TEXTILE

AUGMENTING TEXT
IN VIRTUAL SPACE

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Abstract

Three-dimensional literature is a virtually non-existent or in any case very rare and emergent digital art form, defined by the author as a unit of text, which is not confined to the two-dimensional layout of print literature, but instead mediated across all three axes of a virtual space. In collaboration with two artists the author explores through a bodystorming workshop how writers and readers could create and experience three-dimensional literature in mixed reality, by using mobile devices that are equipped with motion sensors, which enable users to perform embodied interactions as an integral part of the literary experience.

For documenting the workshop, the author used body-mounted action cameras in order to record the point-of-view of the participants. This choice turned out to generate promising knowledge on using point-of-view footage as an integral part of the methodological approach. The author has found that by engaging creatively with such footage, the designer gains a profound understanding and vivid memory of complex design activities.

As the outcome the various design activities, the author developed a concept for an app called TEXTILE. It enables users to build three-dimensional texts by positioning words in a virtual bubble of space around the user and to share them, either on an online platform or at site-specific places. A key finding of this thesis is that the creation of three-dimensional literature on a platform such as TEXTILE is not just an act of writing – it is an act of sculpture and an act of social performance.
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Introduction

Before the invention and widespread availability of printed books and other forms of mobile media, the phenomenon of writing was confined to fixed formations and environments, inscribed on stones, caves and architectural structures. The act of reading such texts required the reader to be physically present in a particular place and often move through space in order to read the text. The creation and experience of literature demanded embodied interactions in a site-specific context. As technologies of writing have evolved – and especially with the latest advent of digital media – these characteristics of text mediation seem ancient, inconvenient or exotic, at best. Today, text is retrieved at the mere push of a button and made available to anyone, anywhere, at any time. Information is no longer regarded as a precious resource that you have to physically seek out in given places, but rather as a ubiquitous matter of course. Yet, digital media and interactive technology is accelerating into the domain of our spatial awareness, inviting for embodied interactions in site-specific contexts. Virtual objects and information perceived and manipulated in mixed reality environments have indeed become the talk of the town these days, and it seems that the industries of science, art, design and entertainment find no limits to the application of spatially immersive technologies, such as virtual reality and augmented reality. Ironically, three-dimensional text mediation appears to have dodged the crosshairs of digital developers.

3D-lit: A Definition

To my knowledge, three-dimensional literature is a virtually non-existent or in any case very rare and emergent phenomenon. Of course, text does exist in the three-dimensional spaces of our physical environment – typical instances include traffic signs, advertisements and graffiti, and less ordinary instances include commissioned engravings on buildings or pavements and small or large scale sculptures and art installations made of letters, words or sentences. What these examples have in common, though, is that text (perhaps with the only exception of sculptures and installations) is always constrained on two-dimensional surfaces. Thereby, the structure of text never becomes truly three-dimensional and for the most part complies with the ancient standard of the two-dimensional print layout – horizontal lines of text moving from left to right.

I define three-dimensional literature (3D-lit) as a cohesive unit of digitally mediated text, which is not confined to two-dimensional planes and does not conform to the rigid layout tradition of print. 3D-lit is a constellation or arrangement of words that extends across all three axes of a virtual space and can move or progress in any direction.
The three-dimensional characteristics of 3D-lit are experienced via spatially immersive display systems, which create the illusion of space by rendering the visual structure of the text in correspondence to the (physical as well as virtual) movement of the reader. In my definition, 3D-lit is created for poetic, narrative, artistic and otherwise aesthetic purposes and I believe that this new art form or literary medium will emerge as a natural evolution of Concrete poetry and electronic literature (E-lit) in the modern context of spatially immersive technology.

To my amazement, I have not been able to find any related works that reflect my idea of three-dimensional literature, which is what drives the motivation behind this design-based research project. Also, it is why I believe that my project is both relevant and new, in terms of Löwgren’s (2007) criteria on academically valid knowledge contributions within the Interaction Design community. I believe that in developing a new type of three-dimensional text mediation I will generate design knowledge, which will be relevant and valuable to designers, developers and scholars alike, once the technology of mixed reality media becomes much wider applied across the world. This thesis will focus on poetry as the subject for three-dimensional text mediation, but I am confident that my research will also contribute to the development of interactive, immersive text environments outside a poetic context, such as learning environments, web browsing etc.

**Design Focus**

As an amateur poet and interaction designer I have worked on this subject before – my first thesis project focused on transforming the traditional, two-dimensional structure of text into a three-dimensional, virtual landscape of text, which the reader had to traverse in order to read. The literary design material I worked with was a 60-page long poem that I had written myself and managed to build in the Unity game engine as a static construction of text, which the reader could experience on a computer and navigate via the mouse and keyboard.

In this thesis, though, I will not employ any of my own poetic texts nor focus on the three-dimensional mediation of one particular work, but instead attempt to develop a medium or platform that enables any author to create 3D-lit. This thesis investigates how both a writer and a reader could create and experience 3D-lit on mobile touchscreen devices, such as tablets and smartphones. By utilizing the interactive capabilities of the motion sensors on such devices, the project will explore how a user would perform embodied interactions as an integral part of both the creation and experience of 3D-lit in mixed reality or ‘blended spaces’. The ultimate goal of the investigation is to develop a concept, a platform and a set of embodied interactions, which the user performs in order to create and experience three-dimensional literature on mobile devices.
Methodology

I regard mixed reality 3D-lit as a fundamentally hybrid art form – although the mediation of literature is its primary objective, embodied interactions in a performative, spatiotemporal environment will also be central to the phenomenon and experience of 3D-lit. Therefore, it is clear that a successful exploration of this complex, hybrid art form must adopt an interdisciplinary approach. In order to develop a well-informed medium for the creation and experience of 3D-lit, I will collaborate with two artists: Anna Navndrup Pedersen, an interaction designer, architect and installation artist, and Rasmus Halling Nielsen, an experimental poet. They will act as experts in their respective fields, the three of us covering the subjects of ‘the body’, ‘space’, ‘interactive environments’ and ‘electronic literature’. The main activity of my design process is an artistic bodystorming workshop, where we will collaboratively sketch and improvise prototypes of 3D-lit, using physical materials and an iPad as the visual entry point and interface for interaction.

Bodystorming

Bodystorming is a user-centered design technique used for design activities ‘in the field’ (Koskinen et al., 2011). Schleicher et al. (2010) define bodystorming as “a form of prototyping in context, and is enacted instead as a technology directly supporting collaborative embodied cognition.” (Ibid., p. 47) Unlike brainstorming, the approach puts designers directly in the context of the environment that they are designing for, and by simulating these real life situations bodystorming helps the designers overcome some of the natural shortcomings of ‘round-the-table’ ideation in an environment, which is unrepresentative of the real life situations that they are designing for. (Oulasvirta et al., 2003) Bodystorming thereby requires the designers and participants “to act first, as physical actors in a situation, not as conceiving designers distanced from things.” (Schleicher et al., 2010, p. 48) Although my bodystorming workshop will be held in a dance studio, which is arguably not the real-life space or context of the product or service that I want to design, the decision was made because I wanted us to improvise in a big room, spacious enough to move around in and without any physical obstacles blocking free movement. I would also argue that when designing many types of applications for mobile devices, the technology itself can be considered as the ‘field’; the body and the embodied interactions with the device as the real-life situation and context, because our interactions with mobile devices are mobile and less dependent on the physical surroundings.


**Editing Various Documentation Materials as a Way of Processing Complex Design Activities**

During the bodystorming workshop we will produce several forms of documentation, such as video footage and written reflections about our experiences, and I shall regard these not only as documentation materials but also as design materials, through which I will gain a better understanding of our bodystorming and ideation process.

In the paper ‘Toy Trucks in Video Analysis’ (Buur et al. 2015) the authors describe their method of using video, not just as means of documentation but as an integral part of the design process. In collaboration with a team of industrialists, researchers and graduate students the designers used toy trucks as scale models to reenact video footage of forklift drivers during their everyday activities, in order to gain a deeper understanding of how these drivers work. The authors argue that even though designers often record video material in user-centric field studies, the primary motivation behind it is simply because “designers have little time to spend in the field, and because the human practices one can observe are complex and difficult to understand.” (Ibid., p. 200) They problematize this approach by pointing out that the large amounts of video footage produced in such studies need to be analyzed in order to add real value to the designers. They argue that the video footage could be analyzed with a valuable outcome if it is regarded as a design material for collaborative meaning making instead of just ‘hard data’ that the designers use to back up their design decisions (Ibid).

As will be uncovered later in the thesis, my creative approach to the editing of the various documentation materials has lead to methodologically interesting insights on the potential of creative engagement with documentation forms as a way of processing and understanding complex design activities.
Theory and Design Domain

**E-lit**

Electronic literature (E-lit) is defined by the Electronic Literature Organization (ELO) as works “with an important literary aspect that takes advantage of the capabilities and contexts provided by the standalone or networked computer.” (Hayles, 2008, p. 3) Canonical examples of E-lit (which are made available in ELO’s online collections) are often multimedial, incorporating graphics, animation and sound, as well as highly interactive, requiring inputs from the reader in order to proceed the literary media experience. Thereby, E-lit tends to draw on playful elements and adopt the aesthetics and procedurality inherent to computer games. The fundamental difference between E-lit and games, though, is pointed out by Markku Eskelinen – in games the player interprets the elements of the virtual environment in order to configure and proceed towards a winning condition, whereas in works of E-lit the reader configures the elements of the virtual environment in order to interpret and proceed the literary experience. (Eskelinen, 2004)

E-lit, with its crude cyber-aesthetics, experimental nature and generally complex narrative form, remains an avant-garde practice beyond the limelight of the general public. But electronic literature in its broader sense, simply defined as digitally mediated text, is a pervasive and deeply integrated aspect of our daily lives. We text message and email each other, we update our social network on the current status of our thoughts, emotions and activities through Facebook, Twitter, LinkedIn, etc. We comment and rate posts, interweaving a textual body and hierarchy of voices. We add photos to our texts on weblogs and add text to our videos on Snapchat. We rarely contemplate these multimodal and multimedial means of expression, but as we continue to express our everyday selves through the ever-evolving variety of social media platforms, we are in fact producing texts that become more and more similar to the works of E-lit.

Prominent figures on the Danish literary scene are also embracing this trend – authors like Lea Løppenthin, Asta Olivia Nordenhof, Rasmus Halling Nielsen, Caspar Eric and Victor Boy Lindholm actively use weblogs and social media as literary instruments. On these platforms they engage and interact with readers through stylized voices that are equally poetic and private, adopting the online lingo of social media while impregnating it with narrative intent. It appears that they seek to blur the line between everyday life and interactive fiction, as their literary endeavors on one hand aestheticize the mundane and on the other trivialize the poetic.
**Embodied Interaction**

Embodied interaction will play an important part in my design process and final concept. The term was coined by Paul Dourish in 2001 and is in the HCI community generally associated with tangible computing and other forms of human-computer interaction, which differ radically from those afforded by the interfaces of the traditional desktop computer. Dourish has later stated that a common misconception is that embodied interaction is tangible computing. (Dourish, 2011) His notions are grounded in deeper levels of phenomenological philosophy, as he defines embodiment as “the common way in which we encounter physical and social reality in the everyday world.” (Dourish, 2001, p. 100) Embodied interaction can be seen as an approach to the design of interactive systems, which recognizes that all things are embedded in physical, cultural and social settings and that people make sense of these things through their bodies, their embodied experience and participative status rather than through the pure, reflective knowledge of a disembodied consciousness. (Dourish, 2001, p. 18) As pointed out by Dag Svanæs, though, this generalized understanding of embodiment and embodied interaction also apples to traditional forms of human-computer interaction:

“All human interaction with digital technology is embodied, in the sense that the technology is physically omnipresent in our everyday lives. An understanding of such technology consequently requires an understanding of the physicality of its contexts of use, including the physicality of its users.” (Svanæs, 2013, p. 3)

However, the contribution of the term ‘embodied interaction’ goes beyond determining the embodied nature of human reality – the concept has spread an awareness amongst designers, which encourages the development of technological systems that take our embodied experience of the world into account, supporting a rich array of bodily, tactile and physical interactions.

