Charged Utopia VR: Exploring Embodied Sense-making in the Virtual Space

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Abstract
This paper reports on preliminary results of a design research project that explores how spaces in virtual reality may be designed to build on qualities of embodied sensemaking. The project forms a basis for the exploration of an ethical dimension to interactions in virtual reality. This publication focuses on identifying qualities of embodied sense-making in an existing physical space, the interactive exhibition *Charged Utopia.* These qualities are transposed into a virtual interactive space. The translation of the qualities is done through the three main themes: Physical Movement, Resistance and Ambiguity. We present the design research process to describe how these themes were identified and transposed. We conclude with reflections that sketch ways in which we might capitalise on the opportunities offered by a virtual space, while respecting human skills in embodied sensemaking.

Author Keywords
Virtual Reality; Embodied Interaction; Ethics

ACM Classification Keywords
• Human-centered computing~Virtual reality
• Human-centered computing~Interaction design

Introduction

Similar to many others within the TEI community, our constructive design research [5] builds on theories of Ecological Psychology [4], American Pragmatism [2] and Phenomenology [7]. These foundations share the notion of embodiment, asserting that our perception is born from action: we make sense of the world by acting in it [3]. To design interactions based on a notion of embodiment means to design for active perception, using our 'being in the world' to allow meaning to arise. Such a stance emphasises the role of our body and physical engagement in sensemaking. However, the physicality of our world is not as straightforward as it once was. Virtual layers are becoming more intertwined with our physical world. The boundary between technologies and the physical world around us becomes increasingly vague [6]. As a result, reality is in many cases not only interpreted as merely the physical world around us, but consists out of physical and virtual aspects. So the question that arises here is: if embodiment in the physical world is the way we make sense of the world around us, how can we make sense of this emerging virtual world around us? In this article, we present the design research project *Charged Utopia VR* (Virtual Reality), where we take embodiment as a means to design meaningful interactions within a virtual space. Our aim is to explore the possibilities of designing for embodiment in a virtual space by building on qualities of a physical space.

Related Work and Motivation

Several scholarly efforts have studied our perception of the world through VR technology. Our main focus here is not on the VR technology itself, but on the possible impact of such technologies on society as a whole. Ethics and morality start to play a role in this discussion. As Madary and Metzinger write*: "VR technology will eventually change not only our general image of humanity but also our understanding of deeply entrenched notions, such as 'conscious experience,' 'selfhood,' 'authenticity,' or 'realness' "* [6]. When looking at this from a phenomenological perspective, we see that this constitutes the idea that we cannot place ourselves outside the virtual layers that we have created for ourselves, since the perception of ourselves is situated in the point of view from which we perceive objects in the world [7]. This new perception of ourselves influences our perception of the world, and thus influences our visions, actions and decisions. This phenomena was clearly illustrated in the study of Peck, Seinfield, Aglioti and Slater [8], where implicit racial bias was found to be fluctuating when VR technologies were used to *"generate an illusion of body ownership through first person perspective of a virtual body that substitutes their own body".* Madary and Metzinger describe this phenomena as a *"complex convolution, a nested form of information flow in which the biological mind and its technological niche influence each other in ways we are just beginning to understand"* [6]. Their focus lays strongly on the importance of thinking about ethics in VR when looking at the consequences it has on our perceptions: both of ourselves and the world around us. They have created a first list of ethical concerns that might arise while using and doing research about VR, as well as a list of concrete recommendations that might overcome these risks [6]. In the *Charged Utopia VR* project we have started to explore these concerns from a design perspective. We approach this by building on an existing physical interactive design: the exhibition *Charged Utopia*, which leveraged embodied interactions to address ethical concerns.

Figure 1 Several visitors interacting with one of the installations of the Charged Utopia exhibition.

Context

The interactive exhibition *Charged Utopia* [9, video: 14] was an event designed and curated by RISE Interactive on the islands of Norrbyskär in Northern Sweden during August of 2016. The exhibition consisted of a series of interactive installations (See Figure 1) on the islands that told stories of the islands' past as the home of a large sawmill and worker community, in the late 1800's and the first half of the 1900's. These installations were designed to use the past as a lense for the present and vice versa: visitors were confronted with both the history of the islands, as well as issues of a more contemporary nature, such as the European refugee crisis. Through embodied interactions with the installations, visitors were triggered to form personal reflections regarding complex societal topics such as immigration. In the exhibition, embodiment was key in order to elicit engagement and trigger personal reflections [11].

In the project presented here, *Charged Utopia VR*, we have started to explore how we may transpose the aspects of morality, ethics and decision making that were embedded in the exhibition's physical interactive design into a new, virtual experience based on VR.

Approach

The approach for the *Charged Utopia VR* project is based on constructive design research, summarised by Koskinen et al. as *"...research that imagines and builds new things and describes and explains these constructions"* [5]. In this approach, design explorations, iterative prototyping and reflections on (intermediate) results form the core of the research methodology. For *Charged Utopia VR,* this meant that a practical approach was used to start ideating and creating interactive VR experiences. Through the development of various interactive prototypes, and through iterations and reflections on these prototypes, characteristics and qualities of embodied sensemaking were refined and transposed into VR.

