. This emergent social structure presents itself through made-up roles that stem from the social dynamics that the designs facilitate. The more roles the designed interaction space can accommodate, the more roles the participants can engage with to become a part of the social interaction. Done right, this can lead to a multilayered exploration space. The question thus becomes how can we design for this, since the performative dynamics are consequences of the participants’ willful and active engagement in the group dynamics. I suggest that we design performative frames. The performative frame is thus a design perspective that enables us to be aware of the potential performative dynamics that can emerge in it. This is both at the level of performative awareness of the social distortions, as well as allowing the participants to engage with shaping the meaning from their own desires as a social meaning-making process.

One could argue that the role of the designers and researchers is a part of the performative frame since they constructed the experiments and took an active role in facilitating some of the processes. However, as the installations were designed so that they could just as easily operate without the active role of the designers, I have deliberately chosen to exclude their roles in this chapter. The self-sustainability of the installations therefore positions the designers outside the performative frame. If the design-researchers had been included in this chapter, it would have shifted the focus of the chapter to a general reflection on a performative research methodology. The role of the design-researcher in general thus becomes a matter of methodology (see chapter 3) instead of a discourse around the performative dimension of Designing for Homo Explorens. The design-researchers have only been included in the descriptions when the designs were not capable of run-
ning autonomously; this was the case with the Mediated Body and the Touchbox which blurred this distinction somewhat. In the former, the performer was wearing the suit, and in the latter, the system required calibration and introduction for it to function properly. In both cases, the performative roles of the designers have been included where it was deemed appropriate throughout the four chapters that discuss the four aspects.

In the following text, three insights are presented which describe ways to create exploratory performative dynamics within the installations. I will present how the designed artifacts were performative in themselves and thus created initial curiosity. I will also explain how the participants took on roles as performers and actively shaped the experience beyond the intentions of the design, and, in conclusion, I reflect on how the design plus the socio-cultural settings became a performative frame for the participants to engage in.

7.2. Insight: Create performative artifacts that convert initial curiosity into exploration

Before analysing the performative role of the participants, it is necessary to reflect a little on the artifacts as having a significant role in creating initial curiosity. In the previous three aspects, the insights mostly cater for design dynamics when the participants had already chosen to engage. The internal complexity in chapter 4 seeks to open a space for exploration, not to create initial curiosity. In a similar fashion, the experience of the full-body interaction in chapter 5 describes the experience of engaging with the installation, not the role of the aesthetics of the object. Chapter 6 gives us insights into social dynamics happening as a consequence of them being a part of a situated meaning-making process, but only hints at the role of the physical appearance of the objects. I argue that the objects themselves play a significant role in the performative frame, and will go into detail about this argument in the final insight. At this time, I would like to elaborate on how the objects had the performative role of a catalyst for curiosity through their physical appearance. In the following, I reflect on their role in creating initial curiosity.

Within Designing for Homo Explorrens, the focus on social consequences became part of the actual aesthetics of use, but also a part of the initial aesthetic experience of engaging with the designed artifacts. To understand the performative role of the artifacts designed for Homo Explorrens, we need to further reflect on their appearance and use.

As mentioned in chapter 4, Tieben et al. (2011) posit that initial curiosity can be evoked through novelty, partial exposure, complexity, uncertainty and conflict. I would like to consider how different installations played with these properties and use that to understand how the aesthetic appearance of the objects is a key dimension in creating initial curiosity:

- **Novelty:** Quite a few installations contained some level of novelty. This could be a special plant in the botanical garden that would sing when touched or a suit that turned one’s body into a reactive-touch interface which creates sounds, etc.
- **Partial exposure:** The participants’ interaction with the Mediated Body would be through wearing headphones. This prevented people who were observing the interaction from understanding exactly what was going on and, consequently, sparked enough curiosity for the observers to ask if they could participate.
- **Complexity:** The Electrolumen installation did not communicate how one should interact with it. Hence, the participants needed to be curious enough to explore it and find out.
- **Uncertainty:** Because of the intimacy of touching a stranger’s body, the Mediated Body became a daring activity to engage in.
- **Conflict:** The Ladies’ and Men’s Room Mixup used conflicting information in the form of switching the gender signs on the public toilets of a nightclub, thus motivating participants to explore the forbidden space of the opposite gender’s toilet.

How the appearance of the designs shapes the first impressions of the interaction is significant. They are not designed to blend into the situated backdrop, but rather to spark curiosity among the participants. Through their physical properties, they guide the participants to engage in the interaction in certain ways. This is what makes them performative, much in the same way as Goffman (1959, p. 8) argues for participants as perfor-
mative when they intend to influence their surroundings. Therefore, they (as I will argue in the last insight) take on a catalytic role for the performative interaction happening around them, in the performative frame.

In this sense, the aesthetics of appearance within Designing for Homo Explorens becomes a performative way of creating initial curiosity. With the Electrolumen, it would be the fear of touching the electrical wires that one had learnt as a kid would be dangerous. With the Touchbox the initial appearance mostly resembled something like a snake oil health-o-meter from early days of technology innovation. Moreover, this is not a solitary experience, but a social one, in the sense that a singing plant is not much more than a plant when no one is touching it, and the Ladies’ and Men’s Room Mixup would not be confusing if you were the only person using either toilet. It is, in most cases, in the moment of observing somebody engaging with the installation or around the installation that the initial aesthetic properties of the installation appear. “Why are there so many people pointing at the two toilet doors?”, “How come five people are stroking the plant and what does it have to do with the sounds?” or “How come she smiles every time the guy with the weird suit touches her arm?” Although for the participants this becomes a matter of aesthetics of use, I posit that the importance of the aesthetic appearance for people observing resides in a combination of the physical properties of the designed artifact combined with the social interaction happening around it. In its simplest form, this becomes a matter of novel connotations, for example, in observing a plant singing, two people touching each other in the metro or simply a performer that walks around with blinking lights on his chest. It becomes something out of the ordinary that an outsider observing the interaction is aware of as something that breaks with everyday patterns; this sparks initial curiosity and invites the participants to explore.

By considering the designed objects performative, I want to make a distinction between curiosity and exploration, and between aesthetics of use and aesthetics of appearance. The performative role of the objects becomes the aesthetic appearance of the objects both in their physical properties, but more importantly, as the combined whole when one observes the object and the interaction of the participants from the outside. The aesthetics of use becomes the way the participants participate in the interaction with the artifacts. Therefore, it is also conceptually fruitful to make a distinction between curiosity and exploration. In this connection, designing for curiosity becomes a way of creating initial aesthetic perception wherein the exploration resides more in the aesthetic properties of use (as described in chapter 5).

58. A rare moment when the performer of the Mediated Body is left alone. His unusual appearance is in stark contrast to the other passengers on the Metro.
7.3. Insight: Create multifaceted roles for potential engagement

The disruptive nature of the designs created a sensitivity among the participants. One such example is in the description of the dynamics when the performer of the Mediated Body approached a group of people in a metro coach. We sensed that multiple agendas were at stake, from the obvious ones like “Why does he want to engage with me? What’s the catch?” to more subtle dynamics as a consequence of being part of a social setting with predefined norms. The fear of friends’ and bystanders’ judgements made them aware and sensitive to their actions in the space. This would result in them approaching the interaction with careful assessment. In the case of the Ladies’ and Men’s Room Mixup, the participants would often peek into both toilets before choosing which one to enter; sometimes this would go on for a while and result in many engagements with strangers. This heightened sensitivity is a core quality when Designing for Homo Explorens. Through simple distortions, it is possible to pull people out of the space they are in and gently force them into considering it as a space where they can step out of their comfort zone and sensibly approach it in order to explore and understand it. This is what Dalsgaard & Hansen (2008) considers self-awareness. The user is simultaneously operator, performer and spectator when interacting. The operator will always be aware of being observed and try to “perform” for the spectators; However, their main focus is on gratification if the interaction goes well, and on the fear of any potential failure. As mentioned in the introduction, I do not believe this 3-in-1 model is enough to understand the interactions as performative when Designing for Homo Explorens. I believe it is important to make a distinction between people being aware of their performance in the space and them choosing to act upon it. This enables us to get an understanding of what motivates people to amplify their own actions in certain situations.

To understand the performative roles, I find it is relevant to dwell a little on the Mediated Body. It is the only example in this dissertation with an outright performer, in the sense of a person with intimate knowledge of the system and a repertoire of strategies to use for creating the social interaction around the suit. The performer gives us a greater insight into what it means to have a performative role while shaping the social interactions. Although this created a somewhat unique relationship between the participants and the performer, we observed similar properties in the other installations where the participants would take on roles themselves.

As illustrated in figure 59, the performer and the participant were consistently part of a greater social whole, with the performer shaping the interaction according to his or her own desire of creating engaging and socially intimate interactions with the participants. In a similar fashion, the participants would naturally be aware of their own performance in the space. Whether they chose to actively shape the interaction varied from engagement to engagement: some participants would take on a rather passive role and let the performer take the initiative, whereas other participants would quickly take the lead and start to choose how the interaction should progress. Queues would form with other people wanting to try out the experience, and people would mill around, commenting on or observing the interaction. This allowed the participants to become willing ambassadors. For example, in the metro scenario, the participants would create curiosity in the observers, and then afterwards, the participants would explain how it works to them and highly encourage them to try it as well; in turn, motivating them to go from observers to participants.

The physical properties of the headphones made the duality of being immersed while keeping contact with the surroundings more explicit than in the other installations. The headphones created a private, intimate bubble between the performer and the participant, while at the same time, one could observe the participant and the performer’s awareness of interacting in a social setting. They were consciously performing for the people around them by exaggerating their interaction and by reacting to comments that the observers made. It seemed as if they iterated between being aware of the observers’ presence and being immersed in the interaction.

