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Objective Meaning: Exploring Mediated Discourse with Anonymous Public Interaction and Visual Techniques

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Objective Meaning: Exploring Mediated Discourse
with Anonymous Public Interaction and Visual Techniques

by

Sarah Storteboom

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
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Abstract

This thesis explores self-expression and dialogue at the intersection of virtual and physical public space, through the conceptualization and development of *Objective Meaning*. This is an artwork that allows individuals to contribute messages anonymously to a public display via personal devices. It builds on relational and disruptive art practices to create an unconventional experience that elicits reflection and a sense of agency for individuals who encounter it. By visually abstracting messages on the display, it is intended that individuals contemplate their engagement with public discourse. The use of visual abstraction also reveals a new space for mediating publicly contributed content on interactive displays. This is further explored through deployment of *Objective Meaning* in a semi-public space, collection of log data and field observations, followed by analysis and reflection on how people make use of this system and respond to the visual mediation of their expression.

Keywords: participatory art, public display, anonymous interaction, computer mediated discourse

Preface

Material, ideas, figures and tables from this thesis appear in two publications: a published extended abstract {Objective Meaning: Presentation Mediation in an Interactive Installation. In *Proceedings of the 2017 ACM International Conference on Interactive Surfaces and Spaces (ISS '17)*. ACM, New York, NY, USA, 360-365. DOI: <https://doi.org/10.1145/3132272.3135079>}, and a full paper in submission with CHI 2018 (Human Factors in Computing Systems). While I shared discussions and writing with my co-authors, I took the lead in both publications. I also verify the concept and production of *Objective Meaning* is my original and independent work. The investigation reported in Chapter 5 is approved with Ethics Certificate number REB15-1574, issued by the University of Calgary CFREB (Conjoint Faculties Research Ethics Board) as a modification for the project “Understanding Response to Interactive Installations” on January 3, 2017.

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On a more personal note, I would like to express deep gratitude towards my partner, Lowell Smith, who has the most enduring kindness, and has supported me in so many ways throughout this journey. I would like to thank my sister, Amanda, who is most impressive and always keeps me motivated, and my parents, Heather and Ray, who are the backbone of all my life's accomplishments. Also, thanks to the rest of my friends and family who I used as informal test subjects for early versions of *Objective Meaning*!

I would also like to thank Craig Fahner, Ricky Pusch, Jo Vermeulen and Stevan Clement, for their technical assistance during different stages of developing and deploying *Objective Meaning*. Thank you to John Broz and Justin Anders, for facilitating deployment in the Taylor Family Digital Library. Also, Daniel Shiffman, Ben Fry, Casey Reas and all the other generous people that share their knowledge and create open source content that give people the opportunity to make work like this.

Dedication

I would like to dedicate this thesis to my grandmothers, Kay and Frances, who would have been so proud.

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“Society is based on shared meanings, which constitute the culture. If we don’t share a coherent meaning, we do not make much of a society.” – David Bohm, *On Dialogue*

Chapter One: Introduction

In this Thesis, I will be applying technology in my art practice to address a need for greater public engagement in public art. I will discuss artistic movements that seek to incite spectators and give them agency to affect their own life through performances and participatory events in public space [13]. The conviviality of these practices is consigned to the social protocol that exists with face to face interactions. However, with artworks that materialize as computational systems, interaction is delegated to technology and the alteration of these social protocols are left in question. To explore this, I have designed and developed an original artwork, *Objective Meaning*, which accepts, visually modifies, and displays text messages from the public. This work is an interactive public art piece, and also opens up a new space for mediating public content creation in human-computer interactive systems. To explore this space further, I will deploy the work in a public setting and collect data logs, as well as observations and feedback from the public. This will allow me to speculate on behaviours surrounding *Objective Meaning*, and reflect on presentation mediation in interactive public art that displays publicly-contributed content.



Figure 1.1 *Objective Meaning*, Installation view in the Taylor Family Digital Library.

1.1 Motivation

Public art is often used to stimulate civic pride and establish a common history [3]. This has led to prescriptive narratives that contained varying degrees of truth, the outcome of which is intended, by politicians, to ease dissent from the populace rather than engage them in dialogue. This is exemplified with the national monument, *Reconciliation* (see Figure 1.2), a contemporary example of how public art can be used to dictate the events and shared experiences of history, with the government's explicit statement that the monument "tells a story that every Canadian can be proud of"¹. Counter to this practice, there is a tradition of artists using public space to disrupt and question the status-quo by providing alternate perspectives [28]. This is exemplified with the well-known graffiti artist, Banksy, who applies tongue-and-cheek illustrations of political criticism in public spaces through illegal means (see Figure 1.3). While they are done so legally, the artworks that I create are also situated in public spaces, rather than in galleries or museums. I do this because in public spaces, people are not expecting to be art consumers, and therefore are more likely to engage with artwork as real-world proxies.

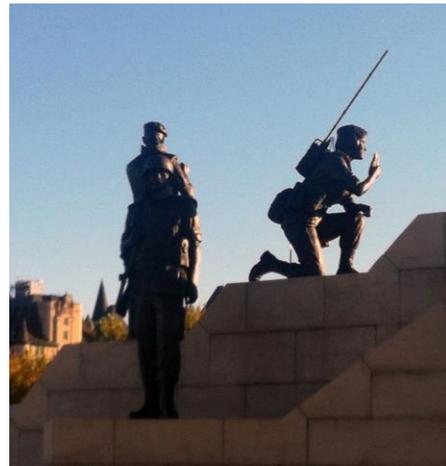


Figure 1.2 *Reconciliation, the Peacekeeping Monument*, Jack K. Harman, Richard G. Henriquez, and Cornelia H. Oberlander (Photographed by: Damien Busi, Parks Canada), 1992. Used with permission of rights holder: Damien Busi, Parks Canada.

This image depicts a monument, located in Ottawa, commissioned by the government of Canada to commemorate soldiers, living and dead, who have participated in peacekeeping operations.

¹ <http://canada.pch.gc.ca/eng/1443025435956/1443025435958> (Accessed September 7, 2017)

Public digital displays are not typically used for public art, because they are mostly used to influence people by advertising or providing directions [18]. However, they can be used to support the socialization and wellbeing of their publics through participatory systems. In my art practice, I strive to create experiences that engage people through participation. Up to the 20th century most visual art was designed to be experienced passively, and artists created their work in isolation. From the onset the 20th century, art movements such as Dadaism engaged in public performance art, which set the tone for new non-traditional art forms to emerge. Another group of artists, referred to as the Situationists [13], employed this participation in public space as a political tactic to revolutionize society by disrupting the status quo. These methods are still used in relational art [9] to blur the boundaries between art and life as means of reflecting on, and impacting, current networks of social relationships. These practices are predicated on the notion that, as individuals, we may be unaware or complacent to exploitive systems in our society, and that through the unconventional experience of an artwork in conjunction with reflection on the artwork's contingency in real life, we may be awakened to those systems/conditions in order to better our condition. The use of public digital displays to disrupt public space and give agency to the public is unconventional and inherently political due to the typical use of these spaces for utilitarian purposes.



Figure 1.3 Title Unknown, Banksy, 2014. This image depicts the work of graffiti artist Banksy, who commonly uses public space to raise social, economic, and political issues. The image here is a commentary on the refugee crisis and migration. Image source: <http://banksy.co.uk/> (Accessed September 9, 2017. Licensed under CC NC 2.0)

Interactive/participatory systems require an input device which allows them to interact but can also be restrictive. Our personal devices, such as mobile phones, sometimes serve as a means to distract oneself from the discomfort of being in public space with others. However, as an input device for the interactive public display, they offer an opportunity for individuals to express themselves with a great deal of freedom and create dialogue in previously co-opted public space.

Through the development of my own participatory public artworks, I have noted that people who interact are sometimes looking to express themselves beyond the composition I had in mind. This has prompted me to create works that are more open-ended and allow for greater expression within the work. As I explore this domain of public expression, however, it becomes clear that individual entitlement for self-expression often overshadows the optimistic idea that these works can foster improved social relations. Although many individuals may be prone to engage in reciprocal dialogue, others choose to use social platforms as a performative space. As I explore the relationship between allowing for self-expression and shaping boundaries for respectful discourse, this raises the subject of mediation in my work.

I am particularly interested in the intersection of the physical public space, such as that surrounding a large public display, and the anonymous input of virtual content to that physical space. The internet is a virtual public space where individuals are able to express themselves freely through numerous social platforms. The discourse that takes place in virtual space typically involves individuals who are not co-located. There are many advantages to this, such as the extension of knowledge through information sharing, support networks for niche communities and informal coverage/dialogue on important events. This type of exchange is something that our

physical public dimension often lacks. However, the internet also fosters negative human behaviours, such as bullying, intense arguments, and social echo-chambers. These types of behaviours in our physical public spaces are typically kept in check by existing social protocols, yet can become amplified in the virtual realm. An input method that resembles that of virtually supported discourse could allow for greater expression in physical public space, however it also calls for new strategies of mediation.

The medium of digital content is often subject to mediation, though this process is typically not transparent [41]. Moreover, the people who develop the social platforms, through which expression is facilitated, disappear from view and their intentions become shrouded in the black box of their system. Consequently, individuals who interact with these systems take for granted the motivations behind the system that they are using as they employ it for their purpose [29]. However, what would happen if mediation became visible to the person interacting? If the individual is able to send the display anything they want, mediation could be represented visually through the display rather than behind the scenes. Much like the reaction of another human, response from the display may cause individuals expressing themselves to reflect on their actions and how it relates to other people within the space.

I will present this question again in section 1.4 when I discuss the challenges in this thesis. However, I would first like to briefly introduce *Objective Meaning* (see Figure 1.4), the art work developed in this thesis that embodies this line of questioning, as point of reference for discussing related work. I will do this by describing what the installation looks like and what happens when it is interacted with.

Objective Meaning is displayed on a large screen and is programmed to accept and display text messages sent by the viewer through Shorthand Messaging Service (SMS) on their mobile device. The messages appear as simple black text on white background at the top of the screen. Every word sent to the installation is individually animated to connect, fall, and bump into one another as they attempt to form the messages that are being sent. Messages appear one at a time, in the order they are sent, at the top of the display. If a word has already been used in a previous message it will rise to complete the message and it may displace, or bring with it, other words that sit on top of it. After briefly being displayed the message will fall to the bottom of the screen and break apart into separate words. At this point the next message will begin to form at the top of the screen.

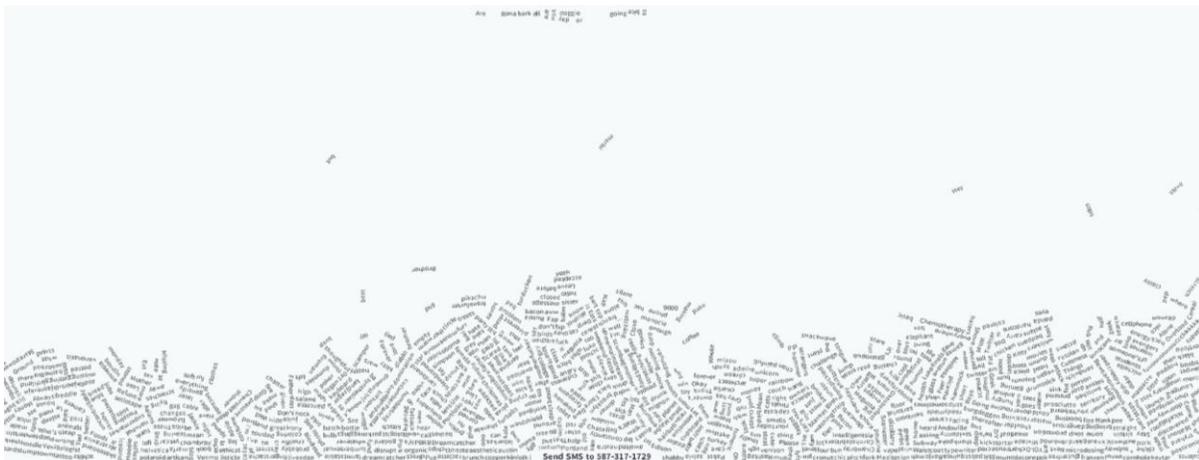


Figure 1.4 The image depicts *Objective Meaning* receiving a message, and displaying it at the top of the screen. There are several words midair – these were bumped when words at the bottom of the screen rose to complete the message.