Since the philosophical inheritance of the term ‘embodied interaction’ might result in different interpretations of its meaning, I find it necessary to clarify my own understanding of the term. When I in the course of this thesis use the term in relation to the experience of 3D-lit on mobile devices it does not refer to the tactile interaction afforded by a touchscreen; instead, it refers to modes of user interaction that employ the entire (or several parts of the) body and thereby affect the sense of spatial presence. It should be seen in contrast to common forms of interaction with computers and mobile devices: moving a cursor, typing on a keyboard, swiping, pinching, tapping or other gestures restricted to the movement of fingers.
**Mixed Reality**

Virtual reality (VR) and augmented reality (AR) are primarily visual technologies that mix elements from virtual environments and the physical world. As proposed by Milgram et al. (1994), they can be seen as points on a Reality-Virtuality (RV) continuum, where one end represents a completely synthetic world and the other a strictly real-world environment. (Ibid) The different types of media experiences between these extremes are referred to as mixed reality (MR).

![Mixed Reality Continuum](image)

VR is commonly understood as a media experience “in which the participant-observer is totally immersed,” (Ibid., p. 283) A popular example of VR is the Oculus Rift, a stereoscopic head-mounted video display that tracks the movement of the user’s head in order to render a corresponding point of view on the virtual world. AR, on the other hand, are “display systems where computer generated images are either analogically or digitally overlaid onto live or stored video images.” (Ibid., p. 284) The authors refer to AR as a ‘window-on-the-world’. Popular examples of AR include Google Glass, a transparent display that is worn like a pair of eyeglasses, and Pokémon GO, a smartphone game that utilizes the camera of the device in order to make animated creatures appear on top of the real world. As a consequence of their distinguishing features, VR is generally not concerned with the physical surroundings of the user, whereas the experiential qualities of AR arise directly from the interplay between virtual objects and the real-life environment. In this regard, AR is more profoundly engaged with the merging of synthetic and analog worlds, which is also why real spaces and site-specific places often constitute an important part of the AR experience.

O’Neill and Benyon (2015) regard MR as ‘blended spaces’, a term inspired by blending theory and conceptual metaphor theory. The central idea of these theories is that concepts which exist in different domains, and with distinct meanings in these domains, can blend to form a new concept with a new meaning in another domain. An example provided by the authors is a queue of people, which is a conceptual blend between the abstract idea of a trajectory and a physical line of people (Ibid, p. 35) When people line up, it does not necessarily mean that they are waiting in line, but when blended with the idea of a trajectory, the concept of a queue emerges. In relation to MR, the blended space is the third space that emerges as a combination of the physical and digital space.
The authors argue that “the correspondences between the physical and the digital are exploited in the design of the blended space,” and that “the job of the designer is to bring the spaces together in a natural, intuitive way to create a good user experience and to give people the sense of being present in a blended space.” (Ibid., p. 31) One of the ways to accomplish this, they argue, is to have a ‘material anchor’ that links the physical world to the virtual content. QR codes and GPS are examples of such anchor technologies and are indeed also used in many AR applications.

**Augmented Virtuality and the Nature of Literature**

Augmented virtuality (AV) is positioned between VR and AR on the RV continuum, and can be regarded as the converse case of AR – instead of augmenting reality with virtual elements, the purpose of AV is to augment virtual environments through elements from the real world. An example of AV technology is Microsoft’s Kinect for the Xbox, a motion sensing input device that enables players to control virtual game environments by moving their bodies. In this sense, AV is a technology that affords embodied interactions with virtual content. While VR and AR are both subjected to enormous scholarly and commercial attention, AV is rarely mentioned in the context of MR. I find that there is a need for research in AV, concerning its application in interactive environments and its implications for the experience of presence in blended spaces.

I will focus on AV as the technology for creating and experiencing 3D-lit on mobile devices, not only because I think it deserves academic study, but because I believe it is better suited than VR and AR in mediating literature, for a number of related reasons. First of all, compared with the visual art forms, such as painting, sculpture, printmaking and photography, and compared with the narrative art forms, such as cinema and theatre, which have a strong visual component and are in many ways fundamentally related to literature in terms of narrative composition and the use of language, literature is arguably the least visual art form. Of course, the medium of literature, which is for the most part black text written on white rectangular surfaces, is certainly visual – especially when it comes to poetry, as poems rely heavily on the visual constellation of words, compared with prose literature, such as novels and short stories. Likewise, the visual and material physicality and aesthetics of a book, with its paper pages and printed words, is indeed undeniable. Nevertheless, literature is not considered as a visual art form, since the visual aspect of literature is merely a consequence of the medium of written words. Unlike the visual aspect, cinema and theatre, which I regard as ‘explicit’ art forms, meaning that their manifestation is static and contained within the physical artifacts themselves, literature is an ‘implicit’ art form, in the sense that the images produced by a text are not physically manifested, but only exist temporarily in the mind of the reader.
This is one of the main arguments of reader-response criticism in literary theory, which states that the literary work emerges from the interaction between text and reader. (Iser, 1988) The written word is essentially a linguistic code that the reader processes and interprets in order to render mental images – much like a computer processes code in order to render a digital photograph. The main difference, though, is that the images produced in the imagination of readers are unique to every person. Thereby, the literary work emerges as a unique, interactive event in every meeting between any text and reader. In this sense, and in relation to AV, literature is essentially virtual content augmented by our active participation in the literary manifestation. I want to retain this idiosyncratic feature of literature and I believe that AV provides the means to do so. Instead of inscribing text as a layer on top of the visible reality surrounding the reader, as would be the case if using AR technology, I want to design a literary MR experience where the reader steps into the abstract, black-and-white world of the written word, augmenting it with their embodied and imaginative participation.
Related Works

**Legible City**

‘Legible City’ is an early example of both E-lit, embodied interaction and AV. Created in 1989 by Jeffrey Shaw and co-authored by Dirk Groeneveld, it is an interactive art installation in which the visitor rides a stationary bicycle mounted in front of a large video screen that displays a computer generated cityscape made entirely of letters, words and sentences. As the visitor rides the bicycle, pushing the pedals around with the feet and steering the handlebar with the hands, the virtual environment responds in a way that produces the spatial experience of riding through the city of words. The virtual cityscape is constructed according to the ground plans and architecture of actual cities, and the visitor is provided the overview of the entire environment, as well as their position in it, on a small LCD screen mounted on the bicycle. The bicycle and the physical effort of riding it can be seen as the material anchors, which link together the physical and virtual environment, maintaining the blended space via the embodied interactions of the visitor. I would argue that the recognition of the spatial analogy between the virtual cityscapes and the actual cities from where they originate also acts as an anchor.

A very interesting aspect of this work, which points back to the opening sentences of this thesis, is that the visitor not only has to travel through a spatial environment in order to read a text – the text itself is the spatial environment. In ‘Legible City’ the act of traversing an environment becomes an act of reading, and by choosing their own path in the environment the visitors create unique sequences of words with new semantic potential. This was also a key aspect of the final design concept of my first thesis project.

**Wuwu & Co.**

‘Wuwu & Co.’ is a Danish, interactive picture book and game for the iPad, which engages the reader in a variety of embodied interactions by using several sensors of the device. It was a collaboration between author Mette Pryds Helle, illustrator Kamila Slocinska and interaction designer Tim Garbos, and the app was developed and released by Step In Books in 2014. As the name of the studio implies, ‘step in books’ are works of E-lit where the reader enters an animated, three-dimensional and spatially immersive AV environment, in this case a little red house in a snowy winter landscape. The house is populated by five strange creatures, each of them with a story to tell and a problem they need help solving. When choosing the individual stories, the reader leaves the house and enters the winter landscape where as series of obstacles must be overcome in order to help the creatures.
The app has two user modes: a reading mode with written words in the conventional print layout, which is used for traditional storytelling through text and narration, and a game mode, which is used for the interactive problem-solving in the spatially immersive AV environment. The switching between these modes is controlled by the positioning of the iPad – when the device is held or placed horizontally, as one typically would in a normal reading position, the user enters the reading mode, and when the device is held vertically, as a ‘window into the world’, the user enters the game mode.

When in the game mode, the user moves and orients the device in order to look around the virtual environment. Here, in the winter landscape, the user is asked to perform certain actions with the device in order to help the creatures with their specific problems. One creature needs you to shake the device in order to shake snow and cones off a tree; another needs you to find a yellow object in your physical surrounding and point the camera at it in order to light lanterns in the dark forest; another one needs you to shout into the microphone in order to wake up her late rising offspring. These embodied interactions all form the material anchors, which hold the blended space together. Furthermore, I would argue that the spatial correspondence between the physical space of the user and the virtual space of the creatures also provides an anchor, which increases the spatial immersion of the experience.

**Data Shadow**

‘Data Shadow’ is an interactive art installation, which contrasts the previous two examples in its relation to electronic text and blended space. Created by Mark Farid in 2015, the installation has a political agenda concerning the issues of data privacy. Before entering the installation, visitors sign a contract that permits access to the data on their smartphones. When entering the darkened room and connecting to the wireless network, the visitor sees a projected image on the wall, a kind of inverted shadow of the visitor. The image is a grid of rapidly changing white words in the shape of the visitor’s silhouette, and as the visitor moves around, the text shadow moves accordingly. The flickering shadow consists of words that are loaded directly from the data on the smartphone, thus portraying a digital reflection of the visitor’s online activity. Thereby, the literary material used in the installation is not meant for narrative purposes, but instead serves as a disturbing reminder of the fragility of privacy in our modern times.

In ‘Data Shadow’ neither the text nor the space of the virtual environment is three-dimensional, but both of these are activated and augmented by the physical presence and embodied interactions of the visitor. The shape and movement of the body is transposed onto the textual and virtual realm in such a way that the body becomes the text and the space of text. Thereby, the body and its digital shadow can be regarded as the material anchor of the blended space.
Design Process

In this chapter I will present the two participants I involved in my project; describe important outcomes of my initial conversations with them; describe the details surrounding the planning and structure of our workshop; and explain how I processed the various documentation materials of the workshop, in order to gain a deeper understanding of our bodystorming and ideation process.

Collaborators

Anna Navndrup Pedersen

Anna Navndrup Pedersen is a fellow master student of Interaction Design. We have worked on several projects before and our collaborations have always been enjoyable and fruitful. Anna holds a Bachelor in Architectural Design from the Dutch Gerrit Rietveld Academy. In her work the encounter between art and human is central and her projects often result in interactive installations and sculptures that challenge the visitors’ spatial awareness (Pedersen, 2016). Her attention to physical spaces, the bodies inhabiting these spaces, as well as the senses through which the body and mind perceives and experiences space and interaction, makes her a conceptually strong artist. Her interest in installation art, the body and embodied interaction has lead to collaborations with dancers, choreographers and performance artists in England, Denmark and Sweden.