[the] player’s experience as [sic!] one of immersion, but it is not an immersion solely in the game-player interaction, it is an immersion in the whole situation of interaction: well-timed responses to the game, socio-culturally recognizable gestures and utterances such as raising ones [sic!] arms in celebration, nods and comments to friends, pleasure in displaying expertise in front of strangers in a public place, adrenaline rushing in the knowledge of the imminent risk of failing. (Dalsgaard & Hansen, 2008, p. 23)

I consider this performative immersion. This is an important theme in understanding the multilayered roles present in all of the installations. How the participants embraced the duality of being immersed and performative at the same time depended on the situation. Some would take an actual performative role of shaping or exaggerating the interaction, and others would react more subtly in the space.
Similarly, in the Ladies’ and Men’s Room Mixup instal-
lation, we observed men who would act as guides for
the women regarding which toilet to enter. A recurring
theme developed wherein the group of men would
high-five each other when one of them managed to
converse with the women about the correct toilet. It
is clear that they were aware of their presence and
how they created their role in the space; they became
performers in the space for the women and in front of
their friends. There seemed to be a mutual relationship
where the women would pretend not to understand the
system and, therefore, act more helpless than they were
to invite others to solve the problem with them, seem-
ingly playing the system to their advantage.

In most of these cases, I only had the observations of
the actual interactions to contemplate the participants’
incentives and roles in the interaction. Although I tried
to enter into a dialogue with the participants about
their experience and their incentives, it often seemed
that they (understandably) lacked the vocabulary to
express their own motivations and reactions. Howev-
er, during the experiments with the Mediated Body,
the performer began to build up a vocabulary of his
experience with the suit. One such example was the
concept of the ‘wingman.’ After many interactions, the
performer had outplayed his own initial curiosity and
was not surprised anymore. To challenge his own role,
he took on the job of becoming a wingman for others.
The concept of a wingman was coined by Strauss &
Chang (2005) and it constitutes the partner of the per-
son with the primary interest in the interaction. His or
her job is to make sure that a friend is able to achieve
their goal for the interaction. Typically, this would entail
starting conversations with others in a crowd of people
to enable the friend to strike up a conversation with the
so called target. In our case, the performer became the
wingman by approaching people who appeared to be
couples at the festival. Instead of driving a wedge be-
tween them, he invited both of them to try out the suit
through him. This was done by giving each one of them
a set of headphones (consequently leaving him out of
the sound experience). By holding one of the partici-
pants’ hands, they were able to play together instead of
only playing with him. This would turn the performer
into a mediator without the agenda of becoming a part
of the interaction itself, and he would later invent the
interaction setup which became the principle of the
Touchbox. As the he puts it himself:

A new level of interaction when going from
interacting with one other person, to when
I tried facilitating the interaction between
couples. “Flirting mediation”. I had obviously

59. View of a common pattern with the people around a performer. The performer becomes a central figure surrounded by several participants
with different agendas. He or she engages them with a predefined set of desires and interests, shaping the interaction in dialogue with the partic-
ipant. At first, the participants will be aware of their own performance in the space, but can choose to take on a performative role by shaping the
interaction towards their own interest.
flirting couples come really close, gave them an excuse to get closer, touch, connect. It was funny, from initially being a threat, I became the wingman emerging out of nothing. (The performer’s description from the jointly-written document)

As he became the wingman, he was able to pass on the joy and energy he had experienced to other people. Where the concept of wingman usually only serves the interest of one part, the Mediated Body became a ground where it would be unclear whose intentions were at play. The transformation of the performer’s role over time resembles what the participants go through themselves as they explore the possible interaction space of the installation.

What I propose is to consider the interaction space as much more nuanced than a simple performer, spectator, observer model and instead consider it a vibrant mixture of multiple roles that the participants take on. Through the installations described in this dissertation, I can classify the following roles:

- **Ambassadors/Guides**: People who would argue for the qualities of the installations and enroll others to engage in it. An example is the Medusae Nilfisk installation, in which participants would find others with which to hold hands and to explain the system.
- **Critics/Pundits**: People who would discuss the consequences of the interaction. For example, with the Touchbox, people would hang around and discuss the qualities of touching each other.
- **Participants/Operators**: People who engaged in the installations.
- **Opportunists**: People who used the interaction to their own advantage, often in other engagement than the interaction itself. The participants who showed the other participants the “proper” toilet in the Ladies’ and Men’s Room Mixup is one example.
- **Observers**: People who would observe others interacting with the installation. For example, circles of people would form around the Mediated Body suit as a participant and a performer engaged in the interaction.
- **Wingman**: Participants who would engage for the sake of seeing joy in other people.

There is no performer in the list. This is intentional because the performative role can be encompassed in all of the roles above, although some have a more natural inclination towards becoming performative roles, like ambassadors, guides, participants and wingmen. The roles would often create an element of performative awareness for the participants, and they would become performative when the participants took on an active role of shaping the interaction happening around them based on their own desires and interests. The moment they choose to engage in the dialogue, it becomes a performance. The example of acting as a guide in the Ladies’ and Men’s Room Mixup is not necessarily a performative activity, it may be out of a sincere interest in helping someone, but when the activity begins to resemble a playful strategy to meet new people it becomes a performative role to engage in. I am sure one could come up with more classifications, but the main point is to begin to design for multifaceted roles in the interaction, with the roles becoming ways for the participants to engage in the interaction. They enable the participants to choose one or more characters in the situation: they could be victims who would be guided or the critics who wanted to reflect on what was happening, and so on.

Designing for socially-performative roles helps us with one of the problems stated in chapter 4. Here, I argue for internal complexity as a way of creating an exploration space for the participants, but pointed out the problem of creating a too-high threshold for novice participants to engage in the interaction. Through the different installations, we have observed how the performative roles of the other participants created guidance for the participants needing help. One such example would be the Medusae Nilfisk installation. The poles as interactive elements were unobtrusive in the space, and were placed off to the side with only the red and green lights indicating their presence. We worried that no one would make the connection between the poles and the lamps, but because the participants needed to find other participants to hold hands with for the installation to work, the rumours of how to interact spread like a virus throughout the festival. This enabled us to create a significantly higher entry level; simple, single-user testing would not have revealed this property of the social collaboration.
7.4. Insight: Create a frame for performance

So far I have argued for the possibility of seeing the interaction as something where the participants can be aware of their own performance in the space and where they can take on an active performative role of shaping the interaction around them as a social dialogue with the other participants. I have further argued that the designed objects themselves can be seen as catalysts for curious engagement for the participants. In this section, I will elaborate more on the interplay between the performative objects and the performative roles of the participants. Specifically, I posit that one can consider the interplay between the two a performative frame.

In its simplest form, the performative frame becomes one where the participants use the artifacts to “put on a performance” for others to observe them. This property was present in most of the designs. One such example was the Barcode Beats. It consisted of a barcode scanner that would convert any barcode into sound through an intriguing set of nonlinear algorithms. The design was tested on a couple of occasions in supermarkets in Sweden and Denmark. In a Kvicky supermarket in Denmark the design was used as a way to invite shoppers to create musical symphonies based on their food preferences. Shoppers would find different foods and explore the different musical scores the barcodes on them would generate. This way they could reflect on how a Coca Cola bottle would sound and how it would sound combined with, for example, a cucumber. The internal complexity aligned well enough with live compositions of musical scores that participants had the possibility to create beats by combining multiple barcodes from different products. Participants would usually begin by selecting a random product in order to ascertain a baseline, thereafter adding the barcode from another chosen product (such as a lemon or a ketchup bottle, etc.) which would create an overlapping rhythm. They could then remove a product (like the lemon) and add another later in the composition. This resembled a live mixing interface, but grocery products were used instead of traditional laptops, mixers and interfaces with buttons.

Once in a while, some participants would use it as a performative tool. They would seek out products that would create the most harmonic symphony. They would then use those products to create different patterns of beats. The Barcode Beats turned into a live mixing tool of musical scores through a performative engagement of the products themselves. The novelty of the grocery products as the sole interface invited a performative way of engaging with the music. The participants would exaggerate their movements to indicate the beats they were creating by adding and removing different products to the mix. This property of using the artifacts as performative props is similar the argument of

**INTERACTION PATTERN OF BARCODE BEATS**

- The physical representation of the installation would be a shopping cart filled with random grocery products from the shelves of the supermarket. A speaker was mounted on the shopping cart and a traditional barcode scanner hung from the side.
- We would explain to the participants that the sounds coming from the speakers were generated from the barcodes and invite them to try it out.
- Some participants would be curious and begin to experiment with the different groceries and their barcodes. They would usually experiment with the groceries present in the shopping cart, but a few would venture out in the supermarket and choose their own products to try out.
- Since it was possible to combine multiple barcodes to create richer compositions, it would be common for the participants to become confused when they added too many barcodes to the musical score. The sound would become messy and noisy as if too many instruments were playing at the same time and out of sync.
- Some participants would then start to remove some of the products from the composition until the noise started to sound like a composition again.
- If they managed to create compositions by combining barcodes, they would then begin to explore what products went well together, resulting in the regrouping of the products in the cart depending on their sound qualities.
- When the participants had completed this mapping, they would begin to create longer scores through combining barcodes over time. This would result in a more controlled interaction with the design. Instead of playing around with it, they started to use it as an instrument, resulting in an awareness of the surrounding participants and their reactions to the compositions.
Reeves et al. (2005) argument for aesthetics of use as a way of creating performative spectator experiences.

Expressive interfaces tend towards revealing, even amplifying, both manipulations and effects. For performances, their primary concern is to entertain spectators by enabling them to appreciate how well a performer is interacting with the system, for example admiring the skill of a virtuoso user or being entertained by a new user’s attempts to use the interface. (Reeves et al., 2005, p. 745)

Reeves et al. (2005) posit that performativity can be designed from a two-dimensional model. On the first axis, they have the manipulations; on the other, they have the effects. In their terms, it became an expressive interface to perform with because the manipulations and the effects were revealed. At the same time, it could be considered magical because of the untraditional manipulation of grocery products as artifacts with which to compose beats. However, the abstractness of the sounds did not invite the participants to engage in a real meaning-making process about the product and their sounds. The ambiguity was more on the level of interface ambiguity than social ambiguity. It did not move beyond a simple playful interface to engage with. The potential of the performative frame was not unfolded to the same extent as some of the other designs. Let me exemplify briefly before digging deeper into the actual conceptualisation.