1.2 Research at the Intersection of Arts and Human-Computer Interaction

A few researchers in the Human Computer Interaction (HCI) community are looking to subvert the monopolization of computational technology for corporate wealth, and to find uses that are more meaningful to society. As they explore potential for “educational, entertaining, participative, and evocative experiences” [18], some of the systems produced in this community fit into the realm of art. One example of this is *SMSlingshot*, a work by Fisher et. al. [16], that allows individuals to launch messages onto an architectural media façade with a custom object that looks like a slingshot. These works expose social phenomenon for contemplation and produce new cultural artefacts. Likewise, as artists claim computational mediums with which to express and engage their audience, their work overlaps with research in HCI. This is exemplified in Varvara and Mar’s work (see Figure 1.5), which utilizes technology to create playful interactions



Figure 1.5 *Katusepoisid (Roof Guys)*, Varvara and Mar, 2017. This public installation features three interactive robot-lamps, installed over a sidewalk. The lamps are kinetic and respond to passers-by with a game of cat and mouse. Image source: <http://www.varvarag.info/katusepoisid/> (Accessed September 7, 2017. Used with permission of rights holder: Varvara and Mar)

between the public and urban infrastructure. These systems can expose new understanding about interaction techniques, communication and human behaviour. The work in this thesis, *Objective Meaning*, sits at the convergence of these two disciplines, and as you will read in the following sections, calls on work from both fields to situate it.

Objective Meaning utilizes a computational simulation to create a dynamic composition in response to each interaction. Artists have been exploring systematic approaches to arranging compositions within their work for some time. We see this in works such as Duchamp's *Three Standard Stoppages* (see Figure 1.6), created by dropping the same string three times, and Malevich's Suprematist composition technique that uses the golden ratio as found in nature to arrange geometric shapes on the canvas (see Figure 1.7). This line of inquiry is continued in generative artworks such as Ernest Edmonds' *Video Constructs* (see Figure 1.8), where computational

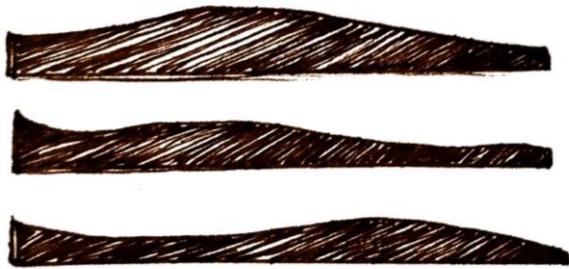


Figure 1.6 Sketch of: *3 Stoppages Etalon (3 Standard Stoppages)*, Marcel Duchamp, 1913-1964. This sketch depicts a series of three wooden cutouts, the shape of each determined by an experiment when the artist dropped the same string three times from the same height. These objects were later used by the artist as tools for the composition of other artworks.

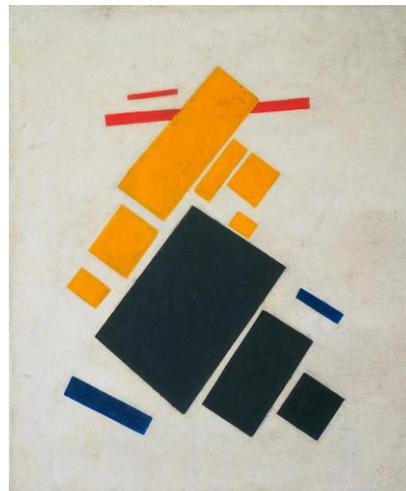


Figure 1.7 *Suprematist Composition: Airplane Flying*, Kazimir Malevich, 1915. This painting, typical of Malevich, uses the golden ratio, of approximately 8:13, in his process of creating and assembling geometric shapes [34]. Image source: Artstor (Accessed September 7, 2017. Public domain)

systems are used as a tool to produce compositions based on rules and interaction. The composition of elements in my work, *Objective Meaning*, is also delegated to computational process and, like Edmond's work, it is recomposed as a result of interaction.

Objective Meaning appropriates our familiar mobile devices into an art object/tool that can be used as a means to extend the body. We often think of extensions as being something that augments our physical body for the sake of strength or mobility; such as with prosthetic limbs. Artists, such as Lygia Clark, instead explore physical extensions as an augmentation of the social being. This is seen in *The I and You* (see Figure 1.9), where two people are forced to navigate as one in a suit that has physically connected them. The augmentation of the social being through communication technology is vividly exemplified by the work of Stellarc. The artist's work, *The Ear on Arm* (see Figure 1.10), is a prosthetic ear imbedded in the artist's arm that is intended to capture sound and broadcasts it over the internet. Although not directly attached to the body, it is common for individuals to now carry mobile devices that connect them to their friends and



Figure 1.8 Sketch of Ernest Edmonds' *Video Constructs*, a series of digital compositions that are generated algorithmically and, sometimes, in response to interaction.



Figure 1.9 Sketch of: *The I And You: Clothes-Body-Clothes Series*, Lygia Clark, 1967.

Much of Clark's work explores the use of physical objects to negotiate or create social relationships between people. This work uses custom clothing to connect two individuals at an intimate distance while obstructing their vision to enhance their sense of touch.

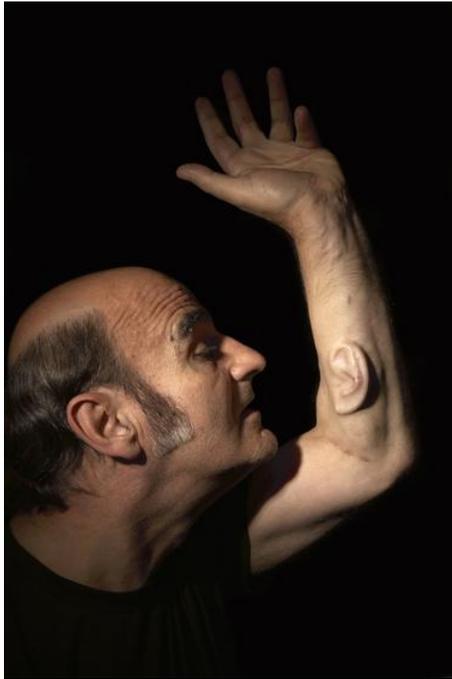


Figure 1.10 *Ear On Arm, Stelarc* (Photographed by Nina Sellars), 2007-ongoing. Image source: Stelarc's website [45] (Accessed September 7, 2017. Used with permission of rights holder: Stelarc)

The additional device that records and transmits sound was removed for safety reasons shortly after surgery. The ear remains in Stelarc's arm however, and it is his intention to reintegrate the listening feature, along with other bionic capacities [45].

myriad of information. These devices are highly personalized so they become unique extensions of the self that augment their social relationships in ways that the standard human simply cannot perform.

In addition to negotiating relations with other people, objects and systems, such as *Objective Meaning*, are also being explored as anthropomorphic agents that individuals interact with either rhetorically or under the illusion that there is consciousness to the machine.

There are many complex examples of this in the development of devices like amazon's *Echo*², and operating systems with talking assistants like *Alexa*³, *Siri*⁴, and *Cortana*⁵. Researchers in Computer Science have long debated the possibility that computers can "think" by challenging their ability to mimic human responses to human questions [39], but some artists have been making work that takes a different outlook on the need for responsiveness. These systems only indicate that they are listening or that expression is appropriate to entice people to interact, this is exemplified by Pippin Bar and

² https://en.wikipedia.org/w/index.php?title=Amazon_Echo&oldid=799155217 (Accessed September 7, 2017)

³ https://en.wikipedia.org/w/index.php?title=Amazon_Alexa&oldid=798255186 (Accessed September 7, 2017)

⁴ <https://en.wikipedia.org/w/index.php?title=Siri&oldid=799404125> (Accessed September 7, 2017)

⁵ <https://en.wikipedia.org/w/index.php?title=Cortana&oldid=798105401> (Accessed September 7, 2017)

Marina Abramovic's work, *Complaining to a Tree*⁶ (see Figure 1.11), a game in which after selecting one of five simple tree illustrations, the person interacting is able to endlessly type complaints to a tree, which immediately disappear upon sending. The work in this thesis exploits a similar compulsion to share, and builds up additional dialogue as the content is aggregated and displayed publicly.

In both art and computer science, creators are seeking to make work that is relevant to communities external to themselves, thus engage in social practice. This can, for instance, be achieved by social design processes that include members of the community in concept workshop [50]. Another example of social practice can also be demonstrated with the orchestration of an event that facilitates socialization, such as Suzanne Lacy's, *The Crystal Quilt* (see Figure 1.12), or the design of an interactive system that facilitates socialization, such Miranda July's *Somebody App*⁷,

where messages are delivered via a third party stranger who happens to be near the intended recipient. *Objective Meaning* also explores the use of technological mediation by facilitating expression and retaining the public discourse that takes place through the installation.

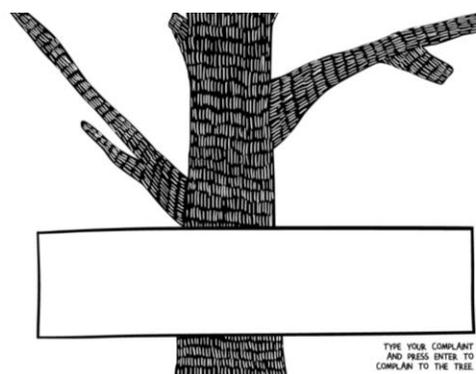


Figure 1.11 *Complaining to Tree*, Pippin Barr and Marina Abramovic. This image depicts the web interface where complaints are typed in and submitted to the tree. Screenshot of <http://www.pippinbarr.com/games/abramovic-methodgames/complainingtoatree/> (Accessed September 7, 2017)

⁶ <http://www.pippinbarr.com/games/abramovicmethodgames/complainingtoatree/> (Accessed September 5, 2017)

⁷ <http://somebodyapp.com/> (Accessed September 5, 2017)

With interactive public displays, the social context of the work plays a significant role in determining whether people will interact with the piece [1]. When systems allow for content creation that is publicly recognizable, the person interacting becomes a performer in a social space that follows them as content is decided amongst the group [16,49]. The social protocol within the group checks the behaviour of the content creator, when they are visible to the group like this. In



Figure 1.12 *The Crystal Quilt* (Photographed by Gus Gustafson), Suzanne Lacy, 1985-1987. Photo Courtesy of the Artist (Used with permission of rights holder: Suzanne Lacy).

This work explores the experience and representation of aging women through an event where a large group of elderly women are invited to engage in performance arranged to resemble a quilt. The performance itself marks a small episode of a larger experience of storytelling and support surrounding these women that the artist wants to illicit.

the work I present here, individuals are able to express themselves anonymously, reducing tensions and inhibitions, such as those related to public performance and exposure. Sometimes when multiple people are interacting with a public display it can create awkward tension [42] or conflict between the people interacting [38]. These conflicts are also kept in check by social protocol, but with the anonymity of content creation, this calls for an alternate approach to mediation.