We had an introductory brainstorming exercise prior to the workshop, in order to identify certain aspects of spatiality, which might serve as conceptual vehicles for our workshop. One of the topics of our brainstorming was the blended spaces of the literary MR media experience that I wanted to develop. Anna quickly recognized three spaces: the physical surroundings of the user, the three-dimensional and spatially immersive text environment and the fictional space in the imagination of the user, produced by reading and interpreting the words.

Another output of our brainstorm was the appreciation of how gravity acts as an anchor for our embodied perception of space and sense of reality. The experience of being in a space is always tied to the fact that we are constantly pulled downwards. Our bodies rest on surfaces, whether we are standing on the floor, sitting in a chair or lying in bed. This constant pull of gravity enables us to recognize what is ‘up’ and what is ‘down’. As Anna pointed out – if you close your eyes and do somersaults underwater, a seemingly weightless environment, your sense of spatial direction is quickly dismantled and only faintly returns as you begin to feel your body float up towards the surface. I became clear to me that gravity would play its part in the MR experience of 3D-lit.
**Rasmus Halling Nielsen**

Rasmus Halling Nielsen is a Danish experimental author and poet, born in 1983. He is regarded as an extremely productive writer and has written and made books since 2002. He started by making everything himself – layout, printing, binding and distribution – inspired by the do-it-yourself tradition. In 2011 he graduated from Forfatterskolen (the official Danish writing academy). He continues to produce his own books, but also collaborates with and publishes through established Danish publishing houses.

His works focus primarily on form rather than content, and he strives towards challenging and questioning traditional literary conventions and genres. One of the formal themes of his authorship is the internet and programmable media, which permeate his literary aesthetics but also act as platforms for the creation, organization, distribution and experience of his works. He has multiple blogs where he posts small texts or just single sentences, or shares Dropbox links to homemade PDF’s, which are often several hundred pages long, sometimes even thousands. Many of his literary works are multimedial in their nature, incorporating graphics and sound, and he also produces videos as a part of his literary practice. In this way, his artistic agenda aspires to test the boundaries of the book, questioning what constitutes the literary experience in a modern technological context. This is exactly why I asked him to take part in my project.

After he had agreed to participate, I invited him to meet me at the Danish Royal Library in order to establish our collaboration and initiate a discussion on the subject matters of the project. In advance I had told him that I wanted to develop a new, three-dimensional medium for poetry or other types of narrative texts, as well as explore what implications this spatial medium (and its possibilities of interaction) would have for the unfolding of narrative and poetry, assuming that this medium might bring about an entirely new literary experience with unique artistic properties. For our initial meeting I had planned to ask him questions such as: What characteristics do you find fundamental to your literary practice? What is your view on and relationship with electronic and interactive literature? Do you see a relation between text and space? What is the difference between text, literature and poetry, and when do they stop being one thing and become another?

These questions were never answered. I discovered that Rasmus did not share my clear-cut understanding of these topics and was quite reluctant to accept my distinction between the terms ‘text’, ‘literature’ and ‘poetry’; electronic or not; in print or written in hand. The objective of his literary practice was to disintegrate such distinctions, making it difficult to identify and categorize the nature of his ‘books’, as he insists on calling them, even though they might take form as purely digital multimedia productions. It quickly dawned on me that sustaining these distinctions would not be fruitful for our collaboration and that I would have to adopt a more progressive literary mindset.
Rasmus explained that this was exactly why he had agreed to participate in my project – he saw an opportunity for radical experimentation with text.

Despite being equally perplexed and frustrated, I felt a sense of resonance with his arguments. If the development of an interactive medium for three-dimensional literature could open the door to a new literary form, why should we work within the constraints of familiar literary forms? Is it even possible to create a new art form if we just attempt to mediate an existing one differently?

In regard to these questions, Rasmus also expressed a deep concern about the source of text we were to use in our exploration of 3D-lit. He did not want to work with traditional, narrative texts, which supported the paradigmatic distinction and relationship between writer, reader and text, stating (as I recall): “I am so bored, so incredibly bored... I am tired of literary analysis.” At this point he took his phone from his pocket, held it in front of me and said (as I recall): “This thing is already full of text.” He imagined that the code running the various applications on the smartphone could act as the source material for 3D-lit, with chunks of personal information appearing here and there in between passages of programming language – an idea quite akin to Farid’s ‘Data Shadow’.

I found the idea of using this type of content intriguing, as it would open up an interesting debate on how modern technologies, auto-generated text, interactive virtual environments, private information and narrative might merge and transform our notion of what literary art is and can be in the future. Nonetheless, I was quite baffled when reflecting on his ideas, since it became clear to me that he was walking down a completely different path than I had paved.

It seemed as if Rasmus regarded letters and words more as visual or sonic design materials than symbols of meaning. He told me that he used technology to continuously destroy and rebuild his texts, in order to break down their meaning and obstruct analytical interpretation. I understood that he was driven by far more extreme, critical and even vandalistic views on literature than I.

After our meeting I was utterly confused and felt that Rasmus had pulled the rug from under my feet. A few days later I went to one of his literary performances at Gl. Strand, a modern art institution in central Copenhagen. I filmed the event and have made the video available at (http://youtu.be/TweW_kLdP2A), if the reader is curious to sample his multimodal, artistic practice.
Before the Workshop

Digesting Rasmus' Ideas

Some days went by before I had mentally and emotionally processed the meeting with Rasmus and found a way back into the project. One of the main decisions, which came out of our discussion, was the choice to use alternative sources of text, specifically text which originates from non-poetic contexts. By ‘non-poetic’ I mean texts that have not been written with the intention of being read as poetry. I chose to focus on text produced on mobile devices, such as smartphones and tablets, since they provide an abundant source of non-poetic text, such as text messages, emails and social media posts. In addition, they (and especially the smartphone) are more than just a piece of hardware, but a socio-technological extension of our digital selves as well as a physical extension of our bodies. Nowadays, it is quite common to carry your phone close to your body everywhere you go and feel uncomfortably disconnected when its not within graspable reach. Many have even experienced ‘phantom vibration syndrome’, the tactile hallucination of your phone vibrating against your skin when in fact it is not.

Another related aspect of our discussion, which has influenced my way of approaching concept of text, is the disintegration or disregard of the strict distinction between the terms ‘text’, ‘literature’ and ‘poetry’. As the reader might notice throughout this thesis, I tend to be somewhat indiscriminate in my use of these terms, although they do signify different aspects of the literary phenomenon. Roughly, I define ‘text’ as the visual medium of written words; ‘literature’ as a cohesive unit of fiction or non-fiction text, written with the intention of being read and interpreted by a person; and ‘poetry’ as a form of fiction, written with consideration given to rhythmic, semantically ambiguous and visually stylized qualities, which appeal to aesthetic and artistically pleasurable, provocative or exhilarating readings.

Both of these outcomes of my conversation with Rasmus reflect the tendency observed in the examples of Danish authors, who switch between different literary modes, contexts and platforms as an integral part of their artistic practice.

Deciding Materials for the Workshop

For our interdisciplinary, artistic bodystorming workshop I decided to use the following materials: an alphabet of printed letters, which I had cut out; paper, cardboard, scissors, tape and glue for assembling these letters into words; wooden sticks, plastic string and white helium balloons for attaching these words to objects, which could be positioned in space or held and animated by embodied interactions; and black markers for writing in hand.
I decided to use my iPad as the device and interface for prototyping 3D-lit in AV, but also asked my participants to bring their smartphones. These devices would act as the ‘windows-into-the-world', through which we would perceive and interact with the imagined, virtual content: our physical prototyping materials in the dance studio I had booked for the workshop. The iPad was recording video during the entire workshop.

For documenting the workshop, I chose to use GoPro ‘action cameras’, which were attached to our bodies instead of a tripod. Two of them were chest-mounted and one was head-mounted, all of them filming our frontal point-of-view (POV). The idea was first of all to produce dynamic and rich documentation material for later analysis, but I also expected that the video footage would capture important moments during our workshop where we bodystormed and performed embodied interactions that would make their way into my final design. By recording these instances from the participants’ POV, I anticipated that the footage could be used as a valuable design material for illustrating these embodied aspects of the final interaction design concept. Needless to say, a POV perspective does not provide a full account of embodied interaction, as embodiment is certainly more than just our visual sense, but I would argue that dynamic POV footage, where you often see the body and arms of the person wearing the camera, stimulates a sympathetic response in the mind and body of the viewers, who consequently adopt the POV as their own. This allows a deeper (embodied) understanding of the embodied interactions captured on video.
Figure 2. Chest-mounted GoPro and iPad

Figure 3. Word floating in the air

Figure 4. Word hovering on floor

Figure 5. Cut out letters
Deciding Tasks

**TASK 1: Working with Rasmus’ text "NORSKE STJERNER"**

Before the workshop, Rasmus and I had discussed how a writer would arrange the linear progression of a text in a three-dimensional, virtual space using only a touchscreen device, such as a tablet or smartphone. To explore this aspect of creating three-dimensional literature, we used a text Rasmus had already written prior to our collaboration.

The text ‘NORSKE STJERNER’ (“NORWEGIAN STARS”) is an experimental poem, created rather than written by using Google Translate. The poem consists of approximately 140 pages, most of which featuring a short sentence, while some are just blank pages. Rasmus started the poem by typing ‘DETTE VIRVAR’ (“THIS MESS”) and translated it to the Swedish ‘DENNA VIRRVARR’. He then copy-pasted the Swedish translation into Danish and slowly new letters and new sentences emerged from the feedback loop. The poem progresses through this procedure, a mechanical ping pong between Danish and Swedish. With minimal interference from Rasmus the poem evolves to produce sentences such as:

‘DANNE VIRAL ADFÆRD’ (“CREATING VIRAL BEHAVIOR”)

‘VI TJENER VORES BILLEDER’ (“WE SERVE OUR IMAGES”)

‘ÆR BILLEDER NÅR DE VÆKKES’ (“HONOR IMAGES WHEN THEY AWAKEN”)

The nature of the poem poses an interesting question about linearity in narrative texts – the procedural momentum of the poem is about as linear as it gets, but as we witness the deterioration of meaning through the evolution of translations, we are forced to question whether such mechanical linearity makes sense at all. I will not delve deeper into an interpretation of Rasmus’ poem, but merely highlight how the poem serves as a suitable source of text for experimenting with linearity in three-dimensional texts.

In order to use the text for our workshop I edited the layout from a vertical to horizontal format, removed the blank pages and increased the font size to make the text visible from a distance. I printed the pages on A3 paper, which was the main material for the first task of the workshop.

After this task the three of us were to write and/or draw our immediate thoughts, emotions, observations and reflections concerning our experience of performing the task.
**TASK 2: Working with a Collaborative Text Produced Before and During the Workshop**

For the second half of the workshop I wanted us to create a three-dimensional text by combining words, which originated from a non-poetic context. I asked each participant to bring a list of 10 words that they had written, either in text messages, emails or social media posts, during the week prior to the workshop.

For this task I had recruited three helpers (my friends Casper, Benjamin and Christian) whose main job was to make these 30 words by gluing paper letters onto cardboard. I had also asked Benjamin to take photos of the entire workshop and had told him to pay attention to what the participants were saying during the first task and to (by any principle of selection) choose 10 words, write them down on a list and give it to Casper and Christian, bringing the total number of available words to 40.

After this task the three of us were again to write and/or draw our immediate thoughts, emotions, observations and reflections concerning our experience of performing the task.