In the case of the Ladies’ and Men’s Room Mixup, we did not predict the amount of interactions and nuances happening around it. The participants went beyond the design by creating their own roles. The most obvious one as guides, which was used as an excuse for engaging socially. When the Mediated Body was designed we already knew through the Medusae Nilfisk installation and the Electrolumen installation that participants enjoyed engaging in the installation by exploring social relationships through their bodies (by holding hands, touching each other’s noses, etc). Therefore we had the idea of creating an interface where the bodies were the sole interaction interface to enhance this experience; however, there was no way to predict how efficiently the system would transgress the intimate boundaries of two strangers meeting for the first time. At first, with the Mediated Body, we considered it a practical solution that the performer and the participant had to wear headphones. In practice, it proved to be a vital feature, because it enabled the participant to step into a parallel universe with normally-forbidden interaction possibilities.

The above examples are a few of the many presented in this dissertation where the strategy of making socially disruptive interactions forces participants to engage in ways that could not be predicted from the begin-
Interactions can emerge that move beyond the intentions of the designers. I posit that this emergence is a consequence of an intricate combination of the insights presented in this dissertation. From a performative perspective, it happens as a consequence of the social dynamics initially started by the performative and discursive role of the objects. However, it is mainly created as a social dynamic arising out of the performative roles that the participants took on their own initiative. This dynamic is similar to Johnson’s (2001) argument of emergence happening as a consequence of a multitude of elements coming together in what would at first be considered chaotic, but through the random encounters complex structures start to emerge. In such structures, it is the multitude of elements and their random encounters that serve as the basis for the structure to emerge. For us to design the dynamics as a complex system, I posit that it is necessary to consider it a performative frame.

The above diagram describes, through a couple of many-to-many relations, how a rather complex web of social interaction occurs. Many people can interact with one artifact while being aware of each other. Further, they can all have multiple, overlapping roles in the space. Most importantly, the diagram has a performative frame within a sociocultural context. This frame represents the participants who are actively engaged in the interaction. The performative frame becomes a dialogue between the sociocultural context and the designed artifact. The observers are, much in line with Dalsgaard & Hansen (2008), a part of the interaction and affect it through their mere presence and the roles they take on. One could imagine that being observed by commentators and critics would be significantly different than being observed by somebody cheering on the interaction.

This performative frame corresponds to the social bubble described in chapter 7. The boundaries of the frame will always be blurry, and the size of it varies greatly depending on the social interaction and the physical size of the overall installation. The importance lies in the difference between the outside of the frame and the inside. New norms of interaction and new meanings of interaction appear inside the frame that would be deemed inappropriate outside of it. This allows the participants to take on new performative roles and have a certain performative awareness of their own actions.

Within interaction design academia, the concept of a performative frame has previously been suggested by Benford et al. (2006). They have the following definition:

In our terms, the performance frame is a set of conventions and supporting structures, physical arrangements, rituals and technologies, through which performers and
spectators come to understand that a performance is taking place and that sets their expectations of how it works, especially what action is part of the performance and how they should behave. The frame essentially defines a contract between performers and spectators; an understanding of the principles and conventions by which both are able to take part in the performance and interpret what is happening. (Benford et al., 2006, p. 8)

Two elements differ in their definitions from the performative frame presented within Designing for Homo Explorens. First, their emphasis seems to reside on conventions and rituals as a way to present it to the spectators, whereas Designing for Homo Explorens emphasises the novelty of the performative frame. Its interest is therefore not tied to traditional conventions and rituals on what constitutes a performance, but on the participants’ own spontaneous appropriation. Secondly, the distinction between a spectator and a performer is more fluid in Designing for Homo Explorens. A spectator/observer can have a performative awareness of their own presence in the space and they can actively start to performatively shape what they observe. This can be done to the extent where they no longer should be considered spectators/observers, but rather participants in the interaction. The possibility of transformation from spectator/observer to performative participants is an important dynamic when Designing for Homo Explorens.

The term stage has been used within performance theory by Goffman (1959) to describe the different roles of public (frontstage) and private (backstage) performative roles. This is a similar perspective to the one I put forward through the concept of a frame. However, I consider it more appropriate to use the term ‘frame’ since the stage, as a metaphor, is commonly tied to the concept of a passive audience, people working behind the scenes (backstage), etc. The term ‘frame’ creates a more portable, translucent and blurry boundary and is therefore closer to the concept of being situated within a context. Further, the concept of the stage tries to conceptualise the idea of being on a stage acting something out, whereas a frame relies on the designer having a major role in creating the frame itself. In this frame, there are no scripts, only participants and the designed artifact.

My intention with the performative frame is to put the design perspective into focus. Dalsgaard & Hansen (2008) argue for the importance of understanding the social dimension through the 3-to-1 relationship of performer, operator and observer, Reeves et al. (2005) argue for a design focus on the manipulative effects of the designed objects. Although they both contribute with valid perspectives, I consider it necessary to include the artifacts, participants, roles, observers, the performative frame and the sociocultural context in the design perspective to enable the perspective to create engaging exploratory interaction with ongoing social dynamics. In a sense, both Dalsgaard & Hansen (2008) and Reeves et al. (2005) perspectives are embedded in it, plus an added sensitivity towards the dynamic between the sociocultural context and the performative frame itself.

Many examples have been given throughout this dissertation of the consequences of the sociocultural context, for example, the difference between the Singing Plant in the Botanical garden versus the same installation at the Roskilde Festival. At the Roskilde festival, people were much more energetic in creating the playful atmosphere around the plant. The queues forming with people waiting to try out the Mediated Body suit became a certain type of observer role. The queues added a vibe around the installation for others to consider it relevant for trying out or for contemplating.
7.5. Interlude

We now conclude the final of the four aspects within the manifesto. The previous aspect in chapter 6 allowed me to reflect on the social dimensions of norms in relation to social play. This aspect enabled me to go deeper into reflecting on the participants’ multifaceted roles. I argue to consider the performative role a more active role than just being aware of oneself. It is a role in which the participants shape the meaning of the interaction in dialogue with the other participants. The role can serve many purposes: becoming a guide for others can just as well be an excuse to actively construct the purpose of the space for others, based on their own interest in it, rather than the mere task of helping out. Finally, it enabled me to argue for a more holistic design perspective that considered the possibility of designing for a performative frame. This frame moves beyond mere interface design and focuses on the performative dynamics emerging as a consequence of the interplay between participants, observers, the artifact and the sociocultural context.

What remains is to take a final look at the role of the overall knowledge contribution in relation to current streams within interaction design academia. However, a conclusion, in the sense of a final summary of the points made within the four aspects, would be redundant because of the manifesto style structure. For example, the final summary is the manifesto as presented in chapter 1, and the purpose of subsequent chapters 4–7 is to ground and flesh out the arguments made therein. What follows is an examination of the genealogy of the program and how it should be considered a forward-looking knowledge construction.
8. In conclusion

8.1. Introduction

In this chapter, I will move into a general discussion of the role of Designing for Homo Explorens in relation to the current streams within interaction design academia. The programmatic approach and somewhat untraditional structure of this dissertation requires a little further reflection on the dissertation as a knowledge contribution. For a more conclusive summary, refer to the manifesto in chapter 1.

In the following, I argue that the compositional perspective introduced in chapter 3 enabled me to create new understandings that were not inspired by incremental improvements based on situated problems, but rather understandings that stem from imagining new design potentials. The design perspective thus becomes a carrier of intention rather than a traditional academic knowledge contribution.

Because of the forward-looking approach, it is necessary to reflect on how this dissertation serves as a knowledge contribution within interaction design. My intention is that it should be evaluated on the basis of how "generative" it is for other interaction designers, in the sense of opening up new potentials for other designers and design academia to appropriate.

Finally, I will reflect on the role of Designing for Homo Explorens and its genealogy within interaction design. From the level of a programmatic approach, I would like to relate it to other streams and further exemplify how traces of Designing for Homo Explorens can be found in already-existing design exemplars within interaction design and HCI.
8.2. Evaluating a design perspective as a knowledge contribution

In chapter 3, I introduced the overall method as a programmatic approach to design research. I argued for the outcome as a snapshot of the program that is packaged as a design perspective. To understand how this snapshot is a knowledge contribution within academia it is necessary to reflect a little further on the consequence of calling it a design perspective. Gaver (2012) argues that within interaction design academia one may acknowledge the possibility that there are many worlds of design:

There is yet another possible interpretation for the apparent lack of convergence in research through design, which sidesteps the opposing views that we either need a shared paradigm to make progress, or already have a shared paradigm and need to recognise controversy as a sign of progress. In this view, whether or not research through design is built on certain assumptions about its conduct, it will inevitably be characterised by greater diversity and less convergence than the natural sciences because of the inherent nature of its field of study. (Gaver, 2012, p. 943)

If this is the case, design will never be unified into one common theory. Instead, consider the many different worlds of design as different design perspectives with different motivations and values. They are not one-size-fits-all entities for all problems, but rather perspectives that carry a specific worldview with them. In the case of this dissertation, they are introduced as ideals in chapter 1 of this manifesto. The design perspectives thus become more of a design stance in which each design perspective is acknowledged as a different way of expressing one’s own agendas, motivations and desires.

To accommodate this, I use the compositional perspective coined by Latour (2010) as a basis for the knowledge construction. The compositional perspective becomes a way of composing and recomposing in a hermeneutical process. These compositions are not empirically-found problems present in the contexts that the designs have been tested in. Instead, they stem from the possibility of thinking outside existing worldviews and thereby imagining alternative or novel potentials within the current contexts. Before the performer with the Mediated Body suit stepped into the metro train coach, there was nothing indicating the need for a performer to be present; it was merely a product of my imagination as a designer contemplating the possibility of changing the social dynamics in a public setting.