1.3 Scope

The work in this thesis relates to and leverages research in many different areas that can be seen in the diagram depicted in Figure 1.13. I will draw on these topics in the following chapters to frame the new space that *Objective Meaning* occupies. Although *Objective Meaning* may have implications for these topics, the thesis will not be focused on contributing to all of them. The primary contribution of this thesis is the identification of a new space for design considera-

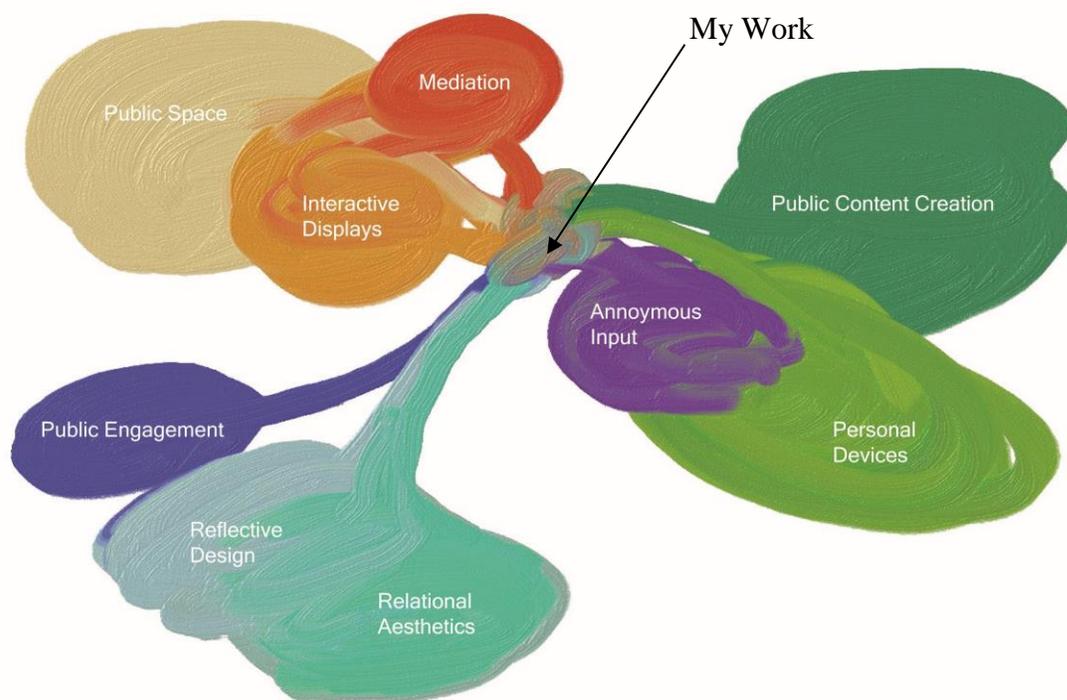


Figure 1.13 In this scoping diagram *Objective Meaning* occupies a blending of many different topics through the exploration of a new space.

tion, that takes place where free and anonymous social content creation is situated visibly in physical public space, and additionally, the design and implementation of a new work that contributes to an exploration of this new space.

1.4 Challenge

In the motivation section I presented a potential space where people were able to express themselves through a virtual input, and have that content anonymously displayed in physical public space. I also presented a form of mediation for this content through visual representation as method for prompting reflection. My goal is to investigate how people engage in this new situation where technology facilitates anonymous expression within physically displayed public discourse. This space warrants much consideration, but, in the context of this thesis, I will focus on the development and deployment of one interactive artwork, *Objective Meaning*, that explores this unique domain through the visual mediation technique of breaking apart messages.

I will first describe the development of *Objective Meaning*, and how it allows for the contribution of content to be the focal point of a publicly installed display. How the composition of the display will evolve over time and leave traces of individual interactions, to give an overall sense of the public discourse. Also, how individuals are able to interact anonymously through their personal devices, prompting the display to perform an animation that engages the viewer in reflection. I will then deploy the interactive system in a public setting to observe how individuals use it. I will then discuss the expected and unexpected behaviours that take place in this new space. Finally, I will discuss the instances of engagement that clearly respond to mediation in this space.

1.5 Methodology

Throughout the development of *Objective Meaning* I follow an iterative design process where concept, design and implementation evolve at the same time. I faced several challenges due to my lack of expertise with programming and the design of digital interfaces. This caused me to step back to the drawing board when something that I thought would work was revealed to

be simply not possible for me to implement. This process is well illustrated by other artist/researchers working at a similar intersection as myself (see Figure 1.14). Macdonald’s braided development model [31] is an adaptation from Beyer and Holtzblatt’s iterative design cycle for interaction design: design, implement, evaluate [7].

In MacDonald’s diagram, evaluation is replaced by conceptualization, and while I also do not use formal evaluative methods, evaluation does play a role in the conceptualization phase. I consider my own personal use and critique as a subjective approach to evaluation, in addition to informal testing on friends, family, and students in my lab [36]. Drawing from Carman Neustaedter’s *Autobiographical Design*, in *Human-Computer Interaction*, when working on a system of one’s own impulse, tinkering allows the designer “to respond both to formalizable aspects of usage and to less formalized intuitions and feelings drawn from experience” [36]. This is particularly poignant for such designs that are based on tacit knowledge and require quite a bit of tinkering to get just right. I will discuss this more in chapter four when I describe the design of *Objective Meaning* in detail.

The piece developed in this thesis is intended to be an “open-work” [14], which contrasts many interactive systems which are designed for utility. As an art work, *Objective Meaning*,

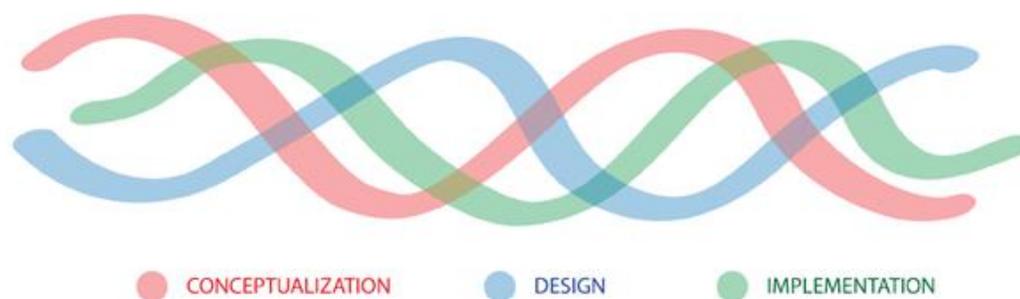


Figure 1.14 Macdonald’s diagram for a braided development model [31] (Used with permission of rights holder: Lindsay MacDonald).

should elicit more questions than it answers, because it is intended to disrupt the status quo rather than solve a problem. Research in HCI call this “reflective informatics” [4] which includes both reflective and critical design. There are strategies outlined in reflective informatics that are used in *Objective Meaning*, such as using breakdowns and slowness to, respectively, elicit and make space for reflection [4]. These strategies compliment strategies in “relational art” that elicit contemplation of real-world issues by subsuming a form that is regular and perhaps even has utility [9]. I will discuss “relational aesthetics” in more detail in Chapter 2, however, “reflective informatics” speaks to a similar phenomenon by pointing out that breakdowns elicit contemplation in a system that was previously taken for granted.

During the deployment of *Objective Meaning* it is the goal to observe and record only authentic interaction. With regards to evaluation, Baumer states that formal methods and traditional user studies of people interacting with technologies of reflection are likely to provide poor results [4]. Reflection is difficult to quantify because it does not always happen immediately or clearly, insights are likely gained from conversations with people after they happen upon the work. *Objective Meaning* presents a unique challenge in this regard, because interactions with the work are anonymous and the people interacting are difficult to pinpoint. Strategies were adjusted during deployment, but even then it was difficult to elicit response from people without the incentives of participating in a study. To accommodate the anonymous and ephemeral passage of people engaging, the analysis presented will focus on methodology used in the context of building knowledge on public art. That is to discover, “people’s behaviours and social responses” [30], in the new space created by *Objective Meaning*. This can be accomplished through observations of the context and behaviours surrounding the installation. Additionally, this can include an analysis

of the content sent to the display, which will give a broad idea of how people are interacting with the work, and more specifically, if interactions relate to the mediation technique.

1.6 Chapter Summary and Thesis Outline

So far I have suggested the use of participatory art in the context of public space as a means to subvert the predominant social-order and potentially foster improved social relations. I have discussed the use of personal mobile devices as an avenue for providing freedom in the creation of content for a public digital display, and how this calls for mediation in response to detrimental uses of the system. Rather than blocking users and content, as is usually the case with social platforms, visual abstraction techniques are presented as a possible means of encouraging reflection and respectful discourse.

The main contributions of this Thesis will be the identification of the unique interaction space created by displaying anonymous virtual content-creation in physical public spaces and identifying visual abstraction as a mediation technique in this area, and the design and deployment of *Objective Meaning* as an exploration of that space. The methodology applied to the design of the system will be Autobiographical [36] with applied theory from Reflective Informatics [4] and Relational Aesthetics [9]. The methodology for evaluating the deployment of this work will take a discovery based approach, to the available data collected through logs and field observations.

In the following chapters of this thesis, I will further discuss how *Objective Meaning* is situated as an interactive public art piece, the design process of the system, and insights from its deployment. For the convenience of the reader, the contents of the chapters will be as follows:

Chapter two will present the paradigm for public art that calls for greater public engagement, a utopic perspective that the unconventionality of an artistic encounter can lead to social change, and works from my previous practice that inform *Objective Meaning*.

Chapter three will discuss how the system design of *Objective Meaning* opens up a new space to mediate public content creation, in human-computer interactive systems.

Chapter four will detail how *Objective Meaning* works, and give insights to my design process.

Chapter five will discuss the deployment of *Objective Meaning*, data logs collected during this time, as well as observations and feedback from the public.

Chapter six will be a discussion chapter where I speculate on the behaviours around *Objective Meaning*, and future design considerations.

Chapter seven will include some reflection on implications for my art practice and conclude the thesis.

Chapter Two: Art Historical Context and Artistic Concept

In this Chapter I will discuss social practices in visual arts and specifically in, what I will refer to as, the public institution of Public Art. Although *Objective Meaning* will not be deployed directly in this venue, this work is informed by the conflict between artistic autonomy and public engagement that endures in this domain. This first section in many ways presents public engagement as a right for the public, who pays for the work via taxes, to be able to relate to the work. The second section approaches public involvement from a different lens, which also seeks to benefit the public, but rather as a form of revolutionizing it in the face of a perceived social disconnection. This approach bends less to public opinion, and maintains an artistic autonomy, while still requiring public participation as an “Open Work” [14].

In this chapter I will also discuss the evolution of my practice towards mediation as a subject in my work, brought on by public participation in two of my previous artworks. I will also discuss two works, by other artists where the public was able to express themselves freely, but the presentation of their expression was limited as a form of mediation. I will then discuss my concept for *Objective Meaning*, and how it looks to expose mediation visually as a point for reflection rather than an unseen barrier for expression.

2.1 Social Practice as Public Art: Its Evolution and Critique

The current public art landscape is an accumulation of different approaches to public art over the past century. Public Art as a public institution in North America officially began in the 1960’s when the United States’ National Endowment for the Arts created the Arts in Public Places Program [28,46]. Preceding that, public art often took the form of memorials, to stimulate civic pride and establish a common history. Judith Baca refers to this as the “cannon-in-the-park”

phenomenon [3], where relics and representations of historical victories are used to decorate public spaces. This practice led to prescriptive narratives that glorified certain aspects of history and omitted or were insensitive to other aspects.

In the sixties, pressure from the high-art world to extend its market for work previously exhibited in galleries, museums, and private spaces [28], initiated public art programs to deliver “plop-art” to the public. Based on the National Endowment for the Arts goal of giving the public access to contemporary art outside of the museum [28], “plop-art” is little more than large scale versions of objects created by studio-based artists of the time, that are “plopped” into public space without consideration of the context. At this time public art was increasingly restricted to the creation of permanent objects, as it became more entwined in the bureaucracy of infrastructure development projects that valued the physical legacy of structures rather than an active cultural value [28].

