Embodied Interaction in a Hacker Lab Approach

Maja Fagerberg Ranten
Malmö University
School of Arts and Communication
Interaction Design
majafagerberg@gmail.com

ABSTRACT

Situated in the field of interaction design, this paper explores design practice in a Hacker Lab approach.

This paper presents the digital interactive installation, *8640 Litres of Air*, made in a Hacker Lab approach, as a basis for a discussion and reflections on methods and processes. In the Hacker approach, a collaborative team explores materials in a playful manner where cognitive thinking and knowing is overruled by action and body in a phenomenological embodied interaction.

The paper argues that methods merge, and discuss the benefits and evolvement of research through design. The paper concludes that the embodied interaction in the iteration of prototypes becomes an important part of the process and the distinction between designer and user is blurred, which positions the Hacker Lab method as an interaction between Lab and Field with a phenomenological approach.

Categories and Subject Descriptors

H.5.2 [User Interfaces]: Prototyping, Theory and methods.

General terms

Design. Experimentation. Theory.

Keywords

Interaction Design, Research Through Design, Embodied Interaction, Hacker Lab Approach.

1. INTRODUCTION

It could be described as a paradigm shift, in design research, to approach research regarding design, art, and technology as a process rather than merely considering its function and results [4]. However, design and technology has, since the 1960's, been viewed through different traditions and methods of more process based understandings. Within design, Participatory Design has opened the field of interdisciplinary work with different stakeholders (e.g. [8]). From the tradition of Science and Technology and Studies (STS) and Actor–Network Theory (ANT) comes a more constructivist view on technology (e.g. [11]). Where technology previously was seen as an independent development force with its own agency, not affected by social and cultural forces, the constructivist thinking is inversely about the interaction between technology and society, an approach where interaction is the evolving force and where technology is not reduced to a medium.

The paper will introduce the prototype *8640 Litres of Air,* a digital interactive installation made by a collaborative team working in a Hacker Lab approach, but the discussion is centered on reflections on methods and processes with the Hacker Lab method as a basis for the discussion about research through design and the division of Lab and Field.

The Hacker approach is a collaborative teams exploration of materials in a playful manner, where cognitive thinking and knowing is overruled by action and body in a phenomenological embodied interaction.

The mix of theory, research and creative practice is based on the understanding that knowledge is not only generated by text, but also through practice. Furthermore experiencing art is driven by perception, and perception is an active process that requires presence, which constructs an experience through interaction [5]. Thus, the testing of the installation in a use situation gives an additional knowledge base. And especially the team member's constant perception (the embodied interaction with the materials and the context) has been the source of the iterative process of creating the prototype. Creative practices can contribute to new knowledge, and thus the opportunity for reflection and evaluation occurs.

2. INTRODUCING 8640 LITRES OF AIR

8640 Litres of Air is a prototype of a "breathing" tunnel that explores body movement and awareness of different senses by playing with light, temperature, sound, and movement within the tunnel. The goal is to make an abstract experience where participants create their own meaning and personal experience of being inside the tunnel, leaving room for ambiguity in the interpretation and perception of the experience, accommodating Gaver et al.'s [7] argument for ambiguity as a resource for design. It is suggested that ambiguity is perceived as an opportunity, as opposed to traditional Human-Computer Interaction (HCI) where it is considered a problem if the user do not get the clear meaning of the interface. Additionally ambiguity can encourage personal engagement with systems, freeing users to make individual interpretations, as the designer only suggests perspectives without imposing solutions: *"... ambiguity frees users to react to designs with scepticism or belief, appropriating systems into their own lives through their interpretations"* [7].

The title, 8640 Litres of Air, represents the amount of air in the prototype, and the average number of air a person respire in a day. It is represented in the work through air in the walls moving as breathing in the tunnel.

The prototype is made out of transparent big plastic bags (Figure 1), computer controlled fans blow air into them in a relaxed breathing rhythm pattern. The floor is made out of baby napkins and foil build as buttons connected to LED spot lamps and sounds, that are activated by the participant's movement inside the tunnel (Figure 2). The light changes through the tunnel from a cold icy blue color to a warm orange, while the sound (a combination of rumbling volcano and a breathing rhythm) changes in speed. In the cold icy blue end of the tunnel, the breathing sound is fast and it slows down in the warm orange end, similar to the effect temperature has on breathing. When it is cold the heartbeat increases and when it is warm it decreases.

Figure 1: The prototype 8640 Litres of Air.