They kept using the old opposition between what is constructed and what is not constructed, instead of the slight but crucial difference between what is well and what is badly constructed (or composed). (Latour, 2010, p. 478)

Through the compositional perspective, it is possible to create a discourse around what the world looks like with the perspective and without it, and we are able to engage in a discussion which explores potential futures and compares the different directions they take us. It should be evaluated on whether it takes us in an interesting direction and whether the design strategies actually fulfil this direction.

If we acknowledge that the design perspectives are, in fact, compositions with embedded intentions, then the question becomes how this affects the general issue of validity. As Gaver (2012) points out, interaction design academia does not have a fixed set of evaluation criteria, but general academic criteria can be summarised as Contestable, Defensible and Substantive (these criteria are based on Booth et al., 2008). Höök & Löwgren (2012) summarise them as follows:

- Contestable means that the contribution proposes a position that not everyone in the academic community already believes.
- Defensible means that members of the community can accept the new position, given the arguments or evidence given.
- Finally, a substantive contribution is one that is worth the time and effort of the researcher making it and community members engaging with it.

Contestable means that the contribution proposes a position that not everyone in the academic community already believes. Defensible means that members of the community can accept the new position, given the arguments or evidence given. Finally, a substantive contribution is one that is worth the time and effort of the researcher making it and community members engaging with it. Contemporary positions on academic quality criteria in design-oriented HCI research (Zimmerman et al., 2007) conform quite well to this generic formulation, and thus we propose to use it […] for assessing intermediate-level knowledge contributions in interaction design research. (Höök & Löwgren, 2012, p. 8)
To understand how the three criteria relate to the compositional approach requires further elaboration:

To assess whether the contribution is contestable is not a matter of revisiting existing theories in a natural science way, but to add new nuances and new design potentials to a greater academic repertoire. As Gaver (2012) puts it:

As I have suggested, a great deal of design theory tends to be generative and suggestive, rather than verifiable through falsification. This seems self-evident in the case of ‘manifestos’, but also of more grounded generalisations from particular design examples (Gaver, 2012, p. 943)

Whether the contribution is novel and inventive greatly depends on what is already present within the field. It becomes a matter of how well the contribution expands the field. The word “expand” has been chosen instead of “move forward”, because the latter would imply some desired direction to move in whereas “expand” acknowledges the endlessness of design itself. Within a programmatic research paradigm, the concept of genealogy has been proposed by Brandt & Binder (2007) as a way to situate the work within the academic community. The role of genealogy is to demonstrate its novelty and how it builds upon what has already been done. I will expand the genealogy of this dissertation in the end of this section.

Defensible becomes a question of how well the members of the community can accept the position based on the arguments or evidence given. Since the position is based on ideals, it should be evaluated on two levels. Internally, it is an evaluation of the match between the ideals embedded in the manifesto and the more concrete constructions of how to design for them in the form of aspects and insights. Here, the insights are a crucial bridge between hands-on engagements and the theoretical discourse within interaction design academia. Externally, defensible is also a matter of how the ideals relate to the contributions genealogy to the extent that the genealogy can show how the work builds from what is already considered a knowledge contribution within interaction design academia.

Whether the contribution is substantive for the academic community depends on the generativity of it. When a design research concept is generative, other design researchers can appropriate it by creating and adding new knowledge contributions, hence it is worth the time and effort to engage with it. Höök & Löwgren (2012) concentrate on the generativity (and thus substantiveness) of intermediate-level knowledge contributions, which in my case would correspond most closely to the aspects. However, I will also argue that the overall framework of Designing for Homo Explorens has generative potential, and thus should be deemed as (at least potentially) substantive.

As argued, it is relevant to elaborate on generativity and genealogy as the two primary evaluation criteria for a knowledge contribution with embedded ideals. I will in the following present those two dimensions. Firstly, by presenting how the contribution has been packaged for the potential of generativity. Secondly, by reflecting on Designing for Homo Explorens genealogy as a part of a larger field of academic knowledge.
8.3. Generativity: Creating a potential for appropriation and re-composition

Generativity is an attempt to name a validity criterion of specific relevance for design knowledge and it refers to the potential of the design perspective to be generative for other designers and within interaction design academia. The downside is that it is hard to demonstrate generativity of new design ideas when they are first presented, since generativity appears through a subsequent take-up by other researchers. The generativity of a design perspective should therefore be seen over the course of time. What is possible for me now, is to reflect on how the contribution has been packaged to be potentially generative for others.

The intention is that this knowledge should be generative for other designers and design academics. First as a way to help other design researchers actually see and experience what Homo Explorens can be like. Secondly to enable them to create designs that promote this kind of experiences. If the focus is on a more abstract design level then the overall concept of Designing for Homo Explorens can be utilised without including the details of the actual implementations. On the other hand, if the focus is on a more hands-on practical approach, then one can go into greater detail about the individual design choices that led to the interaction dynamics. In this way it should be approachable on multiple levels depending on the interests of the reader. Overall when going from concrete exemplars to abstract concepts one creates entities that can be applied more broadly and therefore contain potential for more generativity.

The abstractions deviate from a tendency within design in general—to hunt for a great idea and the great design talent. With this dissertation, I try to replace this notion with the hunt for the great execution and the great experience. Digital sketching thus becomes a method for a sensible execution, and designerly knowing based on a repertoire of previous understandings becomes the experience. In this notion, an inherent challenge exists because the quality of the product mainly relies on the craftsman’s ability to explore new materials and imagine new potentials. The designer needs to have experience in the form of a toolbox filled with tricks, tactics and conceptual understandings of the possible interaction dynamics that may happen around the installations.

It was only after many experiments that the designers in the illutron community had gained a wide-enough scope of understanding to predict most of the interaction scenarios within the installations they built. The designers were not magically talented, but had created an extensive repertoire they could draw upon when confronted with new design situations. Therefore, the initial idea became secondary to the execution of it. The execution became a matter of designing the details of the internal workings all the way up to how the designs are presented as performative objects in a carefully-chosen context.

The practitioner has built up a repertoire of examples, images, understandings, and actions… When a practitioner makes sense of a situation he perceives to be unique, he sees it as something already present in his repertoire. (Schön, 1987, p. 138)

The materials that can be appropriated into the repertoire of other designers are (as mentioned in chapter 3) presented as a knowledge contribution consisting of four levels: the overall composition as the manifesto, the aspects as annotated portfolios, the insights and the exemplars. The four levels operate on different scales: from overall carriers of perspective and intentions (the manifesto and the aspects as annotated portfolios) to the insights as more abstracted suggestions, as well as the concrete, hands-on suggestions of design examples. The design perspective becomes a way of doing, similar to critical design or designing for usability. The insights and the exemplars become inspirational suggestions of ways this can be carried out in practice. These four levels of knowledge abstraction become parts of the repertoire for a designer’s toolbox.

Seeing-as is not enough, however. When a practitioner sees a new situation as some element of his repertoire, he gets a new way of seeing it and a new possibility for action in it, but the adequacy and utility of his new view must still be discovered in action. Reflection in action necessarily involves experiment. (Schön, 1987, p. 141)
For this knowledge contribution to become a generative part of one’s own repertoire, one has to be able to actually build similar designs. The ability to physically create such designs requires a more hands-on appropriation of the technical choices that have been applied in the process. This knowledge is not conveyed through the four layers of abstraction and the knowledge is not readily available in the form of off-the-shelf building blocks. Throughout the many experiments, many small technical tricks have been developed to create the experiences present in the designs. Therefore, the knowledge of how the exemplars were actually built becomes an essential part of the knowledge contribution. Without this knowledge, other designers will face the same technical challenges that have been overcome in the designs presented in this dissertation. To accommodate this, appendix 1 includes a collection of technical strategies to create similar aesthetic experiences through touch, sound and internal complexity.

The compositional perspective leaves other designers free to recompose the ideas found in this dissertation. This leaves room for a more dynamic approach to knowledge production—one can remix it. It does not require a fundamental paradigm shift for it to be redefined, meaning it is possible to combine Designing for Homo Explorens with a learning perspective. In this scenario, the exploration would have a more instrumental perspective, yet still utilise some of the knowledge constructions present in the dissertation.

Finally, it is necessary to look at the genealogy of Designing for Homo Explorens. I will do so in the next section.

8.4. Genealogy: As a part of a larger discourse

As mentioned when introducing the general evaluation criteria, it is necessary to reflect on Designing for Homo Explorens genealogy within the academic field itself. Brandt & Binder (2007) argue that a programmatic approach to experimental design research should be evaluated on its genealogy.

One could say that we with the notion of genealogy want to extend the questions of on what and for whom knowledge production is directed to also encompass which context of debate and dialogue the research is participating in. (Brandt & Binder, 2007, p. 12)

The genealogy thus becomes a way to position the program in relation to the existing body of academic knowledge.

Evaluating a design research program is to a significant degree a matter of how we understand it in relation to other such programs, e.g. to what extent it enables us to think and do given things in certain and preferably new ways. Though the description of any eventual effects of such a program over time and in the future is bound to be guesswork, we can still discuss, critically examine, compare and evaluate design programs in relation to other ones. For us to be able to do this, however, they need to be “finished” to a certain extent, i.e., it is difficult to evaluate a design program before we have enough examples of what it affords, and as such it is typically something we do in retrospect. (Brandt et al., 2011, p. 47)

Brandt et al. (2011) argue that within design programs, it is possible to discuss, examine and compare in relation to other programs, comparing this to the overall discourse within the academic field. Therefore, it is necessary to detail the genealogy of this design program with the awareness that it will be framed in the current discourse within interaction design academia and also enables us to point to an area of unknown territory that the program explores. I will summarise the most important threads and exemplify how Designing for Homo Explorens can be used to gain academic grounding and designerly reflection for existing design experiments.