By the mid-seventies public confusion and alienation surrounding “plop-art” created a shift towards “site-specific” artwork. The National Endowment for the Arts stated that the work should be “appropriate to the immediate site” [28]. Artists were encouraged to consider the social, historical, and environmental aspects of the site and respond to this with their work. The enduring issue, however, when it comes to even site-specific artworks, is that the concept is developed through the singular lens of the artist, or creative team, and it may not resonate with the public who is left with an object that they are not able to understand or are downright disrupted by.

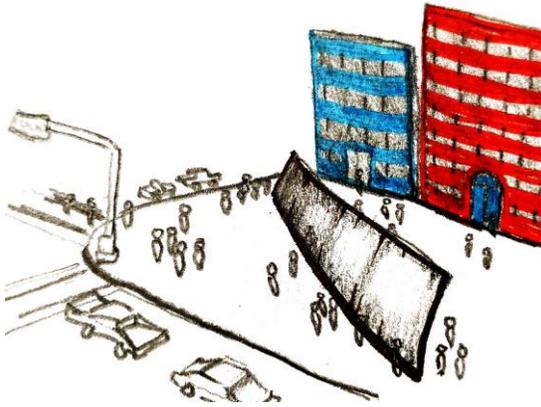


Figure 2.1 Sketch of: *Tilted Arc* installed at Javits Federal Building Plaza in Manhattan, New York.

This large sculpture acted as a wall, dividing up a busy plaza.

The eighties are marked by one of the most infamous public artworks; Richard Serra's *Tilted Arc* (see Figure 2.1). Serra's site-specific installation was a large brutalist wall that divided a busy New York plaza. Locals complained it was an unwarranted physical interruption to how they wished to use the space and, to some, an eye-sore. When government officials decided to remove *Tilted Arc*, Serra felt that this was a violation of his contract with the commissioning body and his constitutional rights [44]. Because the work was

site-specific, removing it from the site would essentially destroy it, and to do so based on taste reduced his work to commodity rather than the cultural artifact he believed it to be. From this perspective, Serra deemed the destruction of his work as something akin to book-burning [44]. By 1989, Serra had lost his case and *Tilted Arc* was dismantled. The controversy around Richard Serra's work called unprecedented attention to the disparity between how artists were trying to create meaning in public space and the public's receptiveness to that expression. With *Tilted Arc*, public opinion prevailed, and it became clear that those who created and administered public art were going to be held accountable to public and political expectations. While the work in this thesis is not a public commission, I am leveraging this example to open a discussion about public rights and expectations, and how institutions that represent the public's interest exercise them.

In the nineties, Nicolas Bourriaud defined a new style of artistic practice called “relational aesthetics” [9]. This type of art is characterized by an awareness of the network of relationships that compose our experience of things, and that the artwork exposes or bridges them with or without the production of artifacts. An example of this is Rirkrit Tiravanjia’s work *Untitled (Free)* (see Figure 2.2), which often turns an art gallery into a soup kitchen, offering up rice and curry to its visitors. This work is open to interpretation, but its meaning strongly derives from the participation of the public, the actual social space created by the event/performance, and its contingency in life.



Figure 2.2 *Untitled (free)*, by Rirkrit Tiravanjia’s, was first exhibited in 1992 at 303 Gallery in SoHo. This image depicts a recreation of the work titled *Untitled (Free/Still)*, exhibited at the MoMa in New York (Photographed by Jane Housham), 2012. In this work curry is prepared and served daily from noon to 3 pm. Visitors are offered the food to be enjoyed in the gallery while they relax and make conversation with friends.

Image source: <https://onarto.com/rirkrit-tiravanjia-conceptualist-anti-object-artist/> (Accessed September 7. Used with permission of rights holder: Jane Housham).

There are a spectrum of practices that relate to this under many different names; “Socially engaged art, community-based art, experimental communities, dialogic art, littoral art, participatory, interventionist, research-based, or collaborative art” [8,27]. What they have in common is a methodology that prioritizes social interactions and experiential inquiry over producing objects. For Kester [27], these works seek to mitigate the alienation of the public over the incomprehen-

sion of previous avant-garde works. However, these social practices, which sometimes aim to encompass the ultimate integration of public interest in public art, are still faced with considerable criticism. One aspect of this, is the scrutiny of process; artists are often positioned in socially constructed constituencies to aid in a process of cultural identity making for them [25]. This is a position of oblique ethics, where people can be exploited or exoticised [8]. The other criticism for social art, is the sacrifice of aesthetics and artistic autonomy in attempt to “instrumentalize art in compensation for some perceived social lack” [8]. Bishop and Rancière [40] point out, “the systems of art we understand in the West is predicated precisely on a confusion between art’s autonomy (its position at one remove from instrumental rationality) and heteronomy (its blurring of art and life)” [8], and, that contradictions, “invite us to confront darker, more painfully complicated considerations” of our human condition [8]. When artistic autonomy is sacrificed for non-confrontational social engagement, its materialization can become complacent to our current social norms rather than challenging them. My work, as I will continue to discuss in section 2.4, aims to be moderate in an approach to facilitating public expression, so as not to lose its potential to raise questions and challenge the status-quo.

2.2 The Transcendence of Experience-Based Art towards a Utopic Paradigm

In the previous section I discussed an evolution towards social practice with a focus on public accountability and involvement, and concluded with criticism towards the pure rationalization of the arts. In this section I will present an alternate practice that utilizes participation and public space, but not at the expense of mystery and autonomy. These artists were working outside of institutionalized Public Art, and commercial art markets, because their practice aimed to revolutionize society by transcending the status quo and creating utopic paradigm of social relationships and creativity.

In the late 1950's an artist group formed called the "Situationist International" which closely followed the ideology of French artist and theorist, Guy Debord. According to his manifesto, *The Society of the Spectacle*, he believed that the Marxist proletariat revolution happened too quickly and inadequately, thus resulting in a "new peasantry" with "manufactured apathy" towards mass commodification of everything, including individual labour and public space [12]. Debord referred to this illusive system of exploiting the middle-class as a spectacle and placed it in opposition to meaningful dialogue and social relationships [12]. He, and many other artists, felt that art could revolutionize society through the creation of authentic experiences that suspend the spectacle.

In 1957 Debord outlined "constructed situations"[13], which can also be referred to as "happenings" [26] or interventions. These are aimed at disrupting the status quo to fulfill a "fundamental need for the lack of consciousness and for mystification"[13]. Debord believed that the "exploitative [consumerist] society" created anxiety and alienation around things such as newly designed goods, which can still be seen today in advertising and pressure to always buy the latest clothes, gadgets, cars, etc. Debord believed that advances in technology were a systematic trap to keep individuals productive and predictable, i.e. ensuring that they perform labour for economic gains that enable them to buy things. However, he believed that this did little to contribute to their quality of life because the goods they were working hard for were unnecessary. Debord's constructed situations often consisted of obscure public performances, thought to interrupt the illusion of the spectacle, creating a moment of authentic experience. Debord believed that these acts would give agency to the public, or as he puts it: "incite the spectator into activity by provoking his capacities to revolutionize his own life" [13].

There are many similarities between the Dadaists and the Situationists, as the former 1920's Dada movement also marked a rejection to the production and dissemination of art within an art economy. The Dadaists played with the banality of everyday life and often used only the unexpected and sometimes unintentional juxtaposition of found material. However, Debord is critical of Dada, writing that they "sought to abolish art without realizing it" [12]. Debord was not in favour of the art-is-dead attitude in Dadaism; instead he opted for a more deliberate politicization of art as a means to "transcend" the spectacle. In essence, Debord truly believed that another, better world was possible, and that society would realize his utopic vision at the interstice of constructed experiences. While my aesthetic does not mimic that of the situationists, my art practice takes inspiration from Debord's theories, as I feel they still resonate with my experience of society today. I will refer to Debord's concept of the spectacle again in Chapter 4, when I discuss the iterative process of creating *Objective Meaning*.

Joseph Beuys expands on Debord's revolutionary theory in his 1973 text: *I am Searching for a Field Character* [6]. He believed that this transcendence of art into a revolutionary practice would become possible when "every living person becomes a creator, sculptor, or architect of the social organism" [6]. This utopic vision relies on the creative participation, of each individual, in reciprocal dialogue. As I will discuss further in the next sections of this chapter, such a grand ideal for participatory work is futile, because each individual does not participate in reciprocal dialogue. I am not alone in the realization that participation can bring about dubious results. In the 90's the idea of utopia in relational art no longer held an "idealist and teleological" view, rather, these works strived for more organic means of building relationships through "micro-utopian" moments [9]. These micro-utopias form a potential space that is open to interpretation,

which I will discuss further in the next section with regard to participation. To illustrate this potential space, Bourriaud describes an encounter with art as the deviation of an atom that can cause a new biological form to come into being [9]; it is not a replacement of the predominant social order, but rather an interstice for social adaptation, which can come about through a much slower process than the revolution Debord was hoping for. This particular view is one that I apply in my own practice, and will continue to discuss in relation to other work in Chapter 3, and in the development of my concept further on in this chapter (section 2.6).

2.3 The Aesthetics of an Open-Work

Umberto Eco's 1962 text, *The Poetics of the Open Work*, addresses openness in the composition of art, music and literature as reflecting a wider canon of philosophical thought around the potential of subjectivity; "the discarding of a static syllogistic view of order, and a corresponding devolution of intellectual authority to personal decision"[14]. Eco talks about the contemplative possibilities of a work with open meaning, but also "works in motion", which are characterized by "concrete pliability" [14]. In these works the author leaves the work intentionally incomplete, allowing for performers or an audience to then interpret and add to the authorship of the work. The individual's interaction is a necessary fulfillment of the work but "is itself only complementary to all possible other" [14] interactions, because the work itself is exposing complexity. In my practice I leverage Eco's concept of an "open work" and "work in motion", as a means to give agency to the public and allow the work to materialize in a way that includes their input, which I will discuss further in section 2.6. Eco writes that this type of work poses a "new relationship between the contemplation and the utilization of a work of art" [14] because

the unfinished state creates a contact between the lived world and art. In Chapters 5 and 6 I consider this relationship when I analyze and reflect on how individuals make use of *Objective Meaning*.

2.4 Mediation as a Subject in my Previous Work Involving Participation

In this section I will briefly describe two previous artworks of mine that allow for public participation. The evolution between these works marks a shift in my practice from the utopic vision of participation to questions around mediation. These works are participatory, not in the sense of artists utilizing a collaborative social process of art making, but rather in that the work itself invites the audience into a performative role much like Tiravanjia's work, mentioned in section 2.1.

2.4.1 *One Time* (2013)

This installation converts a two-story detached garage into a sundial (see Figure 2.3). The building belonged to one of an entire block of houses, slated for demolition to make way for a condo development. The entire block was utilized for a large group art show called WRECKCITY.

A hole cut in the roof of the structure allowed for light to pass into the dark interior of the upper floor (see Figure 2.5), creating a patch of light that travelled from the west to east corners of the room (see Figure 2.6). A bar across the hole cast a shadow upon the patch of light. The audience was encouraged to fill in this line with chalk – a symbolic gesture that represents a juncture between person and place. As the sun continues its trajectory the lines sweep across the floor, creating an array of chalk marks (see Figure 2.4). The following day the chalk lines land further south in the room to reflect the climbing spring sun. With the passage of new visitors each footprint blurs the line of those who came before.



Figure 2.3 Exterior view of structure housing *One Time*, a work that I produced in 2013.



Figure 2.4 Installation view of *One Time*. Here depicting an evening shot with the sun cast in east corner of the room. Several chalk lines can be seen on the ground where people filled in the lines.



Figure 2.5 Detail of *OneTime*, depicting the hole in the roof that allows for sunlight to be cast in the room and the wooden bar below that breaks the circle.