**After the Workshop**

**Editing the Video**

After the workshop I began going through the four sources of video (the POV footage and the video recorded by the iPad). Watching them one by one, I experienced the events of the workshop as they unfolded before the eyes and bodies of each participant. I was ‘post-witnessing’ moments from another person’s POV, accessing subjective subtleties of situations, experiential nuances which I was not aware of during that moment or in any case have forgotten by now. The footage captured a detailed audio-visual account of the events of the workshop, of the ideas we generated, of our group dynamics and our ability to work and improvise together. An emergent and highly interesting (as well as methodologically promising) aspect of the footage was how the camera always seemed to face towards ‘the action’. When synchronizing and compiling the footage on separate tracks in my video editing software, I noticed that we constantly directed our bodies towards the focus of our attention, in a very immediate response. This is of course only natural and merely serves as an obvious observation of socio-psychological mechanisms playing out. However, recording how these mechanisms play out from the individual POV of participants could yield valuable insights for the designer, which the participants themselves might be completely unaware of and therefore unable to express. In terms of applying POV footage from collaborative design activities as a key instrument in my methodology, I was pleased to discover this property of body-mounted cameras and the benefits that the combined footage provided.
As I was sitting in front of my computer, editing the footage and cutting between different points of view, I was granted with the richness of our combined perspectives, but was also appointed the responsibility of choosing whose perspective should be presented to the viewer. I had to assess and prioritize each individual account, in order to decide which was best for showing what I had deemed most interesting or important. By being forced to examine every single moment of the workshop this way, I gained a deep understanding of what had taken place throughout the entire design activity. Making the video was a quite extensive process and by investing so much time and energy in it, observing the event from different perspectives, listening to our every word, translating it to English and synchronizing the subtitles to match our voices, I acquired not only a profound insight in the events of the workshop – by processing the video through the different media of video, audio and text, via different modes of examination, I gained a rich and vivid memory of all our ideas, how we had argued for them and where they had come from. This proved to be a fruitful investment, since I was able to thoughtfully and skillfully incorporate the majority of our ideas in my final design concept, which I had probably been unable to do had I not had such a clear overview of our bodystorming and ideation process.

The Emergent Poetic Qualities of the Documentation Materials

Editing the video required creative effort in terms of using various editing techniques, and I did indeed regard my work as somewhat artful, especially in moments such as the ‘OPLOSNING’ (“DISSOLUTION”) at 7.13-7.34 of the edited video, which was a creative solution to cutting ahead in time, because some footage was unusable due to disturbance from the helpers. But there were other also aspects of the documentation materials that had emergent poetic qualities – the transcript of the subtitles and our written reflections on our experience of the workshop.

As I transcribed the subtitles in a layout similar to movie manuscripts and dramatic texts, I began to perceive our words differently. There were instances where our statements, in their written form, had strangely poetic properties, as if taken straight out of absurdist theatre. When isolated from their visual, aural, social and performative origin, and placed in a completely literary context, I felt the words were vibrating with artistic potential. Below are four examples:
SIMON: I don’t exist, I’m just these words here.

RASMUS: I think we should start making the route.

"THIS MESS"

Figure 9. Extract from transcript

ANNA: … inside.

SIMON: You want me to do something?

"CREATING VIRAL BEHAVIOR"

Figure 10. Extract from transcript

ANNA: ‘DET SENT’, (“IT’S LATE”)

SIMON: ‘DET SENT’, (“IT’S LATE”)

‘DET SENT’, (“IT’S LATE”)

ANNA: (…)

Figure 11. Extract from transcript

Which words should I choose?

What can I do?

How would you …

I don’t know what they’re saying now.

SIMON: I don’t know.

"WAY NOW follow UP
exhaustion"

Figure 11. Extract from transcript
Our handwritten reflections also turned out to hold poetic potential. As I was translating our reflections to English, I decided to replicate the layout structure we had written in hand. To do so, I loaded scanned copies of our reflections into my graphics editor and added my typed-in translations directly on top of the handwritten text, meticulously changing the angle, tracking and spacing of the text in order to fit the originals. Although it was merely a practical way of reproducing text in an unconventional layout format, I was actually creating new, superimposed texts. I quickly recognized their aesthetically pleasing and poetically appealing properties, as visualized in the four examples below:
The emergent poetic qualities of both the transcript and the superimpositions of our reflections confirmed how non-poetic text can be made poetic when transferred to another context or spatially modified in another context. This reflects the tendency of modern Danish authors to aestheticize or rather poeticize texts that originate from non-poetic contexts. My creative approach to processing and editing the documentation materials not only helped me understand what had happened during the workshop – it actually transformed my perspective, as I began to regard the documentation as a poetic design material, thus reassuring me in my decision to work with alternative sources of text in the creation of 3D-lit.

**Evaluating the Workshop**

When evaluating the workshop with Anna and Rasmus, one of their first remarks concerning their overall experience was that the dance studio where the workshop was conducted invited physical movement and a playful approach to designing collectively with our bodies and embodied cognition, and provided a stark contrast to ideating in an office setting. They both agreed that this element of the workshop environment was liberating in terms of thinking more freely when prototyping 3D-lit through embodied interactions.

As an interaction designer Anna anticipated more structure in the workshop, but as a participant she was happy that the format was quite open to free experimentation. She was very curious about all the available prototyping materials (such as the printed letters, balloons etc.) and would have liked to have more time to get acquainted with these materials in the experimental design of 3D-lit. She also thought that the helpers (Casper, Benjamin and Christian) constituted a distracting presence at the workshop, which was difficult to ignore, partly because of noise levels and partly because it felt strange not to involve them more actively in the workshop. Rasmus stated that it would be interesting to include more people in the workshop format in order to see what would emerge from a more complex artistic and social perspective. In all these regards, I could perhaps have invited more artists or designers instead of helpers and extended the workshop from three hours to a full day, so we would have had more time to engage with the materials and to construct the words ourselves, in order for all participants to be included equally in the activities of the workshop. Interesting thoughts and ideas might emerge from working with the simpler or more ‘low-practical’ aspects of the physical prototyping materials – which was what the helpers were occupied with throughout the workshop. An example supporting this argument is that Casper came up with the idea of writing in hand directly on the helium balloons, mainly in order to solve the problem of the cardboard words attached to the balloons not being able to float upwards because they were too heavy. Other such ideas might arise if the participants were deeper engaged with the prototyping materials and construction of words.
In terms of the POV video footage, Anna thought it was a somewhat neutral experience to wear a head-mounted camera – at times she was aware of her head movements, but for the most part she was only conscious of wearing the camera when she got it on or took it off. Rasmus felt that wearing the camera was intriguing and that being aware of the camera sharpened his thoughts and helped him achieve a better focus during the workshop. Anna stated that watching the other participants wearing the cameras made the workshop feel like something more than a regular meeting or design activity – that we were dressed up for a special event and that our outfits marked some kind of importance or significance of the workshop and our activities. She also stated that she usually finds it very uncomfortable to be filmed, but the fact that she was wearing a camera and filming others herself eliminated his discomfort.

Both Anna and Rasmus thought it was very interesting to see themselves in the final video and that the edited footage had authentically captured their overall experience of the workshop, our group dynamics and how and why our ideas had come about. They also stated that it was both strange and revealing to watch themselves in the video – they became aware of their appearance and behavior from an external perspective and compared their appearance and behavior on video with their inner experience of the various situations. When watching herself in the video, Anna was particularly concerned with how she at times seemed to not pay attention to what me and Rasmus were saying, because she was occupied fiddling with the balloons or other materials while we were telling her about our ideas. She stated that she had actually been fully aware of every word we said, but that she just preferred to focus her visual attention on manipulating physical materials – like someone who prefers to make doodles in class as a way of sharpening their aural attention.

Neither Anna nor Rasmus wanted to a part of editing the video, for reasons they did not specify, other than that it might be a tedious process, unfit as a collective act. I agree to some degree, since the work flow of editing such a long video is very non-linear and based on intuitive choices that the editor makes, based on his/her practical experience with video editing. These choices or editing techniques constitute a skill, which is first of all difficult to share but also difficult to formulate and argue for, which is perhaps why video editing is a mostly solitary practice. Nonetheless, it might have been insightful and beneficial to include Anna and Rasmus more in my process of editing the video, so they could have commented on their appearance and behavior in relation to their inner experience of particular situations during the workshop. In doing so, they could have enlightened me as both designer and video editor about their thoughts, emotions and observations during specific moments, thereby helping me better understand their experience, which would lead to a richer perspective on the outcome of our design activity. Their comments would also help me edit the video in a manner more truthful to their individual experience.
Final Thoughts on the Methodological Approach of Using POV Footage

In relation to my methodology I will conclude that I see a great potential for designers in recording POV video and editing this footage as an integral part of the methodological approach to making sense of complex design activities and to generating useful design ideas and design knowledge. I believe that this approach will be most fruitfully applied in projects that deploy participatory and physically engaging design activities, such as bodystorming and improvisational prototyping in collaborative settings. The POV footage from such design activities captures important, interactive situations between participants, which they might not be aware of and could lead to promising design ideas that are based on rich insights into participants’ experience of the design and experience of designing.

Furthermore, I believe it will be of most value to designers that are working with embodied interaction as a prominent aspect of their design, since the POV footage captures a detailed (albeit limited) account of the body in action. In this regard, I would recommend designers using this methodology to not only have a single camera recording the frontal POV of each participant, but instead experiment with attaching multiple cameras to each participant, for example on the forehead, the chest, the back, arms and legs. Thereby, the designer would have a fuller account of the whole body in action, despite having more footage to process and to choose between in the editing of the video, which would most definitely result in much more time consuming process than it already is.

Of course, I have only scratched the surface of the possible benefits of using POV footage as a design methodology. There are many aspects yet to be investigated, and since my findings were quite unexpected and beyond the scope of my design focus, I have not further assessed or developed the methodology.
Analysis of the Workshop

This chapter will in approximate chronological order cover the moments of our workshop where we generated the ideas, which have ultimately merged to form my design concept. I strongly recommend the reader to have the edited video of the workshop ready while reading, in order to experience it from the recorded perspectives of the participants. The video is available here: http://youtu.be/zOpffdVyPTA

*TASK 1: Working with Rasmus’ text “NORSKE STJERNER”*

**Arranging Words (0.06-1.14)**

At the very beginning of our workshop Rasmus suggests that we start by arranging a physical route for his text ‘NORSKE STJERNER’ in our studio. Immediately abandoning the linearity of his poem, he proposes to place the pages in a completely arbitrary fashion, to see what kind of text will emerge without the original linear progression of the poem.

I therefore suggest that we throw the papers into the air. We do so and gravity fixes them to the floor. I ask if it is the app that has scattered the pages randomly, but then suggest that it is the user who performs a throwing gesture with the device in his/her hands, in order to scatter the pages in the virtual space.

*Figure 16. Pages on the floor*
**Words on the Floor** (1.15–3.41) + (8.17–8.58)

I observe that the words are all lying on a flat surface. Despite having expected that we would fix them in the air somehow, either on strings, sticks or by holding them in our hands, I recognize an interesting experiential quality in having the words on the ground. Browsing sentences on the floor was very different from what I had imagined by 'spatially arranging Rasmus’ text in our space'; nonetheless, the laws of physics had forced the paper pages through the air and down to the floor, in a visually enticing, yet merely natural, immersive display. The materiality of these word objects descending through space, as well as their physical presence on the floor, stimulated our spatial awareness and provided the text material with an alluring, tactile quality. The words on the floor, encapsulated by the rectangular field of the white pages, looked like building blocks or modules, inviting for interaction.