Design Research Process

The design explorations took place in both the virtual space and the physical space. Alternating explorations between these different spaces made it possible to compare experiences and see how the inherently different qualities of both spaces - the physical and virtual space - may be used to create experiences where ambiguity, reflection, nuance and difficult questions could be addressed effectively.By reflecting on the physical installations of the *Charged Utopia* exhibition and by prototyping new experiences, we defined qualities that were found to elicit embodied sensemaking on issues with ethical dimensions. These qualities were translated into three different themes: *physical movement*, *ambiguity* and *resistance*. These themes were used as a starting point for the design of virtual interactions. Different prototypes were created to explore how interactions in a virtual space, based on these themes, could elicit a similar experience to their counter parts in the exhibition's physical space. We wish to emphasise here that our effort to transpose the physical interactions in the exhibition towards interactions in the virtual space should not be considered as a one to one, direct translation. This translation was done in terms of qualities, rather than the concrete actions and environment that were created in the physical interactive design*,* since the virtual world and the physical world, inherently possesses different possibilities of interaction.

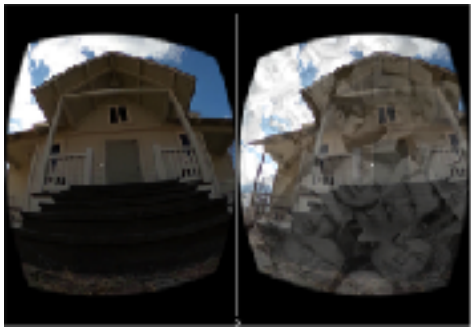

Figure 2 *This screenshot from the Charged Utopia VR experience shows an example of different images being presented to the*

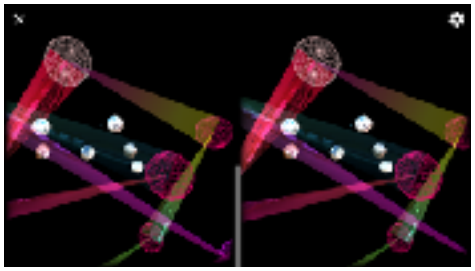

Figure 3 *This screenshot from the Charged Utopia VR experience shows a virtual space with several interconnected elements. The user is able to create a new composition by changing their position, yet experiences resistance through their interconnectedness.*

Technical Description

The game development platform *Unity* [12] was used to create virtual interactions and spaces, and eventually to bring together all the different interactions into a coherent full experience. The hardware that was used to test and experience the created software was a Google Cardboard headset and a smartphone running Android. This choice had been made to make this experience available for anyone interested in VR by removing dependency on more advanced hardware.

Charged Utopia VR

The final design, *Charged Utopia VR* (Please refer to [13] for a video impression of the design), is a virtual reality experience that questions the users identity. What it is to have roots and what it is to long for something better? Upon starting the experience, users are transported to the islands of Norrbyskär. Here, they can move around a map of the island to enter six locations, where they can listen to poems and are shown images that ambiguously address both the past of the island as well as its current state. From a focus on the past and local, the experience gradually moves to the present and global, again through images and poems. To conclude their virtual journey, users are able to craft a desired future - a Utopia - by creating and giving meaning to a composition of interconnected virtual objects in the space around them. This space is captured and printed for the user at the end of the experience, allowing them to take a physical reminder with them into the real world.

Interaction

Charged Utopia VR is a personal and unique experience that is designed to create space for ambiguity, interpretation and reflection. This experience elicits users to create their own reality by affording interpretation and decision making. For example, upon entering one of the six locations on the virtual map of the island, a different image is presented for the user's left and right eyes (one of the past, one of the present). The dominance of the user's eyes (being more dependent the right or left eye) determine what is seen, creating a unique setting for everybody (See Figure 2). Looking through both eyes, the images are overlaid and difficult to discern from one another. While, if the user closes one eye, he or she can focus on one part of the story. Users's are thus able to alter what they see in the space around them, and create their own experience. In the final part of the experience, the user is given the opportunity to express her thoughts by creating a space in which virtual elements can be re-ordered to paint a personal future. The elements can be explored by looking at them, moving them and dragging them around by holding a button and physically moving one's body. The user will find the elements to be attached to one another, resulting in the visualisation of connected aspects when the user gives form to the virtual space, illustrating the consequences of decision making and prioritising certain desires at the cost of others (See Figure 3).