What is notable about this dissertation is its scope; one of the four aspects could have served as a basis for a dissertation in itself. This would have left room for more detailed reflection and experimentation. However, the bottom-up approach (from design experiments to a knowledge contribution) required a wider reflection on the richness of the interaction through the different aspects which enabled me to tie multiple strands together. When Tieben et al. (2011) look at exploration and curiosity as mainly curious obstacles, they leave out an important dimension of experimenting with the obstacles as something that is situated (I presume that their cow sounds would have been less of a curiosity if they had been played in a green field). Furthermore, although they did spark curiosity, they did not go into a deeper meaning-making dialogue with the surroundings. On the other hand, the Dourish (2004) notion of mediating meaning-making as socially situated did not create an understanding of why the cow sounds from Tieben et al. (2011) worked. My point is that the bottom-up perspective enables me to reflect on the
different aspects thus creating a much more nuanced understanding of what it means to design for exploration.

To summarise, Tieben et al. (2011) enabled me to discuss the potential of designing internal complexity to create curiosity. The internal complexity became a basis for augmenting the kinesthetic experience (Fogtmann et al., 2008) as somaesthetic (Shusterman, 2008) interaction in use. Using the rather intimate artifacts in the public settings created a greater understanding of embodied interaction (Dourish, 2004) as situated meaning. This situated meaning-making became a way of identifying a discrepancy between what Dourish calls the backdrop and what Goffman (1966) would consider the normative expectations of the situation. In this tension, social exploration occurs. This is combined with Gaver’s (2002) notion of Designing for Homo Ludens, consequently turning his perspective of ambiguous interface into a perspective of social ambiguity instead. Finally, the social interaction removed the designed artifacts as the center of attention. They became performative mediators (Dalsgaard & Hansen, 2008, Schechner, 2003, etc.) allowing the participants to engage in different roles, hence, transforming the space into a performative frame that resides within a sociocultural frame.

One should consider the different aspects as parts of a holistic design perspective that one should design for to create a rich and complex-enough experience for the participants to engage in beyond a simple novelty interaction. These aspects also serve to position the perspective in the overall academic landscape. Even though it is not possible to create a solid mapping with clear borders, it is still possible to get a sense of where it fits in. As illustrated in the crude figure 64, Designing for Homo Explorens becomes (through the aspects) part of a larger discussion on the possibility to design for aesthetic experiences that enable participants to create their own meaning of the situation through an embodied approach to ludic playfulness.

It is relevant to reflect a little further on the role of the insights in this dissertation. I see the insights as a crucial bridge between hands-on engagement and the theoretical discourse within interaction design academia. You may have been wondering why there are few models, taxonomies or conceptual frameworks for designing exploratory interaction in this dissertation. This is mainly because such criteria would require a higher level of abstraction—a level that would water down the richness and the complexity of the actual interactions. You may say that these levels of abstraction have, to some extent, already been reached; the embodied interaction, the designing of ambiguous interfaces, etc., are such abstractions. My intention in this dissertation has
been to ground them within the frame of Designing for Homo Explores. This has been done through exemplars and insights that stay close to the ground when it comes to making actual design choices in one's own creative processes.

Throughout this dissertation, I have argued for a non-instrumental approach. The instrumental approach can be seen within interaction design academia as a need for justification or purpose within the design. It mostly comes in the form of "for", for example, Play for Learning (Roussou, 2004), Sex Toys for Wellness, (Englin & Bardzell, 2011) etc. Although it might be fruitful to consider play in relationship to learning, I posit that the learning part will naturally be the dominant knowledge contribution and we have gained limited knowledge about play in itself. A similar tendency can be seen within the gamification of interaction. Here, playful designs have a tendency to be tied to some level of game mechanics (Salen & Zimmerman, 2004), either by people having to solve a problem, beat a high score or in some way having to win. I posit that this gamification approach has a tendency to take the focus away from the actual interaction and create a focus on the results of the interaction, for example, when participants ask "How many points did I get?". The non-instrumental and non-gamification approach within this dissertation allows us to gain a general understanding of the role of exploration within interaction design. Later, this can be combined with more instrumental paradigms.

I further posit that Designing for Homo Explores already exists in the way we design. It has just been hidden by a need to create external validations outside the designs themselves. Homo Explores can therefore be used as a new lens for existing projects. I will even go as far as to say that quite a few projects would have benefitted from a justification through Designing for Homo Explores instead of the justification put forward in the academic reflections of the projects.

One such example is the Piano Staircase (The Fun Theory, n.d.). This project turned a staircase in a metro station into an interactive piano. Each step in the staircase represented visually a key on a piano. The colours of the keys were laid out in a similar pattern to a traditional piano. When participants climbed the stairs, each key would represent a note, thereby inviting the participants to use their whole body to play a song while walking up the stairs. The project sought to motivate people to take the stairs instead of the escalators. Although this framing proved to be highly efficient as a way of communicating the concept and arguing its value as an experiment in itself, I will argue that it became a justification instead of a way of describing some of its more poetic qualities. I posit that the novel connotation of the huge piano keys and the non-traditional staircase can be described as a case of Designing for Homo Explores. This might have enabled the designers to develop the concept further and at least enable them to detect more nuances in the interaction. They could, for example, have looked at how people perceived themselves as performers in the space while interacting with it: do they engage in it performatively by making exaggerated bodily motions? Do they engage with others at the same time? Or do they try to get through the experience as quickly as possible? This reflection might have generated a wider scope of designs. For example, while the piano keys are conceptually inviting because they play on familiarity, perhaps another layout of the trigger-points would have generated a more vivid experience from a more somaesthetic perspective.

Within the ifloor project (Krogh et al., 2004) the authors argue that the shared mouse provided a playful experience for the participants because of the collaboration required to use it.

Users then move around to drag the cursor to the question they want to read, and by spreading out the arms or feet a single user can attract more than one string and thereby get more influence on the direction of the cursor. Stepping out of the tracked area will send the cursor floating back to the centre of the floor. If more than one person is present around the floor each will have one or more strings attached, pulling the cursor in different directions. This makes it necessary for users to negotiate on where to take the cursor. This can also lead to playful interactions around the floor like virtual tug-of-war. (Ludvigsen, 2006, p. 5)

I acknowledge that the participants needed to collaborate to engage in the interaction and that it sparked playful interaction, but I am left wondering what other potentials would be possible if one designed primarily from the perspective of making a socially-experatory interface based on floor-projection. It would require prolonged experimentation to give a reasonable answer to this question, but if we applied the design perspective presented in this dissertation, it might open up some potentials for engaging explorations within it. Specifically, it would have been interesting to explore the relationship between the bodies in the space and the actual projection. Could the experience of the distance between the bodies be enhanced? And could one open up a more performative dimension of being present in the space through the discomfort of the collaboration?

Another obvious project to reflect on is the Drift Table (Gaver et al., 2004)). It is one of the iconic designs that forms the basis for Designing for Homo Ludens (Gaver, 2009), which this dissertation builds heavily upon:

The Drift Table is an electronic coffee table that displays slowly moving aerial photog-
on its surface. It was designed to investigate our ideas about how technologies for the home could support ludic activities—that is, activities motivated by curiosity, exploration, and reflection rather than externally defined tasks. (Gaver et al., 2004, p. 1)

This project fits within some of the aspects of Designing for Homo Explorers, as it creates a space for exploration that invites the participants to find their own meaning in the interaction. The use of weight distribution as a way to control the navigation forces them to engage playfully with the installation through positioning different objects on the table. However, this project is not at the core of the ideals put forward in Designing for Homo Explorers. Even though the design invites meaning-making and exploration, it does not enter into a dialogue with the socially-situated meaning of a home (I presume a home setting is where it is to be placed). The design object becomes the center of attention—a conversation piece. It does not fall into the background because of a more general negotiation of meaning in the social settings; similarly, it does not put the user at risk in a way that invites him to engage in the discussion of what it means to be situated in the space. Designing for Homo Explorers may have enabled the design to move into such a situated meaning-making interaction.

An extreme version of discomfort for the sake of creating an experience is the Breathless (Benford et al., 2012) design case:

A previous study of a bucking bronco ride that was controlled by via a chest-strap breathing monitor had highlighted the potential of using breathing to control rides and especially how this requires riders to simultaneously battle the ride and their own bodily response. Breathless extends this approach by embedding the breath sensors into a gas mask which is used to drive a large powered swing. A selected respiration monitor transmitted breathing data to a ride control computer which in turn, actuated a rope swing, pulling it backwards when the rider inhaled and forwards on exhalation. Due to the natural pendulum nature of the swing, this required a human to breathe in harmony with the swing’s resonant frequency to make the swing go higher. (Benford et al., 2012, p. 2008)

This concept is inspired by the experiential qualities of theme park rides. They put forward that the breath is an essential part of the experience of taking the ride. In this case, they take it to the extreme by letting the motion of the ride be controlled by the breath. I imagine that this would create an intense user experience and that this experience would be individual, depending on one's own comfort level and the meaning put into the experience. It possesses some elements of Designing for Homo Explorers, but it mostly focuses on one aspect of it. Primarily, the experience becomes an extreme case of the aesthetics of use: how does it feel to be inside the machine? Adding some of the other aspects might have invited more exploration. Could this machine be made in a way that forces participants to socially engage in it by collaborating or sharing the experience? Mainly, it becomes a question of open-endedness and meaning-making. How could the design enable the participants to create meaning and define the experience on their own terms?