**The Physical Exhaustion of Embodied Reading** (8.58–11.50)

Anna bends down with the device, placing the camera just above the first page of the poem. While the camera is covered she slides in the next page on top of it and rises again, the next sentence visible on the screen of the device. She continues this procedure. I recall a previous conversation with Rasmus on the topic of the physical exhaustion in the act of writing and suggest that there could also be a physical exhaustion in the act of reading. I take the device and demonstrate by imitating Anna’s actions of bending down and up each time I read a sentence.

Anna and I expand on this idea by reading sentences that are placed in different spatial positions. As I squat down, pointing the device towards a page on the floor, Anna holds another page above me. I read the text by tilting my body upwards and downwards with the device in my hands. Once more, I am reminded of the physical exhaustion in the act of reading and restrictions of the body while holding the device.

*Figure 17. Upwards and downwards reading*
We try another approach to reading spatial texts, as I point out that the common reading direction is horizontal, from left to right. I stand up, stretch out my arms and start spinning clockwise with the device in front of me. Once again, I am reminded of the physical exhaustion of reading 3D-lit and imagine how readers might collapse from dizziness before even finishing a text. Anna tries spinning with the device, but does not seem to get dizzy. Rasmus tries it and gets very dizzy. Their opposite reactions provide the obvious proof that users’ bodies and embodied experiences are not all the same and cannot always be equally accounted for in any one design. In any case, this insight into the different thresholds of exhaustion or discomfort in the act of reading advises me to limit the physical challenges and demands of the user interaction. Reflecting on our different attempts at reading, I finally observe an interesting contrast – that reading 3D-lit through embodied interactions is fundamentally different than the usual experience of reading a book, sitting comfortably and still.

**Ways of Space (19.16–21.55)**

During what Anna calls a ‘live writing/reading session’, where Rasmus sits on the floor and meticulously places pages and their words on top of each other, I suddenly realize that a vertical dimension has been added to the text on the floor, a spatial illusion of downwards depth. As I look at the row of pages, I see that Rasmus has arranged them so that some of the text is covered, appearing faintly beneath the empty areas of the white paper. I imagine that the covered text is below the floor, positioned much farther away, and that their faint appearance is due to a misty atmosphere in the space between words in the background and the foreground.

*Figure 18. Text showing through paper*

I imagine that these lines of text would move up and down, from background to foreground and back again, perhaps in response to recitation. As the user would recite the lines they would move towards the device and then drift away as other recited lines would take their place.
I explain to Anna and Rasmus how I normally perceive space in two different ways – either an environment that I move through or a bubble of air surrounding me when I am standing still. I explain that I am not very aware of the vertical axis of space and that I never think about what is beneath the floor. Anna talks about the practical convenience of working primarily with the vertical instead of horizontal axis – if a user creates a three-dimensional text at home and other users want to read it in their own homes, some issues might arise due to the fact that the physical environment of the users are not the same. However, as Anna points out, the vertical axis is very stable, since the distance from floor to device is (more or less) always the same.

**Inside versus Outside** (21.55-23.15)

I realize that reading 3D-lit in a downwards direction is, ironically, very similar to our bodies’ normal orientation when we use our smartphones. I explain how a reader would be completely incognito when reading such a text in public, walking with their devices in their hands, absorbed by the content on the screen, since this is exactly how many people look and behave in public spaces.

Anna picks up on me imagining being in a public space when reading a three-dimensional text and points out how this is a quite different scenario than being inside, in the privacy of your home.

I suggest that users could place their text at a specific GPS location.

**Reading and Writing as a Collective Act / Words as a Scarce Resource** (23.15-28.11)

Anna pretends that she is reading a text at the central station and quietly says that it is ‘a secret experience’. I reflect on this statement and point out that reading literature is very rarely a collective act, suggesting that this new medium for three-dimensional literature might support collective reading. Users could access a text and in order to read it they would have to perform collective interactions.

Rasmus imagines using the camera of the device in order to capture letters. By scanning their physical surroundings, users could find certain shapes and angles in the environment, which correlate with the shapes and angles of letters. In this way, users would collect their word materials from the physical world. He imagines people going hunting for text, looking for the structure of particular letters. I point out that words are normally not perceived as a scarce resource that you have to acquire.
Anna imagines using words in the real world for writing and reading three-dimensional texts. By scanning words that already exist in the physical environment, such as on traffic signs, menu cards, posters etc., the writer could design a linear path of words, which the reader had to physically follow in order to read the text. Thereby, the literary work would become a patchwork of unrelated words, confined to the spaces surrounding the user. She finishes her idea, by stretching out her arms towards the text on the walls, saying: “So this is my vocabulary for today... in this space.”

Rasmus traces back to my notion of collective reading and suggests having an online platform, where all words that have been captured by users are visible and accessible, allowing users to follow the activities of other users. The online platform would constitute a network and database for collective reading, but also support collective writing as the captured words would be available as a collective resource and material for creating three-dimensional texts.

Rasmus’ and Anna’s ideas makes me realize the possibility of not including any keyboard in the design – that words cannot be typed, but instead must come from an external source. I imagine eavesdropping on conversations and sucking in the words through the microphone of the device.

**Virtual versus Real (28.11-30.05)**

Reflecting on this idea, I realize that extracting words from the physical environment establishes a very explicit connection between the virtual texts and the real spaces, from where they originate. In a sense, if the three-dimensional texts emerge directly from the physical environment, the texts will simply become ‘literal’ transpositions of spatiality. Despite finding our ideas interesting, I felt that this spatial marriage between ‘virtual’ and ‘real’ reduced the conceptual tension and potential of their relationship. By extension, I also point out the fundamental difference between using and not using the camera – if the camera acts as a visual access point to the real world, with text layered on top of the camera’s viewfinder, the text would become an AR experience, whereas if the camera is not used and the user instead observes the text on an empty white background, the text would become an AV experience.

I expand on the difference between these two MR experiences by explaining how reading a poem placed on a wall as a kind of digital graffiti, only visible as a layer on top of the camera’s viewfinder, is essentially different than reading a poem in a generic, white hole going through the floor. I argue that the two ways we would spatially perceive and experience these text mediations are fundamentally different from each other.
Personally, I believe that it makes much more sense to use AV, since it would lead to a combination instead of alignment of these different ways of perceiving and experiencing space – the users would experience the space of the virtual environment while simultaneously experiencing the space of their physical environment. And as the reader will know from the previous section on AV, I have a strong preference for this type of MR technology, since I believe that it provides a much more appealing and conceptually coherent mediation of literature.

**TASK 2: Working with a Collaborative Text Produced Before and During the Workshop**

**Building Small Text Installations** (31.16-35.43)

In the second half of the workshop we build small, individual text installations instead of working together on creating a larger, continuous text. Rasmus builds a kind of rollercoaster and Anna builds a ‘word sausage’ by using string to tie words together into a flexible line. Intuitively, we do this with our hands and do not bodystorm the creation of these three-dimensional texts with the device in mind.

At one point I wonder how the user would actually build these kinds of structures using only the device. I lay words out on the floor, grab the device, get up and look at them on the screen. After awhile, unsure of what to do, I recite one of the words and wait for a response. Anna picks up the word and attaches it to the device, with a swishing sound effect. I move the device towards the floor and place it in an upright, but slightly angled position. Anna holds it so it does not fall. I pick up another word and we repeat the procedure until a small text has been constructed.

**Behavior of Words** (35.33-41.52)

The helpers have attached words to helium balloons and start sending them to us by pushing them through the air. Unfortunately, since the words are too heavy they do not float, but instead descend slowly towards the ground. Anna starts kicking a word to keep it from falling, as if juggling a football. Rasmus tries to make a word spin around. I express how I love the way the words fall to the ground, like raindrops in slow motion. I realize that this is the first time during our workshop that we have given the words a certain behavior, animating them with a lively quality. To explore this new behavioral aspect of the text, I attach words to wooden sticks and move them as instructed by Rasmus and Anna.
Getting Rid of Words (43.24-49.17)

What at first seemed like a playful detour turned out to yield insights into the social aspects of an interactive medium for 3D-lit. While arranging words on the floor, I take the word 'here' and give it to Anna, saying “here”. I take another word, ‘down here’, give it to Anna, saying “down here”. She passes them back to me and so we start pushing words back and forth, as if playing catch or hot potato. This game opens a discussion about how to get rid of unwanted words. I imagine being a ‘word pusher’, dealing my words to unsuspecting bystanders. Anna suggests you exchange unwanted words to better ones, and I refer to the game of Scrabble where you can swap letters for new ones. Instead, Rasmus suggests trading with others, making words an economic commodity.

Some moments later I trace back to an earlier idea about the medium requiring an effort from the user, and I imagine words piling up in a disorderly mass that the user wants to get rid of. Instead of trading or exchanging words with other users, the user has to build texts in order to clear the accumulating pile of words. In this way, the user is subjected to a writing urgency, forcing the user to produce texts in order to clean up.

Three-Dimensional or Not (49.21-55.39)

Towards the end of the workshop, I question how our different experiments relate to the texts being three-dimensional. I argue that if users scan words from their physical environment, these words might just as well end up on a regular, two-dimensional list. Rasmus argues that the texts should therefore be connected to real spaces and have a spatially dynamic, visually entertaining, animated behavior. We imagine large, collaborative texts positioned at specific locations, growing in size and brimming with movement, like fireworks or microscopic life forms – texts as organic inhabitants of space. Anna says that if the motion or behavior of words was standardized, then there would be a lot of things she would not want to write in that medium. I therefore suggest that the behavior of words is customizable, enabling the users to animate the words to their own preference.

Attaching Words to the Body (55.58-56.08)

Finally, as a kind of casual response to me referring to the texts as ‘ghost poems haunting the virtual realm’, Anna imagines that words were fixed to the body. I suggest that users would access these words by scanning people with their device.
Design Concept

As the outcome of my various design activities, I have developed a concept for an app called TEXTILE. It allows users to create three-dimensional texts by positioning words in a virtual bubble of space surrounding the user. Rather than write, in the traditional sense of the word, users build or sculpt three-dimensional text structures, visually perceptible via the screen of their devices. The camera is never in use – users only see a white, featureless virtual space and text in black. When moving their device, users can spatially orient themselves in the text environment, the screen acting as a window into the virtual world. Since the users augment a completely virtual environment with their embodied interactions, and since the app does not employ the camera of the device in its MR media experience, it is characterized as AV instead of the AR.

Users can build short or longer three-dimensional texts and share them with the world, either on an online platform or at site-specific places. The next sections will uncover step-by-step how the app and its online platform works.

The name TEXTILE appropriately refers to different core aspects of the design – first of all, the name is intended to be read as a combination of the words ‘text’ and ‘tile’, signifying that the app allows its users to produce texts by putting words (or tiles of text) together. It is also meant as a reference to the word ‘tactile’, encouraging users to regard the virtual words as physical, palpable objects, which are manipulated through embodied and tactile interactions. Finally, the name should obviously be read as it is, ‘textile’, which is defined by the online Cambridge Dictionary (2016) as “a cloth made by hand or machine” or defined by Wikipedia.org (2016) as “a flexible material consisting of a network of natural or artificial fibres.”

I have designed a logo for the app, which comprises each letter of the word TEXTILE, but also depicts a minimalistic space or hallway with a centered vanishing point and a cross on top, which marks a specific location in the air. In addition, the icon could also look like a text symbol or special character of an imaginary alphabet. Thereby, the logo neither excludes nor favors any particular letter system, making it suitable for all languages.