The technical setup is controlled from Pure Data [14], serving as the central unit of the setup, it takes input from an Arduino [1] board reading the floor, and sends it as output through another Arduino board to six DMX LED lamps, and once again as output through yet another Arduino board to the computer controlled fans and directly to speakers.
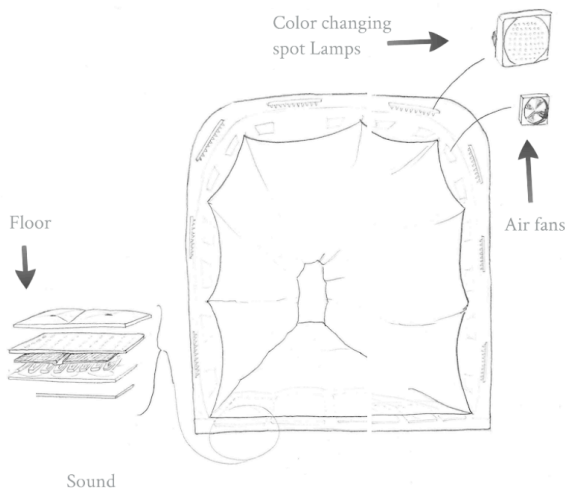

Figure 2: The setup in 8640 Litres of Air
Illustration by Maike Naho Matsuda

2.1 Related Embodied Work

Carsten Höller and Olafur Eliasson are both artists working with large-scale installations within the same embodiment theme. Both are known for working in a laboratory testing manner, resembling interaction designers in a research project. Höller, as a former scientist, is now exploring the limits of human perception, while Eliasson, with his empire of workers, is exploring light.

Both Höller and Eliasson's work is sometimes on the edge of being an experience similar to a ride in a theme park, only situated in a new context: Höller's *Experience* (2011), a large rollercoaster is placed within a museum and Eliasson's *Din blinde passager* (2010), a 90 meter long tunnel placed in a museum.

Both works operates with potentially giving its audience an experience of being in a transition area, between the real world and something else, this is indeed related to 8640 Litres of Air. The experience of entering 8640 Litres of Air could be seen as a liminal phase, the tunnel being a transition between the real world and an unknown mystery. Another commonality is the placement of something familiar in a new context and the potential change in the state of mind of the participants.

3. THE HACKER LAB METHOD

3.1 The Methods Used in "8640 Litres of Air"

In the work process surrounding the prototype for 8640 Litres of Air we've been exploring technology in a Hacker Lab approach, experimenting with different technological solutions and materials to let the concept evolve through experiments and iterations of prototypes. The work is similar to the Lab approach as described by Koskinen et al. [12], with the combination of a hacker culture working with the programming environments and embedded platforms like Arduino and Pure Data, hacking technical digital devices to use digital material as prototyping tools in the installation (Figure 3).

Figure 3: The team working in the Lab

Additionally one team member did fieldwork consistent with ethnographic practices. A practice frequently imported into interaction design, focusing on social relationships and processes in the social space. Furthermore we have done user testing, thereby broadening the Lab approach to the outside world.

The use of the Hacker Lab method has been a playful experience, mixing the arts anarchistic explorative approach with the seemingly calculated language of software. The material became the immediate approach to the process and the use of fieldwork and testing became a parallel process serving to see if we were going in the right direction.

3.2 The Lab Method as Research

The lab method is referred to as being the mainstream in design research in the field of technical design, it orients from natural science and within design research it is close to experimental psychology. From observing and identifying what happens to variables changing, to research focusing on perception, emotions, and social skills. Meaning emerges in interaction, acting-in-the-world, reflection-in-action, phenomenology etc. [12].

The lab is attractive to design research, because it lets us think about research as exemplary processes of inquiry, rather than as finalized results [2]. Furthermore Binder stresses that the Lab method can be compared to an artist's atelier. Another benefit of the labs controlled environment according to Binder, is that it is an *"as-if-world",* a setting where you can explore without deciding if it should be translated into a more permanent reality [2].

The strength of the lab is the interaction between the team members and the communication between the team members and the material.

3.3 Research Through Design

Communication and material is also explicit in the three design research relations: Research *for/into/through* design. In the first two, design and research can be divided, whereas in research *through* design, design and research cannot be separated. Research through design entangles the relationship between the material and the social aspect, and it reveals how research is done through design, and design through research [4].

Another strength in research *through* design is the flexible interaction between practice and theory. In the process of making 8640 Litres of Air the focus has been on exploring, thus letting us twist and turn methods and theory as needed.

3.4 Beyond Research Through Design

In recent years many have challenged the term *research through design* looking to position research more clear in relation to design practice. Brandt and Binder proposes the term *constructive design research*, referring to design research where construction takes the center place and becomes the key means in constructing knowledge [3].

Hobye and Löwgren proposes *research through explorative-design*, a combination of experimental design in the Lab and explorative design in the Field. This method is of special interest in the embodied interaction field beyond established interaction-design methods [9].

Research through explorative-design shows the connection between Lab and Field as an intertwined relationship, in the process of embodied interaction. Where Hobye and Löwgren take their concept "Mediated Body" from the Lab to the Field, we took the Field to the Lab by inviting people to the lab for testing.

In addition to the intertwined relationship between Lab and Field the team members are likewise part of the intertwined relationship between lab and field.