Figure 2.6 Detail of *OneTime*, depicting the circular shape of sunlight cast on the floor with the wooden bar's shadow. A line of chalk can be seen where a person filled in the line just minutes before.

During the exhibition of this work, individuals commonly used the chalk to write and draw on the walls and floors of the installation. In addition, this work and others in the exhibition were damaged and defaced using materials not even provided through the installations. The next work I will describe responds to this destructive behaviour by the implementation of an artificial authority that borrows the social protocol of a school.

2.4.2 *Attention, Please* (2013)

Attention, Please, was a collaborative installation and performance with artist, Lowell Smith. The piece was part of PHANTOM WING; another pre-demolition art project (this is the same concept as WRECKCITY mentioned in section 5.4.1) located at an old school in Calgary named King Edward. After re-establishing the school's PA system, and re-routing it to an office space built within the one wing to be demolished (see Figure 2.7), Lowell and I acted as “arts administrators” during public viewing hours. The office provided a hub where viewers could sign



Figure 2.7 Installation view of *Attention, Please* depicts the office desk, and broadcasting station behind.



Figure 2.8 Performance still of Attention, Please (Photographed by Caitlind Brown), while an announcement is being made. This image depicts the broadcasting station with a microphone, keyboard-tray converted to switch-board and a bulletin board above with notes regarding announcements to be made. Used with permission.



Figure 2.9 Performance still of Attention, Please (Photographed by Mike Tan), depicting the arts administrators engaged in dialogue with another individual at the office desk. The administrators answered questions, took requests for announcements and invited people to relax on chairs in the office. Used with Permission.

in and ask questions, or just have a quiet break (see Figure 2.9). We made announcements regarding performance times, safety concerns, respecting the art work, lost and found items and summoning of misplaced friends and family (see Figure 2.8). Visitors were also invited to give comments and reflections on the exhibition that would be relayed over the PA system, though this was largely not how the public chose to engage. Throughout the exhibition, activities performed in the office were guided by the mandate of art ambassador, but maintained a superficial implication of authority.

With this work, our characters mediated the behaviours of individuals to the point where they no longer considered any entitlement towards self-expression. However, if Lowell and I were not present in the space, individuals were observed attempting to make announcements

themselves. From this I have come to realize that anonymity plays a significant role in the individual's likelihood to express themselves. Thus, the work in this thesis leverages my experience with these works, by exploring the use of technology to shroud my position as a mediator and encourage greater self-expression through the artwork.

2.5 Analog Mediation in Art Works that Aim to Facilitate Public Expression



Figure 2.10 *Mahnmal gegen Faschismus (Monument Against Fascism)*, Krieg, Gewalt, für Frieden und Menschenrechte, Esther und Jochen Gerz , 1986. This sculpture was first installed in 1986, and was slowly lowered until it finally disappeared in 1993. This image depicts the structure part ways through this process. Image source: Wikimedia Commons (Accessed September 7, 2017. Licensed under CC BY-SA 3.0)

Public participation in artworks often serves as purely symbolic gesture, and a gap forms between the impressions of what happens in a work and what actually transpired. This would be the case if I presented the work *One Time*, mentioned in section 2.4, as only being interacted with in the way I intended. As I described this was not the case, as people expressed themselves in any way that the interactive material (ie. chalk) afforded them. This is also the case with *Mahnmal gegen Faschismus (Monument Against Fascism)*, constructed in Hamburg, Germany.

A work that invited the public to scratch their name on a 12-metre tall, lead-coated, square column (see Figure 2.10), symbolizing their solidarity against fascism. In addition to signatures, the public scribbled over the monument, drew swastikas and other inappropriate symbols, and generally disregarded or purposefully debased the artist's intentions [33]. The conclusion of this work saw the monument sunk into the ground, so that today if you were to visit the site

you would see only the top surface of the column in the ground and a didactic panel that describes only the idyllic version of its history (see Figure 2.11). With regards to this work, mediation of the dialogue in process was not actively negotiated by the artists in any way, and the act of sealing up the signatures aided in concealing the complexity of social discourse the monument hosts. From this, we can assume that the experience of participating in the work, and the experience of viewing the work in its present state elicit significantly different perceptions of public feeling/opinion towards fascism, as the latter contains no residue of the former.

The *Monument Against Fascism* exemplifies an approach that is different than the direction I wish to take. *Objective Meaning*, strives to create cohesion between experiences over time, by maintaining the residue of former interactions and relating them to current interactions by the reuse of words. With *Objective Meaning* there is no imposed subject on which the individual is supposed to be engaging, therefore the issues of apathy and dissent that arose in

Monument Against Fascism are not counter to its concept as an artwork. These, like other types of public expression, are social relations that *Objective Meaning* looks to investigate. Other artworks that authentically aim to facilitate public discourse, and allow for anonymous contribution, utilize some form of mediation that curates the output of expression. One such work is the performance, *However you do it...consider*



Figure 2.11 This image depicts the *Monument Against Fascism* (Photographed by Diagram Lajard) at its final position. Only a contrasting square of material shows the top face of the column and an explanatory panel is situated in the space. Image source: Wikimedia Commons (Accessed September 7, 2017. Licensed under CC0)

the stars, by artist collective Sophie Farewell. This work consists of two elevated sculptures (see Figure 2.12), representing a moon and mountain, atop which a performer “hollers” out anonymous messages (see Figure 2.13), submitted by text message or handwritten notes [15]. The artists state that they “don’t allow hateful, sexist, or similar messages to be yelled out” [15]. This



Figure 2.12 *However you do it... consider the stars*, performance by Sophie Farewell (Photographed by Nuit Blanche Calgary), 2012. This image depicts the mountain sculpture, which consists of an elevated platform with a quilted covering. Atop this platform is an actor who calls out hand-written or text-messaged content from the public. Image source: <http://www.ericandmia.ca/solo-works/#/however-you-do-itconsider-the-stars/> (Accessed September 7, 2017. Used with permission of rights holder: Sophie Farewell)



Figure 2.13 *However you do it... consider the stars*, performance by Sophie Farewell (Photographed by Nuit Blanche Calgary), 2012. This image depicts the top of the moon sculpture. The moon sculpture is similarly built to the mountain sculpture, however this shot portrays the actor more clearly. Image source: <http://www.ericandmia.ca/solo-works/#/however-you-do-itconsider-the-stars/> (Accessed September 7, 2017. Used with permission of rights holder: Sophie Farewell)

analog form of mediation is at the discretion of the artist/performer to choose whether or not they will say messages that are inappropriate, and can be thought of as a curation of the dialogue based on individual thresholds for appropriateness.

In my work I wanted to take a different direction than the subjective mediation just described. With the use of technology in *Objective Meaning*, a more objective approach is taken to give the work a sense of autonomy when it comes to my personal threshold. However, this intention becomes muddled with a requirement for censorship which I will discuss further in multiple places throughout this thesis. With regard to the insinuation of a whole message, not just specific banned words, *Objective Meaning* does mitigate negative messages in the same way that it treats all messages: by breaking them apart.

2.6 The Concept for *Objective Meaning*

Rather than placing self-expression and mediation at either end of a spectrum, with *Objective Meaning* I attempt to position them as mutually essential aspects of augmenting social public relations. It brings forth the subject of mediation, by breaking messages apart on the display. Omitting certain messages would be serving as a concrete barrier for expression, whereas the visual manipulation of the messages is intended to engage the individual in a process of reflection that influences their behaviour. This type of influence mimics the concern an individual has, for the reception of their expression by others, that mediates face-to-face social interactions.

With regard to the experience of this work, my approach to the design is one that builds on Eco's "open work" and "work in motion" (discussed in section 2.3); the holistic network of interactions displayed as words on the screen informs reflection, because each individual expression connects to words contributed by other people. With regard to reflection, I presume the

utopic idea that the unconventionality of an experience may elicit reflection on the greater context of the work, such as its placement in the library, use of cell phones for public expression, all of the different words on the display and their relationship to the local public. This stance can be associated with relational aesthetics (as discussed in section 2.2). Additionally related to both situational and relational aesthetics (as discussed in section 2.2), I consider the experience of the work as an interstice for social adaptation towards more positive social relationships in the public sphere. I will describe in more detail how these concepts are applied to my iterative process of designing *Objective Meaning* in Chapter 4.

Although not my original intention, censorship comes to play a role in this work as well. As I will discuss in Chapter 4, the deployment of the work came with imposed restrictions, on words that could be displayed, by the institution hosting the installation. As I became complicit with their expectation for censorship, *Objective Meaning* gave rise to the question of thresholds in regards to appropriateness, as defined by institutions in addition to social protocol. Throughout Chapters 4 and 5 I will present this as an integrated part of the design, but I would like to assert here that this presents a darker side of *Objective Meaning*. What the work seeks to do with the visual mediation of breaking apart messages, is not to curate dialogue, but rather influence a reflective dialogue. With the complete removal of available words *Objective Meaning* moves towards a more dystopic state like George Orwell's, *Nineteen Eighty Four* [37]. In his novel a new language, "Newspeak", has been implemented that renders certain concepts incommunicable. As I will discuss in Chapter 6, the improvement of *Objective Meaning* to compute "inappropriate" messages could very well bring it to an Orwellian state. The discussion I will come back to (in Chapter 6) will offer up suggestions for design competency, but caution the threshold where an application for dialogue becomes one for despotism.

2.7 Chapter Summary

In this chapter I presented two motivations for interactive public art works – one which very much focuses on Public Art as a public institution that services particular mandates and bends to public opinion. The other motivation is predicated on the notion that encounters with art have the potential to affect society. This second view respects the autonomy of artistic practices and suggests that engaging with complex or difficult situations are potentially beneficial. Both contexts are relevant to *Objective Meaning* because the initial design took place with the idealist notions of the latter, while it necessarily shifted towards the institutionalized context when it came time for the deployment.

I discussed the evolution of mediation as a subject in my previous works, and discussed examples of artworks that employ analog forms of mediation. As you continue to the following Chapter I will discuss mediation more specifically in relation to interactive computational systems that allow for public contribution.

Chapter Three: Related Work in Human Computer Interaction

In this Chapter I will discuss related work in the field of Human-Computer Interaction with regards to interactive public displays, their uses and input technologies. In the previous Chapter I discussed mediation more generally in terms of facilitating a dialogue, here I will bring forth Bruno Latour's notion that utilizing technology is inherently a form of mediation [29]. I will present two dimensions for mediation that include analog and technical mediation methods as well as input and output (which will be referred to as presentation or display) methods. I will use these two dimensions to situate the new mediation space where *Objective Meaning* sits. And I will discuss some contingent aspects of this, such as input freedom and anonymity.



Figure 3.1 Large digital display with advertisements.



Figure 3.2 Interactive shopping mall map.

3.1 Uses for Interactive Public Displays

As digital public displays have become more prevalent in our urban environment we see them commonly used for advertising (see Figure 3.1), and giving people practical information (see Figure 3.2). However, researchers in the HCI community are investigating how the one-way information channel, that often characterizes the use of these displays, can be subverted to create a means by which the public can express themselves [18]. This can for instance be achieved by social design processes that includes members of the community in concept workshops [50] or through the direct

input of content, by the public, to the display. While some interactive displays focus on specific topics, such as fielding public opinion on civic issues[5,43], others act as message boards where members of the community are given complete content control in order to create "contextually relevant" content [50]. This can be seen with Wouters et al. in the *OpenWindow* project where members of the community were given control over the content displayed on public-facing screens (see Figure 3.3). Displays can further be used for less utilitarian purposes by serving as an artistic medium for public intervention [16]. This is the line of research I extend in this thesis, by the design and deployment of the artwork, *Objective Meaning*, which I will discuss in detail in Chapters 4 and 5.