Figure 19. TEXTILE logo
1. The Source of Text

TEXTILE does not feature a keyboard for typing words. Instead, the user chooses from a selection of words that have been written outside the app. Every word that the user has typed and communicated to the world, in the form of text messages, emails and social media posts, are fed into TEXTILE. In this way, the everyday text-based communications made by the user will constitute the pool of words, from which the three-dimensional texts are made.

To trace this aspect of the design back to the ideas generated at the workshop, please watch the following clips of the video: (27.52-28.12) + (48.18-49.17)

Below are some practical considerations about this aspect of the design concept:

(i) The Customizability of the Text Feed

It should be possible for users to customize which communication channels are fed into the TEXTILE. Some people might not want to include text from work-related activities or might only want to create poems based on words from text messages to a select handful of friends. By making the text feed customizable, users have the freedom to filter their word pool in order to fit a certain poetic profile or simply to avoid sensitive data from leaving their respective domains.
To view the GIF’s, click on the links:

Online: http://simontheishansen.wordpress.com/2016/08/13/2-opening-textile/
Download: https://www.dropbox.com/sh/xgqlwyq32o4fpif/AAA7OIXa1P7Vw8qcRSiBfD8a?dl=0
2. Opening TEXTILE

When opening the app, the screen fades to white. An instruction appears, asking the user to place the device on the floor, screen facing upwards, in order to calibrate the device with the floor. When calibration is completed, words begin loading into the screen, appearing as a crowded, illegible mess.

When the user picks up the device, an instruction appears, asking the user to perform a jolting, throwing, shaking motion. As the user shakes the device, words fly out and slowly descend towards the ground, like small pieces of paper. When no more words come flying out as the device is being jolted, the user will know that the text feed is empty.

Now the users can browse the available words by scanning the floor with their device, the word pool forming a circle around their feet.

To trace this aspect of the design back to the ideas generated at the workshop, please watch the following clips of the video: (0.45–1.35) + (2.27–2.39) + (47.36)

Below are some practical considerations about this aspect of the design concept:

(i) Calibrating the Device with the Floor

In order to achieve a spatially immersive experience when browsing the words on the floor, the sensors of the device need to know where the floor is, relative to the hands of the user. This could be done in a number of ways, but I imagine the user putting the device on the floor, the camera facing downwards and the screen facing upwards. As the accelerometer and gyroscope sensors detect no movement, this specific location is set as the default position, making the floor a common point of origin.

Perhaps it is not necessary to calibrate the device in order to achieve an immersive AV experience – ‘Wuwu & Co.’ does a great job of rendering its virtual environment without having the users perform certain actions for calibrating their device. However, if TEXTILE’s environment does not technically require calibration in order to render a visually realistic experience, the very act of picking up the device from the floor still has a considerable impact on the user experience. By bending down and picking up the device, the user is actually performing an embodied interaction, which mirrors the act of picking up words from the ground. Each time the user begins working in TEXTILE, the user’s body and embodied spatial perception is activated and stimulated this way, preparing the user for the actions performed in the virtual environment. This aspect of the design does therefore not only calibrate the device with the floor – it also calibrates the body of the user with the experience of creating 3D-lit in TEXTILE.
Thereby, the act of picking up the device can be seen as a material anchor, which holds together the blended space.

(2) The Amount of Available Words

There should be a maximum limit to the amount of words lying on the floor. This is to ensure that the floor does not become overcrowded with words. The area of the floor that words fall onto has to be confined within a specific radius from the center position of the user. If words were too far away, they would become difficult or impossible to read, and likewise, if there were too many words lying in this limited area, they would pile on top of each other, making them equally difficult or impossible to read. Therefore, there should be a maximum amount of words on the floor, which ensures that each word has an empty, white space around them, making it possible for the user to read and identify them.

(3) Clearing Words from the Floor

If the user has reached the maximum limit of words on the floor and there are still pending words in the text feed, the user has the opportunity of clearing words from the floor in order to make up space for new words. By swiping on the screen, the user can remove unwanted words one by one. The swiped words fly away from the floor as if caught in a sudden burst of wind.

Words that have been cleared will be erased from the word pool. Therefore, users have to be certain that they are willing to discard the words lying on the floor, before swiping them away or shaking the device. If users do not wish to remove any of the words on the floor, but still want to load pending words into the environment, they can choose to select words for the word cloud or build a text, organizing selected words in a three-dimensional poem (more on this in the next sections). In this regard, users are subjected to a writing urgency, an urge to produce texts in order to make up space for new words. To trace this aspect of the design back to the ideas generated at the workshop, please watch the following clip of the video: 48.18-49.17
To view the GIF’s, click on the links:

Online: http://simontheishansen.wordpress.com/2016/08/13/3-selecting-words/
Download: https://www.dropbox.com/sh/xgqlwyq32o4fpi/AAA7OLOXa1P7Vw8qCSiBfD8a?dl=0

Figure 22. Words floating upwards from the ground
3. Selecting Words

When browsing through the words on the ground, users will identify words that they want to use in their three-dimensional text. By tapping these words on the screen or by simply reciting them, the user can select them, separating desired words from undesired ones. The selected words are lifted from the ground and begin to float upwards, eventually forming a cloud of words above the user’s head.

This cloud constitutes an extra working environment, where the user can focus on the constellation of selected words, without being distracted by the random arrangements of the entire word pool. In this way, the cloud of words above the user’s head provides a space for concentration and inspiration.

Below are some practical considerations about this aspect of the design concept:

1. **Tapping or Reciting Words**

   Whether words are selected by either tapping on the screen or reciting them has a great impact on the interaction experience. The gesture of tapping is a very intuitive and familiar way of interacting with touchscreen devices, whereas the act of recitation is a much more unusual way of selecting elements in apps based on visual content. By reciting words in order to make them ascend towards the cloud, the interaction imbues the words with a certain aliveness, the words willfully responding to the spoken commands of the user. As if calling them out by name, the user revives the words from their inanimate state. To trace this aspect of the design back to the ideas generated at the workshop, please watch the following moment of the video: 34.28

2. **The Motion of Words**

   When words float upwards, they do so in a certain way, evoking different responses depending on how the motion is animated. I imagine the words moving very slowly, like a feather falling in reverse. When they have reached their final position in the cloud they stop and hover gently.

3. **Clearing Words from the Cloud**

   It should be possible for users to deselect words, if they want them to remove them from the cloud and put them back in the word pool on the floor. When swiped on the screen, unwanted words fall from the cloud onto the ground.
To view the GIF’s, click on the links:

Online: http://simontheishansen.wordpress.com/2016/08/13/4-building-a-three-dimensional-text/
Download: https://www.dropbox.com/sh/xgqlwyq32o4fpi/AAA7OI0Xa1P7Vw8qcRSiBfD8a?dl=0

Figure 23. Positioning words in space
4. Building a Three-Dimensional Text

To build a three-dimensional text, the user pulls words from the cloud and positions them in the space surrounding the user. Pointing the screen upwards, the user can select a word by either tapping or reciting it. The selected word moves towards the screen and attaches to the device. Now, the user can position it in a specific location in the virtual space. By tilting, pitching and turning the words the user can create structures that deviate from the traditional, two-dimensional text layout. By pinching in and out on the screen, the user can also move them inwards and outwards, zooming words closer to or farther away from the user’s point of view. When the user is satisfied with the word’s position, the user can tap on the screen to fix it in that spatial location.

The user can also make the words move and behave in a certain way by recording the movement of the device. When the word has been placed in the desired spatial location, the user can double tap and hold on the screen to start recording. The user moves the device during a specific amount of time, and as the user lets go of the finger the recorded movement is transferred onto the word, making it move in the same way. The word does so continually, repeating the motion in a looped animation.

By arranging words in complex spatial positions, and by animating them with their own body movements, users create three-dimensional texts that are more like kinetic sculptures or virtual installations in which the user is spatially immersed, rather than traditional texts, frozen and confined to the limited space of the two-dimensional page.

To trace this aspect of the design back to the ideas generated at the workshop, please watch the following clips of the video:

(15.06–15.43) + (34.28–35.43) + (39.30–41.46)

Below are some practical considerations about this aspect of the design concept:

1. The Velocity of Words

When selected words move from the cloud and attach to the device, they do so in certain way, determined by their velocity and animation, which ultimately affects the tempo of the experience and the pace of writing. If words move slowly towards the screen, in the same velocity as words float upwards, they would force a slow pace upon the writing process, and, concordantly, if words were flying quickly towards the screen, like an object being thrown at the user’s point of view, they might inspire a fast pace of writing.
(2) **Recording Movement**

When adding behavior to the words there should perhaps be a minimum and maximum limit to the duration of the recorded movement, for example ranging from 1 to 4 seconds. This is to ensure that the duration of looped animation is neither too long or short. If the loop lasted for minutes or hours, the words could move very differently across time, thus preventing a coherent expression of movement.

Perhaps there should also be restrictions on how far away words are able to move from their original position in the virtual space. This is to ensure that the words of the three-dimensional text are kept anchored to their specific locations in the sphere surrounding the user. If all words were flying around in their own distinctive patterns, the text might be difficult or even impossible to read.

On the other hand, the duration and spatial deviations of the behaviors might actually constitute new parameters for impacting the experience and reading of their three-dimensional poems. Indeed, the authors of three-dimensional texts might not want their literary agenda compromised or constrained by restrictions on time and space. Instead of simply anchoring words in space, fixed in a brief and static moment of movement, the author might want to perform and record longer and more dynamic passages of movement. In this way, the text, with its words moving independently across space and time, would become more than ‘just’ a kinetic sculpture – it would transform into a choreographed performance. Every word would constitute an entity, behaving and acting in a unique way, like a performer on a virtual stage, brought to life by the embodied interactions of the user.

(3) **Editing the Position and Behavior of Words**

The user might want to change the position and behavior of some words, if they are not satisfied. By tapping or reciting these words, the user can reposition them or re-record their behavior.

(4) **The Origin of Words**

It should be possible for the author (but not the reader) to see where the words of their three-dimensional texts come from. As the individual words of their texts might come from completely different channels of communication, such as text messages to family members, emails to colleagues or social media posts, it should be interesting for the user to identify the origin of these words. By being able to trace back words to their sources, the user would strengthen the bond between the social aspects of their everyday lives and the poetic potential they carry. I will expand on this in the next chapter of the thesis.
5. Creating Independent or Linked Texts

Users can create as many standalone poems as they like, but also have the opportunity of linking together multiple bubbles of text in a given sequential order. By conjoining separate passages of text, the writer is able to build longer texts that follow a linear progression. In this way, the different bubbles of text act in much the same way as the pages or chapters of a traditional literary work. Instead of just creating a short three-dimensional poem, the user could build a long poem or an anthology of poems, a short story or even a novel.

Below are some practical considerations about this aspect of the design concept:

(i) Reading a Linked Text

When reading a text, which is comprised of a sequence of interlaced text bubbles, there has to be a system in place for managing the transition between text bubbles. Somehow, TEXTILE has to know when the reader has finished reading a bubble of text, so that the next bubble of text can be replaced in the space surrounding the user. This could be done in a number of ways.

Inspired by our workshop, a natural way of reading a three-dimensional text would be to spin around clockwise, reading a string of words circling the user from left to right. As the reader spins 360 degrees, the next text bubble will replace the previous one. In this way, the reader has to continue spinning in order to read the text. To trace this aspect of the design back to the ideas generated at the workshop, please watch the following clip of the video: 9.55-11.11
Another option, also inspired by our workshop, would be to place separate passages of text in particular areas in the space surrounding the user, such as downwards and upwards, or in the front and the back. For example, the user looks downwards at words placed between the device and the floor, and after reading the words the user looks upwards at words above them. When the user has read the words and look downwards again, new words have appeared, replacing the previous ones. To trace this aspect of the design back to the ideas generated at the workshop, please watch the following clip of the video: 9.00-9.20

Another way for the app to know when to transition between different bubbles of text could be through recitation. Besides using recitation as an input for selecting words to the word cloud, recitation could also be a way of reading and progressing through a linked text. When all words of a text bubble have been recited, perhaps in any given order, the next text bubble will replace the previous one, enabling the user to continue reading the text.