Exploring embodied sensemaking in the context of VR touches upon a fundamental problem, since the physical and the social dimensions, fundamental to embodied sensemaking [3], are typically not directly present in a virtual space. In *Charged Utopia VR,* we have started to explore how to create interactions in VR that allows us to make sense of the virtual space in a similar way as we do when being embodied in a physical space, while touching on the ethical dimension

of being in a virtual space. We have found that VR spaces offer new qualities of interaction that provide us with the possibility to create interactions in which embodied sensemaking is still present, but afforded in different ways that it would be in the physical space. These qualities will be set out through reflections around three main themes that we identified over the course of the project. These themes have been identified by starting from the qualities of the physical space (in this case, the exhibition *Charged Utopia*) and the role of these qualities in the process of embodied sensemaking. These themes are: *Physical Movement*, *Resistance*, and *Ambiguity.* In the following section we will set out these three different themes, and relate to them firstly in the physical space, to point out how and why there is a fundamental difficulty in transposing these themes into a virtual space. Then, we will illustrate how this case study has started to identify ways in which the virtual space offers new opportunities for creating elements that take over (parts of) the role these themes have in making sense of a physical space.

Physical Movement

In the physical space, physical movement is present in everything we do. We engage physically with the space around us to feel objects and we are able to identify where we are, what we are doing and know how we can use the world around us. This fundamental element of being in the world is not directly present in the virtual space, since one does not have a physical body. Although more advanced VR headsets are optimizing the possibilities of using real objects to create the sensation of 'being in the world', the more easily available VR soft- and hardware (for example Google Cardboard) do not contain such possibilities yet. In *Charged Utopia VR*, we have found that by creating the possibility of zooming in and out within the virtual space, users were able to shift to different perspectives. This allowed them to choose what position they wanted to have within the virtual space. The transition from a sense of 'greatness' to a perspective from which everything seems uncontrollable and larger than life, has shown to be useful for reflections on what users' position in a space means in terms of what they are able to see and do. Benford et al. describe this as physical transcendence *"a desire to use media to move beyond the limits of body and sensory channels"* [1]. The ability to zoom in and out, and position oneself in the VR space can thus be a means to create this physical transcendence, and create a different form of physical movement in a virtual space.

Ambiguity

With ambiguity we refer to the grey areas between two (or more) choices and possibilities [10]. Within the complexity of our world, nuance and ambiguity are things that everyone is confronted with. Questions like: "*What would you rather do? This or that?"* Would normally be answered with *"It depends on.."* Or*, "I can only make that choice if I knew this and this..".* The complexity of the world is captured in these answers, since the answers illustrate that decisions have consequences reaching further than the topic at hand. Within the virtual world, this complexity is usually not present, which means that deciding and choosing will not contain this nuance. This often results in a black and white world, where things *are*, or *aren't*, and there is little space to explore the grey area of what things *could be*. Within *Charged Utopia VR*, we found that the virtual space provides opportunities to create such sense of ambiguity. VR offers possibilities to create

unique experiences for every user in the virtual space, while providing them with the exact same virtual reality space. The unique experiences were created by using the fact that humans use both eyes to have 3-D vision. Through the presentation of different images to each eye, the space was perceived differently by every individual, because of the difference in dominance between the two eyes and thus the way the two separate images are mixed (See Figure 2). We have also seen that when users started to understand how this effect was initiated, they closed and opened their eyes individually, in order to play with new emerging perceptions of the space around them. This interaction allowed the interpretive abilities of people to contribute in sensemaking of the virtual space.

Resistance

In the physical space, there are physical and social aspects of resistance [10]. The place where we are in the world determines our action possibilities and the people around us might provide us with new perspectives and insights. Furthermore, physical constraints (like gravity and the characteristics of our bodies) make us be where we are and feel what we feel. In the virtual space, resistance cannot be interpreted directly as such. The complexity of the world cannot be captured in full, and the presence of others is not always possible. A social aspect is thus missing when being in a virtual space. Furthermore, the physical constraints like gravity, having our body to interact with the world around us, and the borders of our being are not evident in the same way they are in the physical world. Within *Charged Utopia VR*, we found that especially because of the 'blank' sheet that a virtual space in fact is before it is programmed to be something, any forces can be applied on the objects created in it. We found that resistance emerges when objects are related to each other and create a complex network, where interaction with one of the objects might affect the movement or position of many other elements in the VR space. This makes the dependencies and relations around oneself experienceable and brings a part of the complexities in our physical world into the VR world (See Figure 3).

Future Work

Many of the key characteristics of the physical space, on which we depend to make sense of the world from an embodied perspective, are not typically present in a VR. However, one could argue that it is exactly the absence of these key characteristics that creates the potential of VR. One could also argue, that to make use of this potential, our understanding of the virtual world and how we make sense of it, should reflect to a certain extent the way in which we make sense of the real world. The *Charged Utopia* VR project has started to explore how to create a VR space that allows us to make sense in a similar way as we do when being embodied in a physical space. Ultimately, the goal of this project is to explore how this can contribute to a better understanding how we may design to afford an ethical dimension which is not yet fully explored in the virtual space. In this publication, we have started to sketch design opportunities in which we might capitalise on both sides of this coin: to afford embodied sense-making in Virtual Reality akin to those we use in our Physical Reality, by exploiting qualities offered by the virtual that are inspired by the real. Further development of the *Charged Utopia VR* experience will focus on more clearly identifying such qualities and effective ways to transpose experiential qualities from the physical and real, into the digital and virtual.

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