The physical context in which interactive displays exist greatly impacts how people are able to use it. However, Akpan et al. suggest that the social context also plays a large role in determining if people will interact with a piece [1]. It is often observed that the interaction paradigm fosters socialization among groups as they decide how to interact with a given system

[16,20,32,38,43,49]. Often times the visibility of other people interacting with a system will inspire other individuals to interact with it as well [35], this is often referred to as the honeypot effect [22,48]. Wouters et al. offers this diagram (see Figure 3.4) to show the levels of interaction and social influences in participation with interactive installations.



Figure 3.3 *OpenWindow*, Wouters et al. [49]. In the left window of the coffee shop there is a digital display that can be updated by a member of the community to display different texts that they compose. Used with permission of rights holder: Wouters et al. [49].

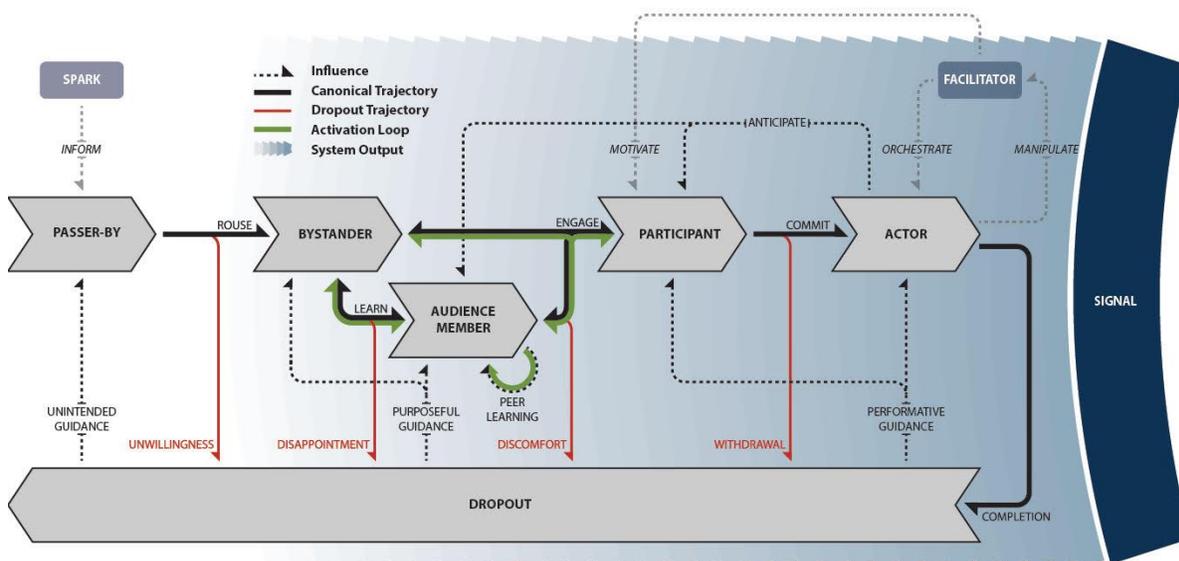


Figure 3.4 As presented by Wouters et al. [48], this diagram depicts the progression from passing by an interactive installation to participating and becoming a committed actor. This diagram also depicts how some people jump from bystander to participant, while others stay in the audience and discuss or learn amongst their peers before deciding to engage. Used with permission of rights holder: Wouters et al. [48].

When systems allow for content creation by only one person, they become the performer/actor in a social space that follows them around as content is decided amongst the group [16,49]. This can be seen in an image by Fischer et al. that illustrates the interaction zones in front of their interactive media façade [16]. The façade accepts publicly-contributed content through a limited number of customized devices, therefore, they observe that groups of people discuss together what content to send to the display. This creates a ‘social space’ that only surrounds the individual with the input device, but that individual is situated anywhere in the larger ‘potential interaction space’. When multiple people are interacting with a public display this can sometimes create awkward tension [42] or conflict between the people interacting [38]. In some cases, this is even used as an advantage to foster a playful sense of competition [35]. In Chapters 5 and 6 when I conduct and analyze how people make use of *Objective Meaning* I will reflect on this previous

research regarding social spaces surrounding interactive displays, however, I do not anticipate observing much of this behavior because the design will allow for anonymous interaction.

Goncalves et al. [17] studied crowdsourcing on public touch display, and they identified categories of social behavioural differences between people, such as attracting or repelling other individuals. Interestingly, they observed that people who interacted with the system individually spent more time and engaged more seriously, whereas groups were observed to “engage in explicit subversive performances in which the primary user deliberately performed badly” [17]. In the design of *Objective Meaning*, because content creation is anonymized, this creates new social dynamics for interaction because actors and participants are not necessarily visible. In section 3.3 I will describe how *Objective Meaning* deals with this through a form of technological mediation to make the displayed content suitable for a public setting.

In order to facilitate public expression and democratize content creation, interactive displays need to provide a means to input content. Some systems use apps on people’s personal devices to interface with the public digital displays and allow them to contribute or control content [35]. An alternative and more light-weight approach is to use web-based technologies,



Figure 3.5 This image depicts a mobile device being used as a game controller. The researchers studied different methods for connecting the device to the display such as scanning a QR code vs typing the URL into a browser. Used with permission of rights holder: Vepsäläinen et al. [47]

which allow people to start interacting by visiting a URL, because they do not require the extra burden of downloading a custom app [47]. Vepsäläinen et al utilize connection to a URL to transform personal devices into a game controller (see Figure 3.5). Additionally, many alternatives to using peoples’ own personal device have been developed as input devices. Fischer et al. [16], designed SMSlingshot, which lets people in urban environments ‘shoot’ messages typed on a custom interactive slingshot to a media façade. The design goal for this interactive installation, was for the display to create a spectacle in front of it and make the person inputting content identifiable. This was not an approach that I wished to take in the design of *Objective Meaning* because, as previously discussed, I wished to have an input device that allowed for individuals to contribute anonymously.

Other techniques also result in identifiability of interacting people. Examples of this are the use of touch in Hinrichs et al.’s interactive information visualizations in a museum setting where non-interacting people were able to observe other people’s interactions on a wall projection in addition to the touch-capable display [19]. Also in a museum setting, Hornecker et al. utilize hand gestures for input over a projected tabletop [21]. These are all examples of input types



Figure 3.6 This image depicts individuals interacting with *CityWall* by arranging images submitted via mobile devices. Used with permission of rights holder: Peltonen et al. [38]

that do not allow anonymous input, which I will discuss further as a form of mediation in section 3.3.

By combining mobile and touch displays, Peltonen et al. [38], let people contribute content through mobile phones that others could then explore on public displays (see Figure 3.6). In this work, they discuss the act of “placing” media. *Ob-*

jective Meaning uses a similar type of “placed” media, where content is displayed in the same location, whether people contribute content close to the display or remotely. Memarovic et al. [32], in contrast, used smart phones as a kind of output device, by letting people use QR tags to remember content shown on a public display. This is not a direction taken in the design of *Objective Meaning*, primarily because the system is designed to facilitate expression rather than be a source of information.

Content input can take very simple forms, such as with the use of simple text messages as an input technique. Wouters et al. [50], used a standard keyboard for a system that enabled residents in a neighborhood to contribute messages to a display in front of their apartment. Although visible to others, this type of input offers a level of freedom for individuals to express themselves that I wished to offer in the design of *Objective Meaning*. Various input techniques are custom made to structure and restrict input. For example, Behrens et al. [5], describe a device that allowed citizens to send their feeling (happy, indifferent, sad) about different aspects of their city. It allows for input though a physical interface that allows individuals express their opinion on five categories of urban infrastructure. There is a rotary knob switch at the top to select a category and the mood is then selected via swiping an RFID token. This can also be seen with Agora2.0, where Schiavo et al. [43] adapt a mouse to use for very limited input of voting yes or no (see Figure 3.7). While text input offers individuals a range of expression, content

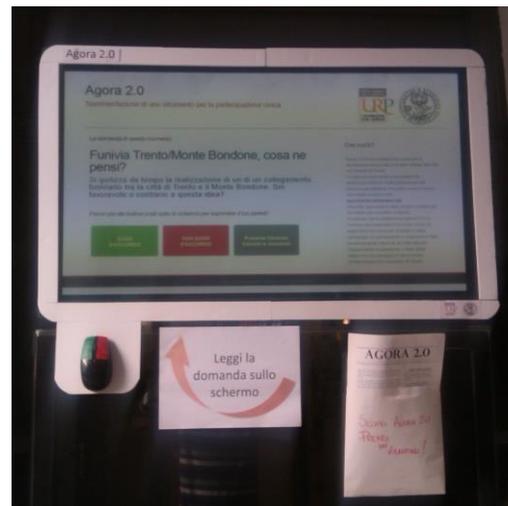


Figure 3.7 This image depicts the input device of a mouse that allows for voting on civic issues. Used with permission of rights holder: Schiavo et al. [43]

contributed through these controlled systems does not facilitate an active discourse through the display. They can be characterized better as systems that collect and aggregate data of public interest and therefore, stimulate dialogue in the existing social space. On the contrary, *Objective Meaning*, is designed to facilitate discourse through the display of public expression and does this by offering considerable freedom in the composition of messages. In addition to providing this freedom, using the native text messaging app on personal mobile phones reduces barriers to entry [11], and leverages a familiar input technique that is experienced as private and secure [2], which I will discuss further in Chapter 4.

3.2 Latour's Mediation

In his philosophical discussion of technological mediation [29], Latour suggests that mediation is comprised of eleven layers made up of human and technological actors (see Figure 3.8). He discusses the relationship between humans and technology not as a dichotomy, but rather in that they are interwoven through the transfer or delegation of human action to technology. Borrowing from this, the mediation of content created by the public in *Objective Meaning* can be discussed as the application of a technological approach, or 'technique', to a social situation. In this way I am delegating my social practice as an artist, which is usually a human action of mediation, to technology.

These interwoven layers of human and technological agents (see Figure 3.12) comprise the holistic order of our modern social existence. To analyze how any particular thing came into being, such as speedbumps, one must unpack many layers of human and technological influence; the engineer who designed the speedbump, the institution that determined the need for a speedbump, the invention of cars, etc. This concept resembles Nicolas Bourriaud's *Relational Aesthetics*, discussed Chapter 2, which describes artworks as a mode of thinking critically about these layers.

Latour builds on this by saying that, for the most part, we take these layers for granted in our experience of things, but when technology “breaks down” we are forced to analyze the sum of its parts and thus expose the complexity of its contingency in life [29]. If we think of the unconventional experience of a constructed situation (Chapter 2) as a break down—which it can be in the sense of an individual not having an automatic social response—then this too suggests that the experience of such a situation might elicit reflection

on some of the layers presented by Latour. I will further discuss reflection and break-downs in Chapters 5 and 6, specifically when I present and analyze how individuals interact with *Objective Meaning* and respond to the animated breaking apart of their messages.

Objecting Meaning represents the actual breakdown of messages on the display, but it also breaks expectation by using technology in a way that is subversive, in the context of public space. This will be discussed further in Chapter 4, with the design of *Objective Meaning*.