Each text bubble could also have a limited time duration. Instead of requiring certain actions from the user, the experience of reading a linked text could be divided into moments, a sequence of words constellations that change in a pace, which is completely uncontrollable by the user.

These options of reading linked texts focus on a situation where users are standing in the same spot, with a sequence of text bubbles unfolding in the space around them. An entirely different way of linking multiple texts together is presented in the next section.
When users have created their three-dimensional texts, whether as single or linked text bubbles, they can upload them to TEXTILE’s online platform in order to make them available to readers. Texts can be made available in generic space or site-specific places.

By generic space, I mean that readers can access three-dimensional texts at any given location. The readers open TEXTILE, access the library of published texts and load any of these into the bubble of space surrounding them – whether they are at home, in school, on the job or in the supermarket.

By site-specific places, I mean that authors can upload three-dimensional texts to specific GPS coordinates, making them available only at that location. Authors can also choose to place the individual parts of a linked text in separate GPS locations, creating a physical route that the reader has to follow in order to read the text. The text would thereby acquire a more profound spatial dimension, as it would become a locative media experience.

One of the main differences between these two options is that texts in generic space can be read by anyone anywhere, simultaneously by hundreds of people around the world, whereas only one person or at least only a very few can read a site-specific text at the same time. As a result, there is a certain social potential inherent in site-specific texts, since strangers might cross paths during their reading. I will expand on the social dimensions in the next chapter.

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**Figure 25. Texts made available online versus on the map**

6. Making Texts Available in Generic Space or Site-Specific Places
To trace this aspect of the design back to the ideas generated at the workshop, please watch the following clips of the video: (22.17-22.41) + (28.12-28.39) + (29.34-30.05)

Below are some practical considerations about this aspect of the design concept:

(1) **Putting Texts On the Map**

When authors put texts in site-specific places, they could do so in number of ways. The author could access a map within TEXTILE and manually decide where the text would be placed. The author might also have the opportunity of placing texts at completely random GPS coordinates, with or without the approval of the author. Thereby, many of these texts might end up in very desolate or inaccessible locations, such as on the sea or in mountain ranges. Or texts could be placed at randomized locations within a chosen area, such as a certain country, a city, an urban district or along a highway.

Another option would require the author to be physically present at the given location when publishing site-specific texts. In this way, the texts would become tied to their physical surroundings in a much more profound way – if the author was required to travel to a certain location in order to make it available there, the author would first of all have had to invest more time, energy and consideration in placing their site-specific texts, and they would have seen and experienced that location firsthand and in direct relation with the publishing of the text. Authors might even choose to go to a location and create their three-dimensional text there, instead of the other way around. In this regard, the texts would become both conceived and born in that given location. And what is equally intriguing is that readers would be aware of these circumstances – readers would stand at the birthplace of texts, present in the same surroundings as their authors, perhaps even looking at the exact same things as the authors did while creating their texts. Thereby, site-specific texts would establish a physical connection between author and reader, both of which sharing the experience of a space through a three-dimensional literary work.

(2) **Accessing Site-Specific Texts**

When readers want to find and access site-specific texts, TEXTILE could assist the navigation in a number of ways. One option would be for the user to open a map inside the app, displaying exactly where texts are sited. The user could browse through certain geographic areas of interest and go there in order to read the texts located there. The map would also show the location of the user, making it easier to find the texts.
Another option would be for the map to only show texts within a certain radius of the user. Thereby, the user would have to go look for texts without being certain of where they would find them, without being certain of which kinds of text they would find, or without being certain of finding any texts at all.

Another option would be to further reduce the navigational capabilities of the map, by only enabling users to receive directions instead of looking at a map. Users would either have the possibility of using the map to browse through available texts in the areas around them and then go look for them, or they would not be provided any map at all but only receive directions to texts within a certain radius around them. The users would see a kind of compass on the screen, which showed the direction they should follow and approximately how far away the text was located. In this way, users would probably be less occupied with looking at their screens and instead observe and focus on their physical surroundings, curiously scouting for the possible site of the text. I imagine that this heightened awareness of the space around the user (a kind of psycho-geographical experience) would contribute in building up certain expectations, which would have a positive impact on the eventual reading of the text and the overall user experience.


7. Public, Private, Collaborative and Anonymous Texts

When users make their texts available to others, they can choose to make them either public or private, as well as collaborative or not.

By making a text public, the text becomes available to all users of TEXTILE. The text is published on the online platform and can be read by anyone. By making a text private, the text is made available to only one or a select group of people.

If the author does not choose to make the text collaborative, readers cannot alter the composition or behavior of words, nor add any new words or behavior to the text. The text becomes locked in a ‘Read-only’ mode, accessible only in the form that the author intended it to be read and experienced.

If the author chooses to make the text collaborative, the text will be set in a ‘Read-write’ mode, which authorizes others to alter or add to the text (via the same interactions as described in section 4). When texts are made collaborative, the author invites others to participate on equal terms in the writing of the text. Collaborative texts do therefore not have a single author, as the authorship is distributed across a collective of authors.

Authors of non-collaborative public texts can also choose to publish them anonymously or pseudonymously. This is to ensure that users have the possibility of not being credited as the author of the text, for any given reason. Some users might have a political or activist agenda, which they do not wish to be associated with personally. The famous graffiti artist Banksy is a great example of activists that hide their critical, controversial or even criminal activities behind a pseudonym.
Other users might exercise the freedom of anonymity for more innocent purposes – a secret admirer could place a romantic poem outside the home of whom he or she wishes to flatter. Authors might also use this opportunity to work with more experimental literary devices, such as the authorless text. Users could tell a story through the voice and perspective of an ancient oak tree in their favorite park, an elusive back alley cat or an abandoned factory in the outskirts of their town.

Below are some practical considerations about this aspect of the design concept:

(1) **Friends, Followers, Collaborators and Such**

There should be a system in place for managing the social interactions that are made possible in TEXTILE. I imagine a rather traditional network-based platform, where users can create profiles, provide contact information, connect with friends, follow other users and be followed themselves, as well as invite specific users to collaborative on three-dimensional texts. What I do want to avoid, though, is to provide a system for rating texts, either positively or negatively with ‘likes’, ‘dislikes’, ‘upvotes’ or ‘downvotes’; to include features such as posting content on other users’ profiles or re-posting other users’ content on one’s own profile; and to implement an environment for comments, discussions or any other text-based communications. TEXTILE is not meant to be another variation on social media platforms, such as Facebook, Instagram or Snapchat, or platforms based on creative content, such as YouTube, Flickr or SoundCloud. The online platform of TEXTILE and its network architecture is meant to accommodate interactions between users that focus primarily on poetic qualities and potentials, to facilitate creative collaboration, as well as encourage ‘real life’ interactions through the writing, reading and experience of site-specific 3D-lit.

(2) **Regular, Anonymous and Pseudonymous Accounts**

When users make their texts available to the public they can choose to publish them from their regular profile or from anonymous or pseudonymous accounts. To simplify this aspect of the design, which might confuse or distract the user, I imagine that these alternatives should be enabled in the settings, before they appear as options when users publish their texts.

(3) **Reporting and Deleting Abusive Texts**

There should be a system in place for dealing with possible instances of abusive behavior, such as bullying, threatening or leaking personal sensitive data about other people. I imagine that this might occur mainly in anonymous site-specific texts, where violators might write harmful words, threats, toxic rumors or information, which would compromise personal security and privacy, at the door step of their victims.
In such instances of wrongful acts, it should be possible for the victims to report abusive texts and have them deleted, though this would require a rather resource-consuming violation enforcement.

4) *Keeping Your Texts in a Personal Library and the Opportunity of Deleting Them*

Users can choose not to publish or send their texts, but instead keep them in a personal library hidden from other users. Here they can work on their projects for as long as they like, taking their time to develop and finish their texts before publishing or sending them. Of course, users can choose to never publish or send their texts, but keep them as a private collection of poems.

Users also have the opportunity of retracting published texts or have them deleted completely.
8. Word Auras

A final feature of TEXTILE enables users to emit word auras, which are only visible to other users. Words that have not yet entered the word pool, but are still pending in the text feed, will drift around each user while waiting to be loaded into the text environment. By scanning other users with this feature turned on, users can visually access these auras.

To trace this aspect of the design back to the ideas generated at the workshop, please watch the following clip of the video: (55.58-56.08)

Below are some practical considerations about this aspect of the design concept:

(i) Emitting a Word Aura

In order for the aura to radiate from its user, the GPS location of user’s the device must be tracked. Auras are quite different from the other types of three-dimensional texts since they are neither fixed to one specific geographic location nor accessed in the space surrounding the reader, but instead mobile, following their users as they move around.
In order to ensure that devices only emit auras when they are being carried by their owners – and not lying flat on a table, perhaps in another room – the motion sensors of the device must detect some kind of (body) movement, for example within a 30 second time interval.

(2) **Animation of Auras**

The auras should not be spatially consistent, compared to the regular text structures built in TEXTILE. Instead, they should flutter chaotically, somehow appearing formless as if in between spatial dimensions, not yet materialized and only faintly legible in a limbo between virtual spaces. This is partially due to a technological constraint. I am not confident that it would be technically possible to visually render the auras in a spatially realistic way, without having glitches or malfunctions that compromise and disrupt the users’ spatial immersion. Such malfunctions will occur as a result of two devices (the aura-emitting device and the aura-scanning device) moving independently of each other. Since TEXTILE has to constantly receive, processes and transmit these continuously changing GPS locations to all devices with the word aura function enabled, there will be an inevitable rendering delay, which I strongly want to avoid. But this aspect of the design also makes sense on a conceptual level – the pending words of the aura have not yet taken any structured, spatial form, but are still waiting to materialize and fall to the ground in the working environment of TEXTILE.
9. The Architecture of the Platform

Needless to say, all of the foregoing aspects of the design cannot not exist in the same operational mode of TEXTILE. Writing or building a text is a different operation than reading or experiencing it; browsing texts from a list of users is different from finding them on a map; and scanning a person’s auras is different from all of the other features. Therefore, the architecture of the app and platform has to be designed in a way, which allows users to navigate naturally between the different modes of operation. Because of the limited scope of this thesis, though, I have not put much thought into this more practical, utilitarian aspect of the user interface, but I do realize that it is an important element of the interaction design and user experience.

The next chapter is meant as an expansion of this chapter, providing deeper analytical perspectives on some of the conceptual and social implications of the design.
Reflecting on the Implications of the Design

The Source of Text and Poetic Contexts

Most people feel compelled to produce small poetic texts when confronted with words as a physical, tactile material. The popularity of ‘fridge poetry’ is a perfect example of how this playful type of tactile writing has become a household exercise in kitchens all over the world. By simply rearranging a set of given words people have created brilliantly quirky sentences, often at great amusement of the readers. And conversely, many aspiring authors have stared in silence at the empty page, their fingers just itching to type, yet waiting in vain for the right words to come.