A similar (although less extreme) project that uses uncomfortable interactions is the Reality Helmet:

[T]he reality helmet is a wearable computer device designed with the purpose of providing its users with altered experiences of reality—or ‘artificial synaesthesia’—which may be seen as a form of interactive art in which the users themselves become actively involved in creating their own, individual experiences through the use of digital technology. […] Through computer processing, the Reality Helmet is designed to alter the user’s audio-visual perceptual experience by providing a real-time visualization of the auditory environment in which the user moves and likewise, a landscape of sound generated from the digital video input; a soundscape. Hence, by wearing the Reality Helmet, the user sees what she would normally hear, and hears what she would normally see. (Fällman, 2003, p. 277)

By converting sound to visual input and the visual input to sound, an experience of artificial synaesthesia is created. This conversion is similar to the aspect of internal complexity and it plays heavily on the bodily experience of use in a similar fashion of converting touch to sound. Depending on the quality of the conversion, I imagine this experience as highly engaging and an efficient way to revitalise the embodied experience of being in the world. What normally would be considered a common experience (looking around or looking at an object) becomes a vivid exploration of the sounds generated from it and vice versa with the conversion of sounds to visual. For this to become exploratory within the ideals of designing for Homo Explorers, it should reflect on the experience of solitude it provokes when inside the helmet in a social setting. How would it be possible to engage socially through it, or what would be the consequences of the social awareness that happens through the sense of solitude? As Waterworth & Fällman (2003) point out, it is necessary to be in a safe environment while using it. This hints at the experience as not only a solitary experience, but also one of reflecting on the social meaning-making situated in a shared space.
The Reality Helmet is a case of non-instrumental aesthetics in use as put forward in chapter 5. Petersen et al. (2004) intend to convey similar qualities when arguing for such experiences. Here they uses eMote as a design case:

By means of sensor technologies in the form of accelerometers in the eMote, we are able to record gestures with the device and relate that to playing music-files. The current system allows one to turn the music off as the remote is turned upside down, to skip tracks by making a throw gesture, and to turn the volume up an[d] down through vertically tilting the remote itself. The design ideal of the remote control is to enable the user of the system to relate directly to the music as it is sensed and reflected upon, rather than replicate the functionality of the music-playing appliance. (Petersen et al., 2004, p. 272)

They describe a new way of interacting with a music device by waving one’s hand to control it. This, from the perspective of pure cognitive usability, can be seen as a step in the direction of a more embodied design example, but it is still contained within the instrumental perspective of changing the tracks. Although they argue that they are not replicating the functionality of the music-playing appliance, I would argue that this is exactly what they are doing. Skipping a track by waving a hand instead of pressing a remote does not get you closer to an aesthetic relationship to the music as Wright et al. (2008) argue for when they talk about continuous sense-making. The motivation behind the instrumental perspective put forward by Petersen et al. (2004) is valuable in the sense that they argue for “the use of interactive systems, aesthetics is not only an adhesive making things attractive, and it is part of the foundation for a purposeful system.” (Petersen et al., 2004).

The meaningfulness of aesthetic experience emerges in the use instead of being predefined by the designer. I posit that their notion of instrumentality might be too literal. If we consider the music-controlling example, the aesthetic value of engaging and listening to music is, at best, slightly enhanced. The interface does not enhance the core perception of a music-listening experience. One could consider a more complex system in which the listener engages bodily with real-time manipulation of music. As a hypothetical example, we could have music playing according to the dancer instead of the dancer dancing to the music. I would imagine this would create a new and engaging aesthetic experience. Such a system would require a relatively complex internal system to be able to encompass the experience (see the sweet spot mentioned in chapter 4).

My intention in examining the different projects from the perspective of Designing for Homo Explorens is twofold. Firstly, to position Homo Explorens within the existing field. Small nuances in the design, that are at first unnoticed, can have huge consequence to the actual experience and the ideals of them. Through the examples of existing work I hope to have pinpointed how they relate to Designing for Homo Explorens, but also where this design perspective has something to offer in parallel with existing design perspectives. Secondly, the examples are used to point out how Designing for Homo Explorens would have added new dimensions to works if it had been used as a design perspective. Whether Designing for Homo Explorens would have pulled the designs in a relevant direction greatly depends on the ideals and experiential intentions of the designers.

Finally, to lay out the genealogy, it is also necessary to reflect a little on the scope of it. In this dissertation, I have tried to stay within interaction design and HCI academia and have therefore a limited amount of external theoretical references and reflections outside this field. However, this does not mean that there would not be anything to gain from them. One example would be the potential of reflecting more thoroughly on the social and cultural potential that the designs create. In chapter 6, I argue for norms and social disruptions, but I do not do an in-depth sociological reflection on the consequences of these disruptions and their cultural triggers. This would move beyond the scope of this dissertation and into a reflection of what actually is exploratory nature in our culture.

Another dimension that I have only scratched the surface of are gender roles. As hinted here, the intersgender dynamics tended to amplify the engagement and the experience. Intuitively, this makes sense since our culture has strong ties to intergender exploration when it comes to sensuality, intimacy and general social engagements, but the nuances of this dynamic have yet to be explored; for example, with performative roles that became gender-specific in some instances—why was it mostly males who took on the role of guides in the Ladies’ and Men’s Room Mixup? And even though the Mediated Body suit was not designed specifically for a male, it still ended up in the stereotypical role of a male being the one actively engaging with others. This, of course, becomes much more nuanced when we take other installations into account. With the Touchbox, it became more equal, and in the case of the Medusae Nilfisk, females were the most active in creating the interaction.
Similarly, in this dissertation, I have distanced myself from traditional game design by arguing against the high score as a motivator for the interaction. This should not be seen as the same as game mechanics in general; the simplicity of the internal complexity could be expanded greatly by looking into some of the strategies for explorative interactions within game design theory. The reason why I have not gone down this path in is primarily because the level of internal complexity in the designs was just enough to get interesting responses from the participants and therefore enough to convey my point. However, I want to point out that “just enough” should not be considered the ambition to strive for when creating interesting designs further down the road.

Finally, a significant design dimension is left unresolved: the designs that attempted to utilise some level of connection from a distance (Hydraphonia, the Megaphone Project and Find My Twin) have not proven to go beyond mere conceptual idea generation. It has not been possible to create a design within Designing for Homo Explorens that generated sincere engagement between multiple participants across a distance. This may be a consequence of the framing that focuses greatly on the socially situated and the experience of somatic engagement, but it may also be a consequence of the limits of the imagination of the designers or the limits of the current state of technology. Certain aspects of MMORPG (Massively Multiplayer Online Role Playing Games) may be seen as such attempts to create exploration into the realm of the online world. In this case, the situated would be represented by the virtual world that people engage in instead of the physical world of the machines that are used as interfaces to it.

I hope that the concept of Designing for Homo Explorens can be used as a foundation for others to explore understandings that go beyond the scope of this dissertation: how can the designs have greater interaction space through game mechanics? And what are the gender roles of the design and how can we design for them? And so on.
8.5. Postscript

As this dissertation comes to a close, I hope to have created a design perspective that enables you to examine designs that create explorative social dynamics for the participants and, some day, you may say in a brainstorming session: “What if we design for Homo Explorens?” which may lead to alternative design solutions. Further, I invite you to create new compositions based on the compositions I present in this dissertation. In my designs and in my design perspective, I put an emphasis on the intrinsic values of being in the interaction itself. However, other motivations and goals can be implemented within Designing for Homo Explorens thereby altering the design motivation slightly while keeping some of the same strategies.

As Brandt et al. (2011) point out, one should repeat the program until one is not surprised anymore. Although I sympathise with this notion, it also bears a problematic dimension since being surprised is limited by the capacity of the designers within the program. Hence, this primarily relates to the researcher’s imagination more than the actual potential of the program. I am not surprised anymore, in the sense that I feel I have fulfilled my own initial exploration of Designing for Homo Explorens. I look forward to seeing the potential that lies beyond my own imagination and hope that this program inspire compositions which will take on new forms in the future.
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Local and Global – Games in Culture and Society.


Appendix I: Tools to Design for Homo Explorens

Introduction

The traditional format of an academic discourse within interaction design is a fruitful way to disseminate and reflect on the conceptual dimensions of the knowledge contribution. However, in this process, valuable information about the hands-on craftsmanship of designing the actual artifacts is left out simply because it does not fit within this frame of academic knowledge production.

We study existing artifacts and practices, again, increasingly with an eye toward use experiences. We do all this to construct and communicate knowledge, the signature task of an academic. But when we communicate the knowledge we have constructed, we do so almost exclusively in the medium of text, with a few images. (Löwgren, 2011, p. 2)

Löwgren (2011) argues for a richer approach to communicating knowledge. His argument is for including video as a part of the knowledge contribution because the medium enables us to convey a richer understanding of what the experience of the design entails: how it sounds, how it moves and how participants interact with it. For similar reasons, this appendix includes material that is normally left out of the academic discourse. This includes links to rich video material, but is extended even further with the inclusion of non-discourse-related, yet relevant, material that contains essential knowledge for understanding the process of constructing the artifacts themselves.

In chapter 3, I argue for sketching digital material as part of designing for the unexpected. The small tweaks have significant consequences in the resulting product and the resulting interaction dynamics occurring around the project. For example, the nonlinearity described in chapter 4 is one example of something that can be difficult to comprehend without actually experimenting with its properties. Therefore, it is necessary for the researcher to better understand the technologies used to achieve them and to be able to experiment with similar principles to the ones described in this dissertation.

Through the experiments, a set of technical building blocks have emerged which represent best practices for achieving some of the qualities presented in the four aspects. For example, the synthesizer used in the Mediated Body is the first software-based polyphonic synth developed for the Arduino board. It was developed as a consequence of creating an embedded interaction interface that could also produce sounds. Likewise, advanced debugging has been missing from the Arduino platform. This made it extremely hard to design for internal complexity since it was difficult to get a sense of how the internal parameters behaved. To solve this problem, GUINO was born as a generic debugging interface that would show the different parameters and enable us to tweak them in real time.

In the following, I summarise a set of basic technical strategies to debug with Arduino when one is creating internal complexity and nonlinear signal-filtering principles; also, I detail how to create sound on an embedded Arduino platform and how to detect touch.
As the code grew from simple action/reaction-based systems to non-trivial internal complexity, we had increasing trouble making sense of what the code actually did and how the different parameters affected, for example, the sounds. To solve this problem, we had to gain a greater understanding of how the individual parameters were behaving when participants were interacting with the system in real time.