3.5 Embodied Interaction Through Research

"...*I touch the world, certainly I do when I handle materials in the creative process, and these materials touch me back, challenging my autonomous role as creator of knowledge and bestower of meaning*" [13].

In the collaborative work process in making 8640 Litres of Air, the Lab is about more than materials and technology. The team members' interaction with the material, own bodies and memory influences the process. Our embodied interaction with the materials and prototypes becomes part of the process and blurs the distinction between designers and users and that places the Hacker Lab method as an interaction between Lab and Field with a phenomenological approach.

From Schön's *reflection-in-action*, acknowledging the designers reflective conversation with the material [10], to a constructivist experience-based approach, where the researcher is an active part of the process. From an objectivist approach this would be viewed as a source of error, that the researcher actively engages and participates in the process - but this has provided in adding more layers to our exploration and has given a new knowledge base.

"Embodied interaction is the creation, manipulation, and sharing of meaning through engaged interaction with artifacts" [6]. The users lead to the final prototype through engaged interaction with the artifact. As stated by Dourish, work is both dependent and defined by the viewer's interaction and being: *"Users, not designers create meaning and communicate meaning"* [6]. Challenging and twisting Dourish's statement this also includes designers (being phenomenologists) when the role of the designer and user merge.

3.6 Towards a Conclusion

Research through the Hacker Lab method is constituted by the addition of the real world, the Field and the Lab complement each other. In research through design, design becomes as much a medium and a process of research as a result.

Design and art practice is not a linear process, trying to categorize methods and work towards general rules and fixed results is utopia. Process based work is more complex. At the same time, it is part of human nature to categorize, measure, and be solution-oriented in spite of, and sometimes as response to the complexities in a process. In reality methods merge and iterations between different approaches are needed.

It makes sense to include objects and materiality in the study of interaction design, both as the actual artifact, but also living through and with various digital technologies. Add to that the actors, the team members' embodied interaction with the digital material and the way they all affect the process.

4. CONCLUSION

The strength of the Hacker Lab approach lies in the interaction between the social and the digital material. Materiality of digital interaction design is not only the digital material, but also a constant interaction between concept, perception and context. In the Hacker Lab method, the separation between Lab and Field merge, and the embodied interaction in the iteration of prototypes becomes the essence of the process where the distinction between designer and user is blurred.

The process in interaction design is a complex affair designed and influenced by people, materials and context. Thus, 8640 Litres of Air is dependent on both technology and human agency. Installation and humans act in the interaction between interpretation, perception, and experience on the one hand and context, prototype, and technology on the other.

2. REFERENCES

[1] Arduino. *http://www.arduino.cc*. 16.01 2013.

[2] Binder, T. 2007. *Why Design Labs?*. Design Inquiries. Stockholm. www.nordes.org.

[3] Brandt, E., Binder, T. 2007. *Constructive design research*. Chapter 1 in *Experimental Design Research: Genealogy - Intervention - Argument*. In Proceedings of IASDR, 1-9.

[4] Bærenholdt, J. O., Simonsen, J., Büscher, M. and Scheuer, J.D. 2010. *Design Research – Synergies from Interdisciplinary perspectives*. Routledge, 1-15.

[5] Candy, L. and Edmonds, E. 2010. *The Role of the Artifact and Framework for Practice-based research*. In (Ed.) Biggs, M. and Karlsson, H. 2010. *The Routledge Companion to Research in the Arts*. Routledge, 120-137.

[6] Dourish, P. 2001. Where the action is: The Foundations of Embodied Interaction. MIT press.

[7] Gaver, W. W., Beaver, J., Benford, S. 2002. *Ambiguity as a Resource for Design*. CHI 2003 submission.

[8] Greenbaum, J. and Kyng, M. 1991. *Design at Work - Coorperative Design of Computer Systems*. Erlbaum Associates Puplishers, London.

[9] Hobye, M. and Löwgren, J. 2011. *Touching a stranger: Designing for engaging experience in embodied interaction*. International Journal of Design, 5(3), 31-48.

[10] Ingemann, B. 2010. *Designing an exhibition*. In (Ed.) Bærenholdt, J. O., Simonsen, J., Büscher, M. and Scheuer, J.D. 2010. *Design Research – Synergies from Interdisciplinary perspectives*. Routledge. 2010, 138-155.

[11] Latour, B. 1991. Technology is society Made Durable. In Law, J. A sociology of Monsters: essay on power, technology, and domination. Routledge, 103-131.

[12] Koskinen, I., Binder, T. and Redström, J. 2008. Lab, Field, Gallery, and Beyond. Artifact, 2:1, 46-57.

[13] Kozel, S. 2010. The Virtual and the Physical: A Phenomenological Approach to Performance Design. In (Ed.) Biggs, M. and Karlsson, H. 2010. The Routledge Companion to Research in the Arts. Routledge, 204-222.

[14] Pure Data. *http://puredata.info*. 16.01 2013.