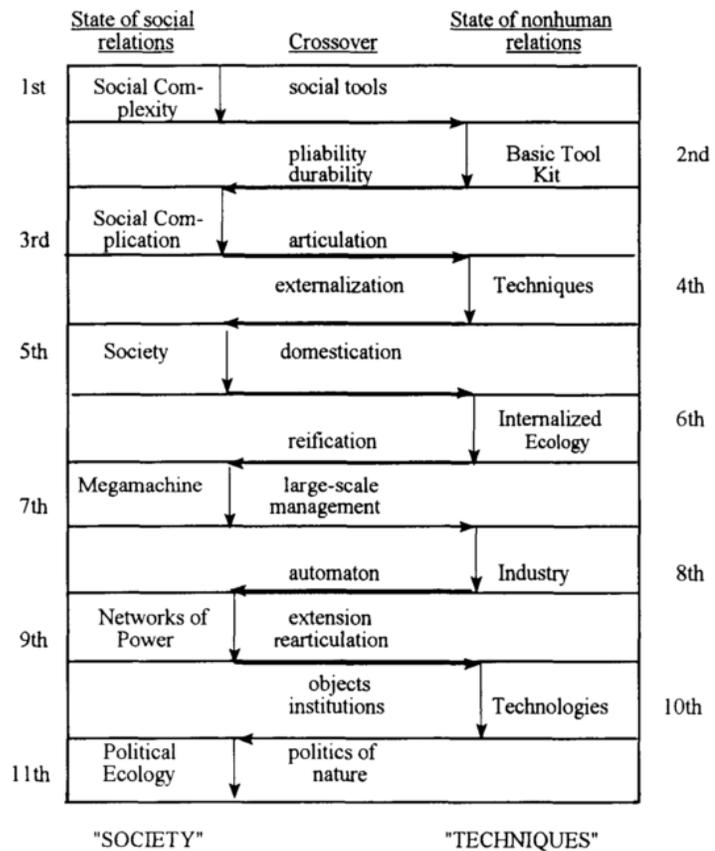


Figure 3.8 This diagram depicts the eleven layers of human and technological agents, and in the center, their exchange of properties. Used with permission of rights holder: Bruno Latour [29]

3.3 Two Dimensions that Situate *Objective Meaning*

Related work in the area of using public displays to facilitate public discourse suggests that while some systems delegate the task of mediating content to technology, many rely on the social context to complement their techniques. As you can see in Table 3.1, the delegation of mediating content creation to technological input techniques and the delegation of displaying that content to technological presentation techniques originate from differing analog allocations. *Objective Meaning* occupies the “presentation technique” quadrant of Table 3.1, and in the following section I will be describing work that falls into the other three quadrants in order to illustrate how presentation techniques constitute a new design space for mediating public displays that can be explored.

Systems that restrict content using “input techniques”, (see Table 3.1), employ a wide range of controls. Cellphones, for example, might have auto-correct and change a word that you had intended to write. Other examples have an acute control over the input and representation of

		Mediated by	
		Social	Technical
Affecting	Created content	Social protocol	Input technique
	Displayed content	Curation	Presentation technique

contributed content, such as with systems that only allow voting [43]. Alternatively, creating a custom interface of buttons and switches [5], can make the interaction so highly controlled that the technology is able to mediate autonomously by not allowing undesirable input. While these systems have some similarity to *Objective Meaning*, in

Table 3.1 Social and technical content mediation in created and displayed content.

that they also seek to facilitate public discourse, the input techniques they use do not afford much freedom for the public to specify content of importance to them and therefore .

With *SMSlingshot* the input technique itself does not aim to directly mediate the display of content. Fisher et. al. defer to social relations instead, as a way to mediate content before the input (see Table 3.1, “social protocol”). The decision to use the particular technique of the custom-made slingshot makes it easy to pinpoint the individual interacting in a crowd. This visibility holds the individual accountable to the existing social protocols of public behaviour. This social protocol is heightened even more with the presence of a creator of the artwork. Although this person is there to shepherd the interaction by providing helpful guidance, they can be perceived as an authority figure, and thus will temper the behaviour of people interacting [16]. Rather than an imposing authority, Wouters et. al. choose delegate content creation to community representatives. This method still fits within the realm of social protocol, but is a fabricated social pipeline that mediates the content. This in fact disrupts the ongoing social negotiations, leading to jealousy and conflict between community members during the study [50].

Objective Meaning is designed to disrupt the input of content as little as possible by providing an input technique that anonymizes the interaction and only restricts content input to the existing limitations of the cell phone. Systems that do not attempt to mediate the input often implement a technique to manage the content that appears on the display. Brynskov et. al. do not mediate the content created by the public but they “curate” (see Table 3.1) only clips that they feel are on topic with the message of their installation *CO2NFESSION/CO2MMITMENT* [10].

Another way to mediate displayed content is editing the content on the fly. Similar to curation, this method is a human action, but it takes place once the content has already displayed. Hosio et. al. monitor the display remotely for misbehaviour [23] and respond ad hoc. This serves

to remove the imposing figure of the attendant, because the presence of surveillance is not necessarily known to the individual interacting, but it still requires constant supervision and relies on fixing after the fact. As I will discuss in Chapter 5, there is a small amount of covert surveillance undertaken to improve the presentation techniques implemented in *Objective Meaning*. However, the goal is to have the system operate autonomously in its management and display of content.

With the design of *Objective Meaning* I explore the presentation of content as a technique for mediation (see Table 3.1). With this, I attempt to delegate mediation of content to the way in which the display shows the content it receives, which I will describe in detail in Chapter 4. I will also discuss further in Chapter 4, how the presentation technique that mediates content is joined by the removal of certain censored words, which is not considered a presentation technique, but rather, a curation.

3.4 Chapter Summary

In this Chapter I have discussed research in the field of HCI that relates to interaction with digital public displays. I set forth a framework, using Latour's theory of delegation, to characterize the design space where visual/presentation mediation fits. I have furthermore related this technique to exposing the blackbox of a system which may foster reflection, and I have identified where several other interactive systems are positioned in the framework.

Chapter Four: Concept Design/Development Process

In this Chapter, I will discuss *Objective Meaning* in detail. First I will describe the first iteration of *Objective Meaning* to highlight some of the design challenges brought forth during the process. Then, I will discuss praxes used in the design process to elicit reflection, including mimicking nature, slowness and subversion. I will also explain how *Objective Meaning* mediates publicly-contributed content, through the visual mediation technique of breaking apart messages and additional mediation techniques required for the deployment. And finally, I will discuss the technical requirements for *Objective Meaning* and the platform used to build it.



Figure 4.1 Illustration of interaction with *Objective Meaning*.

4.1 Previous work that set the foundation for *Objective Meaning*

I have presented the motivation to facilitate mediated discourse in Chapter two and will further describe how theoretical concepts are implemented through a process of iterative design in section 4.2 . However, the form of *Objective Meaning* builds on two previously developed interactive systems that were the foundation of this process, and elements of them are still present in the final manifestation of *Objective Meaning*. In the following paragraphs I will first describe the individual pieces, the initial system that merged the two, and how this set some further design parameters.

The first work is a small display that could be discretely imbedded in objects or surfaces in public space. In Figure 4.2 the screen is installed in a newspaper dispenser box. The screen



Figure 4.2 This depicts an interactive artwork, whereby the public can send a message to the small credit-card sized screen embedded in a typical form of urban infrastructure, such as the newspaper distribution box.

also displayed SMS messages sent to a Twilio number, but only the last sent message. This piece is designed to be discrete so the noticing of it by an individual would seem serendipitous, an approach that is decidedly anti-spectacle in response to similar issues presented by Guy Debord and discussed in Chapter 2 (Section 2).

The second piece is a game where two opposing sets of coloured bubbles compete to occupy a 2D display (see Figure 4.3). There is a rule set, based on the age and size of the bubbles, which will eliminate one if two opposing bubbles collide. However, when like colours collide new bubbles spawn, creating a continuous struggle between the two sets. An individual can interact with the system by touching and dragging bubbles around the display.

This gives them the option of meddling slightly to affect the outcome of the system, or leaving it be and observe how it resolves itself based on random movement within the system.

These two works were combined to be the first iteration of *Objective Meaning*. In this iteration messages sent to the display would appear next to a bubble, which could then be dragged around by touching the screen (see Figure 4.4). If two bubbles collided the messages would concatenate to enable the construction of randomly arranged texts and intentionally arranged texts that resembled fridge magnet poetry. Mediation in this iteration, borrowed from its predecessor in the newspaper stand, was accomplished only through temporality. To accomplish this, gravity

was applied to the movement of the bubbles and text so when messages reached the bottom of the screen, they would simply disappear.

Through informal testing this system proved to be quite playful and entertaining in a group setting because, while one individual could touch the screen to build stories, additional people could participate by messaging the screen and co-author the text. This required a number of people to interact simultaneously and continuously, however, and did not translate into engaging experiences for individuals. Because the system did not retain the messages this created a blank slate after interaction which did not serve to engage future interaction. In



Figure 4.3 Inspired by Conway's *Game of Life*, this system uses random generation within a set of rules to work out a composition through a process that is visible to the audience. This system builds on that concept by allowing interaction to affect the outcome.

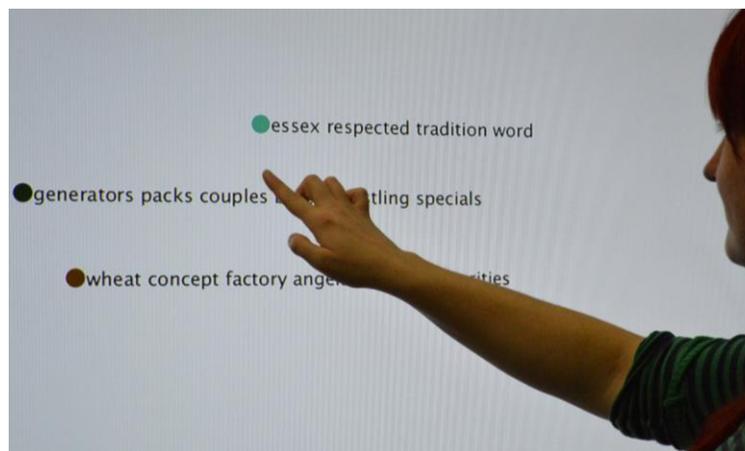


Figure 4.4 Depicts the first iteration of *Objective Meaning* where text appears next to a bubble, which can be dragged around through touch and enables the concatenation of messages with collision.

addition, the system's temporality and interaction dependant dynamic left little room for thoughtful speculation, which I will continue to discuss further in the next section. Elements of this original system had an interesting impact on interaction and may serve other contexts, but for the design of *Objective Meaning*, which aims to engage individuals in a process of reflection (as discussed in section 2.6), many of the characteristics of the first system discussed here, were edited out.

4.2 Designing for Reflection and Designing for Understanding

In this section I will be talking about how I put theories into practice through the design of *Objective Meaning*. Using a braided design process [31] and informal critique [36], I work through iterations to improve design according to my two design goals, reflection, which relates to the unconventionality of the interaction and its contingency in life that I have outlined in Chapter 2, and understanding which relates to the usability of the system. In most cases these two goals work in harmony with each other in the design of the system, and I will give examples of this throughout the following section, but at times they do conflict. Designing for reflection, is inherently designing to raise questions, but not all aspects of the system should raise questions. The choice of font, for instance, was selected for its distinction between lower case “L”/ “l” and uppercase “I”/ “i”. The font, Source Sans Pro, has a slight curve to the lowercase “L”/ “l”. This makes the characters readable when the words are taken out of context and not properly oriented on the screen. Nevertheless, the system needs to maintain an element of curiosity in order to initiate reflection; while the words should be readable, the abstraction of the messages by dividing up the words should cause speculation for the viewer/person interacting.

4.2.1 Slow Technology and Mimicking Nature

With the design of *Objective Meaning* a key principle was to reduce elements that overpower thoughtfulness. When it comes to pervasive displays, many designers are concerned about people not noticing the display, which is referred to as “display blindness” [1,11,17,24,35,49]. Often this is either attributed to, or contributes to excessive stimulation from digital displays. The design of this system sheds the spectacle that has come to be expected by, for example, eliminating colour and decoration. *Objective Meaning* uses only the animation of words in a way that mimics relationships between movement and time found in natural systems. Think about sitting next to a window on a breezy summer day, and witnessing a gust of wind rustle the leaves and then slowly die down and relax before the next gust, and you notice how the leaves change from golden yellow to deep green as they dance towards the sun and then turn away. Or sitting on a beach watching the ocean swell towards you with tiny bubbles rushing up from cracks in the sand, then, chased by a family of nimble birds, trickle back out revealing little bits of shell and rock. These natural rhythms are peaceful and invite thoughtfulness. Now imagine that the waves are crashing in one after another, or that the tree is thrashing about in heavy, relentless wind. Even if you are sheltered, the sheer carnage of the whole scenario overwhelms its tiny details, and, furthermore, can bring about a sense of anxiety.