One such challenge was while testing the Mediated Body at Burning Man. Here, we only had the sounds coming out of the system to understand how the algorithms converted the touch into sound. The sensing of touch is visualised as a graph in figure 65.

It tells us that there is a noisy baseline that needs to be filtered out and that the change when almost touching was significantly smaller than the reaction when actually touching. Hence, if we treated the three scenarios equally, we would have a small change in the aura and a good change in the contact, or alternatively, have a good change in the aura, but an extreme change in the contact. The first would result in no sense of aura at all, and the latter would result in a poetic experience of creating aura, but a sound explosion in the headphones as soon as the two people touched each other. The dotted line in figure 65 represents the ideal scenario where the distance to each other would be relative to the actual sensor value. This ended up being a constant battle of tweaking different parameters to gain as much variance as possible out of a relatively small span of touch data. It was clear that I needed to design a better interface for visualising and tweaking the parameters that created the non-trivial internal complexity.

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65. A stylised example of the interaction pattern when working with touch interfaces. Without touch, a noisy baseline exists. When a hand hovers around the sensor, a small change in the signal appears. At contact, the signal increases significantly. The dotted line represents the optimal line for touch detection: no noise, a clearly detectable aura and a possibility to detect the amount of touch.
The Arduino platform provided limited possibilities for debugging as it only had a serial prompt to print out values as a long stream. Although this would give us a rudimentary idea of what was happening inside the system, it would be difficult to understand a more complex system. When one works with up to 16 real-time parameters, the stream simply becomes too saturated to comprehend.

To solve this problem I developed a tool called GUINO that enables one to visualise and tweak what is going on inside the system. The internal parameters are visualised by real-time graphs, sliders, labels and buttons which make it possible to get a general overview of what is happening; they can be tweaked to get a sense of the consequences and, ultimately, calibrate them accordingly.

Based on the graph in figure 65, one way in which the tool could be useful would be in finding the baseline. The baseline threshold parameter could then be adjusted through the GUINO interface until it would cut off the base noise of the system. This way, the system would be more reactive to initial touch and the aura would be much more present.

66. Traditional Arduino interface. The side bar is the screen where you can see what is going on inside the system.
Without this visualisation and the possibility to tweak the parameters, one had to brutally force it through the code. In this case, brute force should be understood as making an estimated guess of the value, editing it in the code and uploading it. This would then be repeated multiple times until the right value for the parameter was archived.

Finally, the tool had the possibility to save the parameters in the EEPROM of the board and retrieve them when the board was rebooted. This enabled us to separate the tweaking parameters from the embedded code. So, instead of having to upload a new version of the code (as we did in the dust of Burning Man), we could quickly plug in a computer, tweak the parameters, save the changes and let the performer run around again. In terms of the internal complexity argument from chapter 3, the tool enabled the designer to quickly tweak the sweet spot while experimenting in the field.

Instructions on how to use the system and the source code can be found here:

http://www.instructables.com/id/Guino-Dashboard-for-your-Arduino/

67. This screenshot illustrates the elements that the GUINO interface accommodates: graphs visualise analogue data, buttons create interactions with the Arduino board, and sliders help visualise single values in real time, and also in tweaking the values.
FEATURES OF THE GUINO INTERFACE

Custom design your interface from the Arduino board

You define which sliders, graphs and buttons you need for your interface. You do this in your Arduino sketch which means that the GUINO program acts as a slave to the sketch. All information is stored in your board.

Visualise and manipulate real-time data

Whether you are making an RGB light controller or a robot arm, getting graphical feedback is crucial for understanding what is going on inside the board. This enables you to know whether it is your hardware or the code that is causing the problem. Further, the sliders and buttons enable you to tweak the individual parameters in real time. This way, you can see what effect different thresholds have on the interaction.

Save the parameters in the board memory

When you have tweaked the parameters, you can save them to the EEPROM of the board. The parameters will be autoloaded next time you power on the board, even if the computer is not connected.

Use the same app for all your Arduino projects

I have made tons of small apps for different projects. My problem is being able to find them again a year later. Because we save everything in the Arduino, I only need to keep one app around, and the Arduino will automatically configure the app for the current project.

Prototype the interface before you turn on the soldering iron

Because you can design the GUI as you like it (within reasonable limits), you can prototype the interface before you have made a physical interface. This also enables you to divide the tasks between multiple people, e.g., one person is working on the hardware and another person is working on the code. When you have made the physical interface, the GUINO will integrate seamlessly.

Use it as a fullscreen dashboard

You can use it as a fullscreen dashboard by pressing 'F', and pressing 'T' toggles the visibility of the settings panel. You hereby only present your custom interface for the world around you.

Control the background colour

The background colour can be controlled from the Arduino which enables you to create different colours for different sketches. It can also be used to make alerts when something is wrong; for example, changing from green when everything is okay to red when something is wrong.

Fast and slim

I have taken great care in making the footprint on the Arduino as small as possible—it only stores a minimum amount of data in the memory (concretely a pointer list of 100 items). This setting can be changed lower or higher depending on the amount of GUI items you intend to have in your interface. Further, the system relies on the EasyTransfer library which transfers the information in binary form. Each package consists of a byte for command, a byte for item number and an integer for the value. Ideally, all your data should be normalised to a 16-bit signed integer range. This means optimal usage of the serial port when working with integers (technically, we use a little extra space for a checksum).
Nonlinear internal complexity with running average

The input from touch-based systems is most often quite noisy. Within engineering, a whole array of different approaches to this problem exists (Kalman filtering, Bandpass filtering, etc). When sketching new interaction designs, what is commonly known as 'running average' has proven to be a good enough, quick-and-dirty solution to most problems and, moreover, the limitations of the running average can be used as an advantage when working with the aesthetic qualities of interaction design.

When used as a noise filter it takes a noisy input signal, sums it up and gives you the average of it. The trick is that it does not require you to keep all historical data in large tables, run through them and do the average. Instead, it calculates the average on a continuous basis through a relatively simple formula.

As an unwanted side effect, the more filtering, the greater the delay the filter will generate. The delay presents itself as lowered reaction time to change in value. This means that the reaction from, e.g., a touch sensor is delayed as a consequence of the filter. Although this would, from an engineering point of view, be considered a flaw in the algorithm, it can generate interesting interaction qualities in the designs. As a consequence of the delay, one can decide the sensitivity of the formula by tweaking the reaction time of the individual patterns. For example, if one wants to create a slow reaction, one can average over a greater amount of data.

Figure 68 shows the noisy signal coming in from the touching/sensing and how it looks (slightly idealised) when it has been filtered by a running average. The formula for the running average looks like the following:

```c
float raw = 0;
float filtered = 0;
while (true)
{
    raw = readSensor();
    filtered = filtered * 0.9 + raw * 0.1;
}
```

In the above version, the filtered signal is set to 90% of the previous filtered version plus 10% of the raw signal. By tweaking the balance between the two, one can achieve different levels of filtering depending on the amount of noise that needs to be filtered.

68. Basic running average example. It takes a noisy input and turns it into smooth curve.
Figure 69 illustrates different patterns that can be created varying the delay of a running average by adding or subtracting them in real time. The code would look something like this:

```plaintext
float raw = 0;
float amountOfTouch = 0;
float amountOfTouchOld = 0;
float amountOfActivity = 0;
float amountOfChange = 0;
float amountOfEnergy = 0;

while (true)
{
    raw = readSensor();
    amountOfTouch = amountOfTouch * 0.9 + raw * 0.1;
    amountOfChange = amountOfChange * 0.9 + abs(amountOfTouch - amountOfTouchOld) * 0.1;
    amountOfActivity = amountOfActivity * 0.99 + amountOfChange * 0.01;
    amountOfTouchOld = amountOfTouch;
}
```

By combining multiple running averages, one is able to create different patterns that correlate to different perceptions of the interaction. This way, a simple running average enables one to create fluid, analogue interactions instead of binary on/off interactions. This is essentially what the nonlinearity argued for in chapter 4 is based on.
Embedded synthesizer based on Arduino

For the Mediated Body project, I had the problem of creating a portable sound system that was capable of creating rather complex, interwoven patterns of sound. At the time, most embedded sound systems were too simple to be interesting; they would usually consist of a simple tone generator with only one square wave frequency. These systems would not create sounds engaging enough for the participants to explore. To solve this, Möbius (n.d.) pushed the limits of what was previously possible with an Arduino board. Through an intricate pattern of bit-shifting and low level interrupts, he managed to create something that resembles music that would come out of an old 8-bit Gameboy.

It was definitely not measuring up to the sound standard we have become used to in our everyday life, but it proved to be just enough to create an engaging experience when it comes to touch interaction.

It is an 8-bit, four wavetable polyphonic synth, and as a default, it includes the classic wavetables sine, square, triangle, and noise, with the ability for custom wavetables to be created as well. Through envelopes and a little sequencer, it is possible for one to compose unique compositions. It requires only a few simple components to operate and, at the time of writing this dissertation, it remains one of the simplest synthesizers to use and hack for different interaction projects within the Arduino environment. If one wants to replicate the functionality of the Mediated Body or the Touchbox this synth is one of the core components used.

One can find full instructions on how to build it here:

http://www.instructables.com/id/Turn-your-Arduino-into-a-4-voice-wavetable-synth-w/

An alternative synth based on the same principle can be found here:

http://www.instructables.com/id/Algorithmic-noise-machine/
Touch-sensing technologies with an Arduino board

Many ways to detect touch were experimented with as a part of the developmental process. It was a tricky task to get a clear-enough signal so that one could create sensible interaction, and many technical solutions were used in the designs depending on the qualities we wanted to achieve and the physical properties of the installation. It would not be uncommon for the signal to completely vanish because the system was too grounded. In other circumstances, grounding would be an essential requirement to get any signal at all. Since each type of touch-sensing technology possesses different kinds of aesthetic qualities and technical limitations, I find it relevant to present the different types of touch sensing used in the projects and their strengths and weaknesses.