The design choice of not providing a keyboard, but instead feeding external text into the app, does not only help avoid the frustration of being unable to find the right words when writing a poetic text – in limiting the availability of words to text that the user has already written, it is the intention to bring an awareness on the everyday use of language. Unlike the word magnets of fridge poetry, TEXTILE is as much a mirror as it is a writing tool. When users browse through their word pool they are affectively observing a reflection of their digital selves, a (re)collection of previous conversations, correspondences, comments and updates. By being confronted with one’s everyday language in the very different context of creating 3D-lit in a virtual space, it is my intention to establish a connection between poetic and non-poetic ways of reading and writing text, as well as observing one’s social life.

For example, the 3D-lit created in TEXTILE will consist exclusively of words that were written outside a poetic context – one word might come from a text message to your mother, asking what your father wants for Christmas; another might come from an email to your colleague, stating the details of the Monday meeting; and another might come from a discussion you had with a stranger on Twitter. These everyday instances of social, professional, public and private communication become directly embedded and reframed in the poetic context of the three-dimensional works created in TEXTILE, thus encouraging users to develop a poetic awareness of their everyday language.

In addition, if users are not satisfied with the available words in their word pool, it is simply because they are not practicing language in a (poetically) satisfying way. In other words – users can only preach what they practice. If users feel they are missing the right word for their poem, all they have to do is type it and send it, in order for it to appear in the word pool. In this way, the poetic activity in TEXTILE also extends into the user’s everyday communication, imbuing these real-life instances with a poetic quality and agenda, in much the same way that modern Danish authors poeticize their online communication.
Material Anchors

As argued by O’Neill & Benyon (2015), the successful design of MR experiences exploits the correspondence between physical and virtual spaces and brings these together in a natural way, which gives the user a sense of presence in the blended space, often through material anchors. In the MR experience of TEXTILE there are many material anchors. First of all, the spatial correspondence between the physical and virtual space can be regarded as a material anchor, which holds together the blended space. The user will visually perceive the physical and virtual space as parallel, interlaced environments that respond in the same way to the user’s embodied interactions, thereby strengthening the spatial immersion of the MR experience.

Secondly, the embodied interactions with the virtual content can equally be regarded as material anchors. By having words as virtual objects that behave like physical, tactile objects, and by requiring the user to interact with them through mimicking real-life actions, such as shaking or throwing a handful of objects in order to scatter them onto the floor, TEXTILE employs the user’s body and embodied cognition in building a bridge between the physical and virtual environment.

Thirdly, by simulating gravity in the virtual environment, with words falling to the floor and words floating to the ceiling, TEXTILE stimulates the user’s perception of physical matter in physical space. The laws of physics are hard-wired into our brains and gravity is perhaps the strongest and most apparent natural force impacting our perception of the world and our sense of reality. Thereby, the simulation of gravity in the virtual environment strengthens the spatial immersion and acts as a material anchor, which holds together the blended space.

Finally, the site-specific aspect of TEXTILE is also a material anchor – by linking virtual texts to physical locations using GPS coordinates the blended space is held together.

Divided Regions of Space

The separation of space into downwards and upwards regions is not just a natural consequence of the way that TEXTILE stimulates the visual and embodied experience of gravity – it is also a design choice that challenges and plays with our usual body posture while interacting with our smartphones or tablet devices. When the user is browsing the words on the floor, the app accommodates the ordinary downward orientation of the smartphone; and conversely, when the user turns to look at the words above them, the app demands an unusual upward orientation of the smartphone, affectively steering the user’s body and perspective towards the sky. Only few other apps afford this upwards direction of attention and physical orientation of the body.
**Sculpture and Performance as Acts of Writing**

Since there is no keyboard in TEXTILE, and the user therefore has to construct texts by physically arranging a given set of virtual words, the creation of 3D-lit is as much an act of sculpting as an act of writing. The traditional mode of writing, either in hand or in type, is discarded in favor of a more embodied approach to literary creation. Text exceeds being mere linguistic artifacts of encoded meaning – words become plastic, tactile design materials, which the artist physically manipulates in order to create three-dimensional structures.

Creating 3D-lit in TEXTILE can also be regarded as an act of performance. If observed by spectators while sculpting a three-dimensional text through embodied interactions, the user would by definition engage in a performative display. However, the performative nature of creating 3D-lit in TEXTILE goes further beyond. By recording the movement of the device (and consequently the movement of the body) in order to add behavior to the text, the work becomes more than a literary sculpture – it transforms into a kinetic installation, a virtual choreography of text, performed and augmented by the body of the user. In this regard, the text is not much different from a drama, augmented on stage by an actor.

**Social Aspects of Site-Specific Reading and Writing**

There are many social potentials related to the creation and experience of 3D-lit in TEXTILE. First of all, there is the obvious social aspect of sending and collaborating on 3D-lit with other people. There is also the adventitious opportunity of meeting strangers when seeking out site-specific texts. Two people or more could unknowingly end up at the same place, reading the same text, which would most likely spark a conversation, regarding the text or the place or something entirely unrelated. By bringing people together in the same place and for the same reason, TEXTILE has the potential of facilitating social encounters and establishing relationships.

Site-specific texts (poetic or not) could also add another dimension to remote communication. By sending texts to friends, family members or loved ones, which would only be available to them at specific locations, users could decide the physical, spatial context for the delivery of their message. Perhaps a user would place a text to an old friend at the site of their first encounter, with kind words reminiscing youthful days. Another user might place a text to his or her daughter at her regular bus stop, wishing her a good day. Site-specific messages could be used for bringing recipients to special places, where someone would be waiting with a surprise party or a marriage proposal.
Site-specific, linked texts (whether private or public) could also inspire playful and interactive location-based media experiences similar to treasure hunts or pervasive games, where a series of texts provide the instructions or narrative framework of a social, adventurous chain of events. The writing of such texts could be done collaboratively – one person would write a text bubble at one location, another person would take the next and so on.

The extreme example of collaborative writing (whether linked or not) would be massive works created by a great number of people. Imagine a huge, virtual text installation, situated at the central square of a capital city, augmented by the words and movements of thousands of people – a mass choreography of language. These kinds of texts could be created during a single flash mob event or gradually by individual contributions stretching over time. This virtual spectacle of animated text would become an organic work of literary performance, a kinetic inscription, a digital shadow and record of people’s private lives reframed and poetized in the context of public spaces. To trace this aspect of the design back to the ideas generated at the workshop, please watch the following clips of the video: (49.56-51.11) + (51.53-52.43)

**Word Auras**

The word auras form the final piece of the design concept. An aura is a paranormal phenomenon, characterized as an invisible field of energy emanating from all living things. This aspect of the design ties back to the beginning and bridges the gap between the first and second section of the concept – ‘The Source of Text’ and ‘Opening TEXTILE’. When users open the app and shake their devices, words fly into the virtual space, apparently appearing from nowhere. This ‘nowhere’ is actually the aura, which is visible to others users when scanning these users with their device. Now, if the other users are scanning these users while they shake their devices, they will see the aura diminish, its words apparently vanishing from thin air. This event – words drifting around a user as an aura; the pulling of these words into the text environment through shaking the device; followed by the words falling to the floor – is not visible to anyone in its entirety. Instead, it is divided into halves, witnessed only by separate parties: the senders and recipients of communication. Words materialize in the aura as soon as they have been written and communicated, and the while the aura is imperceptible to its owner, it is visible to the world – the audience of their communication. Thereby, the word aura builds a bridge between private and public realms. The words that users have put out in the world, in the form of private text messages, emails and public social media posts, are manifested and publicly displayed in the aura of the users, and by loading these pending words into TEXTILE the users are actively removing them from the aura, taking them back into the privacy of their personal, digital space.
Conclusion

Three-dimensional mediation of text as a poetic practice has not yet come into being, and I regard my first and second thesis projects as pioneering attempts of developing a new, emergent literary art form. I believe that 3D-lit will become established when we all get accustomed to spatially immersive MR technology, such as VR and AR. Experiments like mine will contribute knowledge in the early and ongoing development and design of interactive 3D-lit.

This thesis has investigated how writers and readers could create and experience 3D-lit on mobile devices equipped with motion sensors that enable users to perform embodied interactions as an integral part of the literary MR experience. Since the experience of 3D-lit is deeply fused with spatial, embodied and performative aspects, I regard it as a fundamentally hybrid art form. Therefore, I have collaborated with two artists in an interdisciplinary workshop where we bodystormed and improvised physical prototypes of 3D-lit, using an iPad as the interaction interface and ‘window-into-the-world’ of the imagined virtual text environment.

I decided to use body-mounted GoPro cameras for documenting the workshop from each participant’s POV, which resulted in methodologically interesting outcomes. First of all, I have shown that POV footage from bodystorming and ideation activities can be used as design materials and directly incorporated in the visualization of an interaction design, such as TEXTILE. Furthermore, I have found that recording the perspectives of multiple participants in design activities provides the designer with a very rich documentation that shows events unfolding from different angles, revealing subtleties of situations that were either lost in rapidly flowing group dynamics or simply forgotten. Another (and unanticipated) finding was how participants always seemed to face towards ‘the action’. This is very valuable for the analysis of video documentation material, since participants immediately and unconsciously point the camera towards the focus of their attention, possible areas of interest. The editing of POV footage can also be very valuable to the designer – by witnessing design events through the perspective of each participants and examining each moment of the event in order to decide when to cut to the next source of video, the designer gains a profound understanding and vivid memory of complex design activities. I consider all of these findings on using POV footage as a methodological approach as an important knowledge contribution to interaction designers.

As the outcome of my various design activities, I have developed a concept for an app called TEXTILE. It enables users to build three-dimensional texts by positioning words in a virtual bubble of space and to share them with the world, either on an online platform or at site-specific places.
I chose to work with AV as the technology of the literary MR experience, not because I have observed a need for research in AV, but simply because I believe it is the most suited choice for mediating literature, since they both share the defining feature of augmenting virtual content through the active participation of the user/reader. This recognition could serve as a knowledge contribution for designers, scholars and authors of 3D-lit or otherwise spatially engaging forms of electronic literature. Yet, since I have not focused on how 3D-lit would perform in VR or AR, it is uncertain whether or not AV can be regarded as a superior medium for 3D-lit. It is yet to be investigated how the application of different MR technologies will affect literary experiences in interactive blended spaces.

A valuable knowledge contribution of this thesis in relation to the MR experience of 3D-lit, though, is how various virtual simulations of reality can act as material anchors, which hold together the blended space. By having a spatially immersive correspondence between the physical and virtual space; by having words as virtual objects that respond to embodied interaction like physical objects would; and by reproducing natural forces such as gravity, the user’s perception of reality is stimulated and the experience of presence in the blended space is enhanced.

Another key finding and important knowledge contribution of this thesis is that the creation of 3D-lit on a platform such as TEXTILE is not just an act of writing – it is an act of sculpture and an act of performance. And through the collaborative features of TEXTILE, these performed sculptures of language have the potential to become massive, social works of art, monumental choreographies of mundane communication. I believe that TEXTILE could indeed pioneer a new, hybrid art form, powered by the poetic potential of our everyday lives.

Needless to say, these grandeur prospects are purely speculative. Despite what promising possibilities I might see in my design, the concept is still just on the drawing board. There is no hi-fi prototype of TEXTILE, which can be tested in order to discover how users would engage with the medium, and many questions remain unanswered. But I will continue to develop and validate my ideas on 3D-lit and attempt to answer these questions and generate more knowledge for the successful design of 3D-lit in blended spaces. And as digital media continues to expand into our spatial awareness, through VR, AR and hopefully AV, I have no doubt that the literary experience will once again be restored as the site-specific phenomenon it once was, inviting a wide variety of embodied interactions in the act of reading and writing.
References