Capacitive touch sensing

Capacitive touch sensing is a common way of sensing touch within tangible computing. It is based on an instrument invented by Léon Theremin. The instrument detects the capacitance between an antenna and the human body. The capacitance then affects the frequency of a sine wave. Since the distance between the human body and the antenna is relative to the capacitance, it creates violin-like sound qualities depending on the distance between them. It is not necessary to touch the antenna and, therefore, it serves as an efficient way of sensing the aura between the object and the body. Even though it traditionally consisted of an antenna, it could just as well be anything else that is conductive. This includes, but is not limited to, plants, human bodies, water, metal objects, fruits, vegetables, etc.

As nifty as this principle is to create touch interaction, it comes with a set of technical limitations. For capacitance to appear between the two objects, it is necessary for both of them to be grounded. This means that the human touching should not be isolated from the ground and the designed artifact has to be connected to a main power supply or similar. Therefore, it is not an efficient technology when it comes to interfaces that should be able to move as a part of the interaction. Further, the system always detects the highest level of capacitance and is therefore unable to detect the presence of multiple people touching at the same time. The person who is closest to the sensor will be the one who determines the readout and response from the system. Finally, larger sensing areas or high amounts of aura add higher amounts of noise which requires more noise filtering.

The first version of the Singing Plant installation was based on this principle. Here, the plant served as the antenna for the capacitive sensing. We always had difficulty making sure the system was grounded and that the plant itself was isolated from the ground for it to work. Further, the amount of aura highly depended on the type of plant used: large leaves create a nice sense of stroking the plant, whereas many small leaves created an aura-reactive interface where the participants did not even have to touch the plant to interact with it. If the aura became too sensitive, the participants would be confused as the plant would react based on the mere presence of people in the space and even before they began to touch it. This was solved by trimming the plant to a smaller size.

The most common library for capacitive sensing on the Arduino platform is the CapSense library by Paul Badger:

http://playground.arduino.cc/Main/CapSense
**Arduino touche**

Sato et al. (2012) presented a much more advanced iteration of the traditional Theremin capacitive touch sensing. It is based on a frequency sweep response. By alternating the internal frequency of the sensor, it is possible to get a capacitive response on multiple frequencies at the same time. This enables the system to detect minute variations of touch, e.g., whether one is holding a glass of water, one is dipping their finger in it or touching with two fingers.

Touche proposes a novel Swept Frequency Capacitive Sensing technique that can not only detect a touch event, but also recognize complex configurations of the human hands and body. Such contextual information significantly enhances touch interaction in a broad range of applications, from conventional touchscreens to unique contexts and materials. (Sato et al., 2012, p. 1)

This is by far the most advanced way of sensing touch, and it opens up a whole new set of interactive possibilities wherein the system creates interactive nuances based on the interactions. Currently, the system is mainly limited to touch interaction and is not capable of sensing aura-like interaction when participants wave their hands in the air.

Disney Research have never made their code and schematics publicly available thereby limiting the possibility for others to use it. This is a clear example of my argument for this appendix. Without the code and the schematics, it is impossible to replicate their findings or build on top of them. Instead, it is limited to a novel concept only available as a conceptual paper one can reference. To circumvent this problem, Møbius (n.d.) and I set out to replicate their system on the Arduino. We succeeded to get a similar version up and running based on their principle. Our version of the Touche touch principle has been published with open source schematics and source code here:


If one would like to create a singing plant based on this touch interface, instructions for it can be found here:

Signal to noise ratio

Signal to noise ratio is by far the most stable system to use. It works in harsh conditions like a rainy day at the Roskilde Festival or a dusty playa at Burning Man; therefore, I consider this principle my all-time favorite way of sensing touch. It detects the amount of connection between two electrical points using two antennas as sender and receiver. The amount of artificial data coming from one antenna to the other correlates with the amount of contact between the two points. The code for this principle can be boiled down to the following:

digitalWrite(39,HIGH);
delayMicroseconds(5);
high = analogRead(0);
digitalWrite(39,LOW);
delayMicroseconds(5);
low = analogRead(0);
signal = (high - low);

Set the signal for the first antenna high and read the signal from the other. Then set the signal low for the first antenna and read the signal from the other. The difference between the two equals the amount of signal that will come through. If the two antennas do not touch (or are not within near proximity), the result will be around zero. If the two touch, the signal will go up significantly. It is recommended to use the running average presented above to get a sum over time for the readout.

The Medusae Nilfisk installation was perfect for this system, since it was based on physically creating a connection between two points. With the Mediated Body and the Touchbox, this was achieved through electrical contacts in the headphones. This turned the two participants into two antennas; one antenna would be the sender and one would be the receiver. In the Electrolumen installation, this was extended to a four-point contact interface by alternating which contact was the receiver and sender, respectively. The code for the installations using this principle can be found here:

Electrolumen:
https://github.com/Illutron/electroLumen

Medusae Nilfisk:
https://github.com/Illutron/MedusaeNilfisk

Mediated Body:
https://github.com/madshobye/mediatedBody

Touchbox:
https://github.com/madshobye/touchBox
74. A simple Singing Plant setup. It consists of a flower, the box that converts touch to sound and a pair of headphones for sound.

73. A diagram of simple touch sensing with signal to noise ratio.
Appendix II: Manifesto of illutron

Manifesto 1.1

illutron is a haven for innovative thinking between art and technology. The physical location is a rusty barge in Copenhagen Harbour.

Here submarines and space rockets are built. Scrapped industrial robots are brought back to life. Here singing plants grow and classical music plays together with electronic music.

illutron is a space for adventure and experimentation. Artistic and technological frontiers are challenged. Experiments can be based on intuition instead of reason.

Here people are creators, not consumers. Here the audience are participants, not passive observers. Here anything can happen.

Creative thinking emerges from below, and as long as a fertile creative environment is fostered, small seeds can find nourishment and grow roots and flower.

Technological progress happens in dialogue with the surrounding society and refers to both the past and the future. Our art is a joint creative process in form of a group in dialogue between the group members and with cultural undercurrents in society. Art involves the audience, and they become actors in dialogue with the work of art and its story.

Illutron offers collective illusions, fascinating illustrations and blinding illuminations, embracing new inspirational stories in and about the world.

We make the works of art and source code available under the name Creative Commons. We encourage others to expand on our work.

Our work:

- Fosters interaction with the audience
- Is a living process and not a static product
- Is based on recycled materials
- Refers to its inspiration in society
- Credits all involved (including the tea person)
- Makes the works of art and source code available under Creative Commons.
- Encourages others to expand on the work, as long as illutron is credited.

This manifesto may not be printed on dead trees, but must be in dialogue with the times/our time and illutron's members. If it takes on fixed and recognisable forms, the project has stranded/run aground.
Appendix III: Photo credits

**Figure 7:** Both images by Mathias Vejerslev.

**Spread on page 28:** Right image by Mathias Vejerslev.

**Spread on page 32:** All images by Schack Lindemann.

**Spread on page 40:** Top-left, Top-right by Schack Lindemann. Bottom-left, Middle, Bottom-right by Mathias Vejerslev.

**Spread on page 48:** All images by Magnus Kaslov.

**Spread on page 52:** Bottom-left, Top-middle, Middle-full-height by Mathias Vejerslev.

**Spread on page 72:** Bottom-left, Top-middle, Bottom-right, Top-right by Kim Rune.

**Figure 22:** Mathias Vejerslev.

**Figure 26:** Mathias Vejerslev.

**Figure 36:** Magnus Kaslov.

**Figure 37:** Top-left, Bottom-left by Mathias Vejerslev. Right by Schack Lindemann.

**Figure 38:** Schack Lindemann.

**Figure 39:** Schack Lindemann.

**Figure 40:** Schack Lindemann.

**Figure 55:** Kim Rune.
Appendix IV: Experiments, publications and exhibitions

Throughout the course of my PhD studies I have been involved in many exhibitions, experiments and publications. Below is a summary of the most relevant ones.

Exhibitions and experiments

As an integrated part of the knowledge construction, many experiments and exhibitions have been completed. These served as ways of understanding the interaction of the participants. The exhibitions and experiments from 2004 to 2009 predate the PhD degree period; however, they are part of the list because knowledge gained from them was included in the overall knowledge contribution of Designing for Homo Explorens:

• Odense Main Street 2012 – Hydraphonia
• CHI Interactive 2012 – Touchbox
• Magic Mama Event 2011 – Touchbox
• Wired Mind 2011 – The Megaphone Project
• EmergenceAndSee Conference 2011 – The Mediated Body
• Click Festival 2011 – The Megaphone Project
• H.C. Ørstedsparken 2011 – Find My Twin
• Burning Man 2010 – The Mediated Body
• Roskilde Festival 2010 – Electrolumen
• Kvickly Copenhagen 2009 – Barcode Beats
• Kunsthallen Brandts 2009 – Shared Robotics
• Skanderborg Festival 2009 – Lotus illutronica
• Inkonst Malmö 2008 – Ladies’ and Men’s Room Mixup
• Roskilde Festival 2008 – Explosion Village
• Ørestaden 2008 – CPH Add – 8-bit Traffic
• Robots at Play 2008 – The Singing Plant
• Botanical Garden 2007 – The Singing Plant
• Charlottenborg Forårsudstillingen 2007 – The Machines Are Having Fun
• Roskilde Festival 2007 – Medusae Nilfisk
• DGI Byen 2005 – The Singing Plant
• Tingbæk Kalkminer 2005 – The Singing Plant
• Half Machine 2005 – Colour-Changing Clouds
• Half Machine 2004 – The Singing Plant
• Roskilde Festival 2004 – The Singing Plant

Publication

During the course of my PhD programme, the following papers have been published about my research process. They could have been compiled into a collection, but I wanted to go further and create a more unified whole. After reworking and revisiting the following papers, I was able to incorporate the ideas into this more coherent, monographic dissertation.


Dissertation series in

**New Media, Public Spheres and**

**Forms of Expression**

Faculty of Culture and Society
Malmö University