Objective Meaning uses oscillation between stillness and upheaval to initiate reflection each time a message is sent, which will be described further in section 4.3 . This oscillation is also achieved when the line of text, which displays the phone number on the screen, jumps to a random location on the display (see Figure 4.5). It does this when a message has not been received for some time and continues to perform this action until the next message is received. Similar to the original bubbles program, described in section 4.1 , this creates a dynamic system

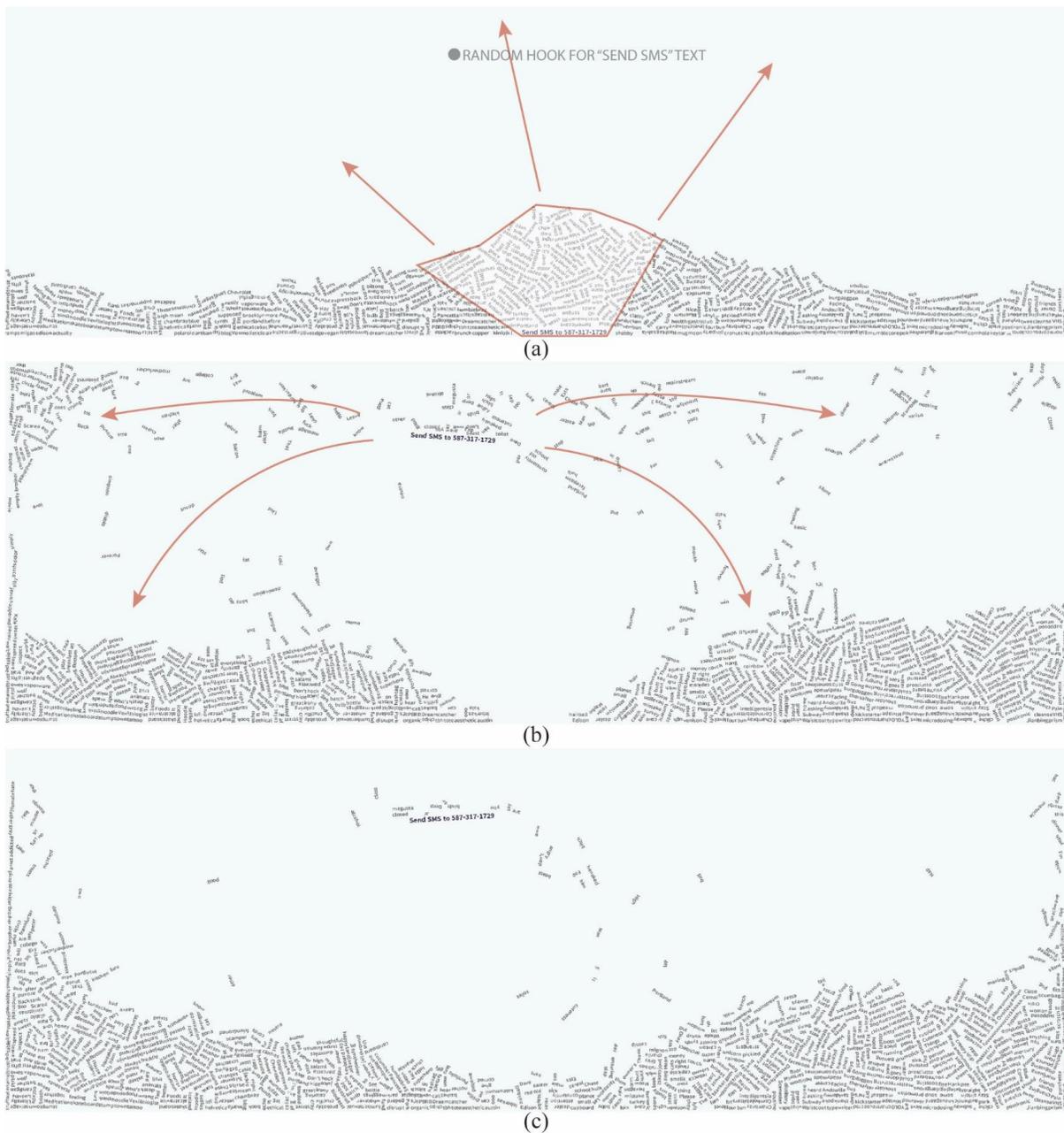


Figure 4.5 Similar to what happens when a new message is sent the display responds to long breaks between interactions by going through a cycle of movement to random points on the display. This (a) causes the displacement of words that are in the way. (b) Creates a visual impact that draws attention to the display and (c) is equally balanced with periods of waiting for the words to settle.

which can be observed for some time, thus building up the observer's curiosity and desire to interact. This design decision originates from my personal experience with systems [36], where I feel that an interactive system with a slight ambivalence towards me is more interesting and appealing than one which is obnoxiously calling for attention.

The choice to use the simple line of text, "Send SMS to ...", as the only explicit communication between the system and people who interact with it furthers this mystery and ambivalence of the system towards the public. Feedback is an important component of interactive systems [11], because this lets the person know when an interaction was successful, however there is very little of it in the design of *Objective Meaning*. This was not always the case, several iterations included a dashboard of some kind on the display that would let people know that their message had been received and how many messages were waiting to be read (see Figure 4.6).

Although this dashboard may have made the system's response to the interaction clearer to the audience, it was a visual distraction to the movement cycle of the words. Therefore, the dashboard was edited out of the system and the instructions were integrated into the animation. Consequently, the only feedback that indicates a successful interaction is the appearance of a person's message at the top of the screen. This will happen right away if there are no messages currently being displayed, but if multiple interactions are happening within a short time period, messages are backlogged while each one completes the cycle, which will be outlined in section 4.3. This cycle ensures that when messages do come through they are recognizable to the person who sent them because they are not mixed up with other messages. The dashboard is an example of the conflict between designing for understanding and designing for reflection. At first the dashboard seemed like a logical choice, no doubt because this strategy is commonly used with many web interfaces and even television news stations, but immediate access to information was

not the best method in designing for reflection in this system. As Baumer states, “Slow technology provides a certain design sensibility that uses slowness to make space for reflection” [4]. With *Objective Meaning*, the lag of response to their own message, gives the individual time to speculate on what will happen to their message and where the words currently on the display came from.

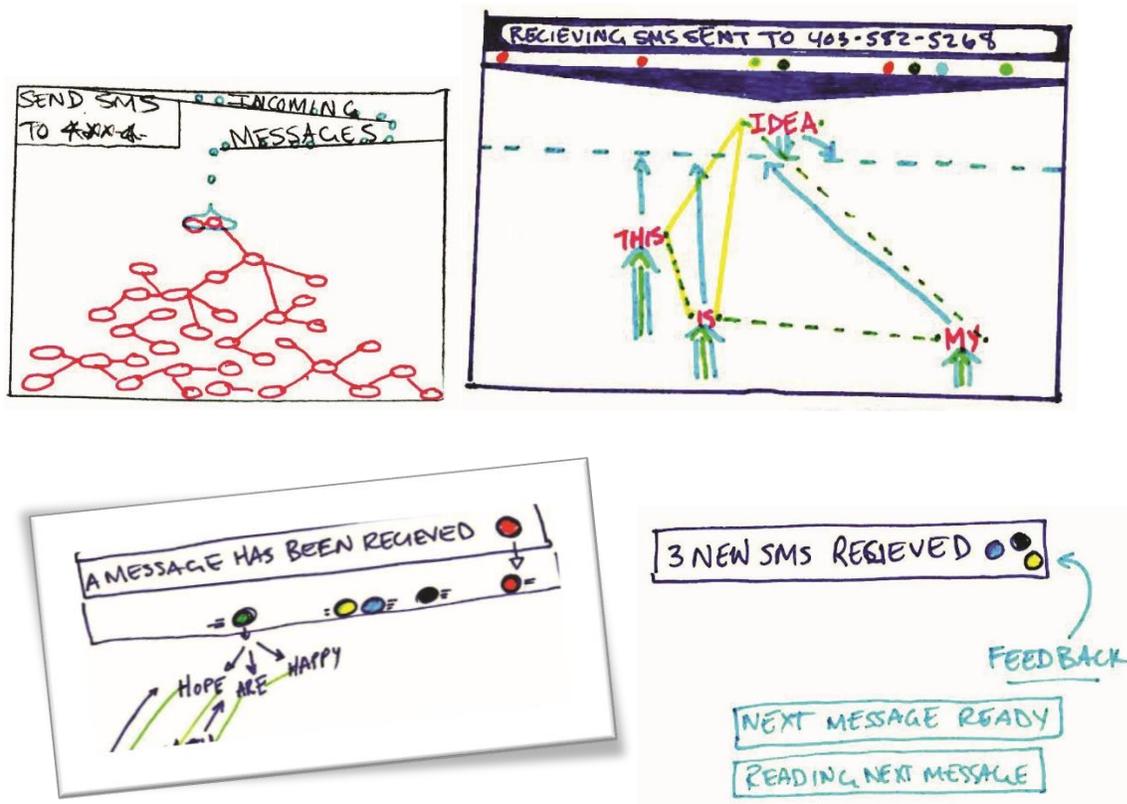


Figure 4.6 This figure depicts a selection of development sketches for a dashboard that would provide feedback to people interacting.

4.2.2 Subverting Expectations

Subversion is a concept applied to many aspects of *Objective Meaning*'s design, such as subverting the spectacle of digital displays previously discussed in section 4.2.1. However, *Objective Meaning* is also designed to subvert expectations related to the personal mobile device as

a tool for expression with the visual breaking apart of messages on the display. The animation of this break-up visually mediates the discourse on the display, as a concrete abstraction of the message content, but it is also designed to mediate through a process of self-reflection because the message is received unconventionally. Baumer states that when dominant values are subverted in the design of a system, this can provoke inquiry [4]. *Objective Meaning* does this by first giving individuals the opportunity to express themselves, then subverting that opportunity by breaking the message apart and rendering their expression incomprehensible. This may provoke inquiry on the right to express one's self and how expression is mediated in the public sphere through technology, social protocols, and any other potential factors.

In the design of *Objective Meaning* the subversiveness of breaking apart messages is dependent on expectations around the use of cellphones. In Chapter 2, I discussed how people responded to *Attention, Please* with the same subordinate behaviour as they would in a grade school head office, and this indicates how prevalent the context is in determining the dominant values Baumer speaks of. Personal mobile devices are typically associated with granting individuals a certain amount of freedom and entitlement in their interaction and representation on various virtual platforms. It connects them to people who they have already negotiated a social relationship with in person, and it also connects them to the internet, where the design of social systems foster the entitlement of individuals to express themselves. With the breaking apart of messages in *Objective Meaning*, interaction through personal devices is more affective as input device compared to touch and others because it is more strongly associated with supporting individuals with their desire to express and communicate.

4.3 Visual Breaking apart of Messages Explained

The animation of words breaking apart on the screen is handled by a physics simulation library called Box2D. This library has complex rules that are applied to different classes of objects created in the system. For instance, when a new word is added, a rectangular object with mass and density is placed in the Box2D world. From there the simulation, which applies forces such as collision and gravity, takes place in a black box while time is incremented. Then to display the word, the base program requests the coordinates and rotation of the object from the simulation and draws it to the pixel display as text. In this section I will discuss the stages of each message being displayed, and the elements in the physics simulation that control the behaviour of the words on the display.

The display responds to each new message sent through a series of steps. First, the message is displayed at the top of the screen. To do this, display specifications, such as the size of the message and position of words within the message, are determined before the words are separated. From this, static anchor points, called “hooks” (see Figure 4.7.a), are created within the

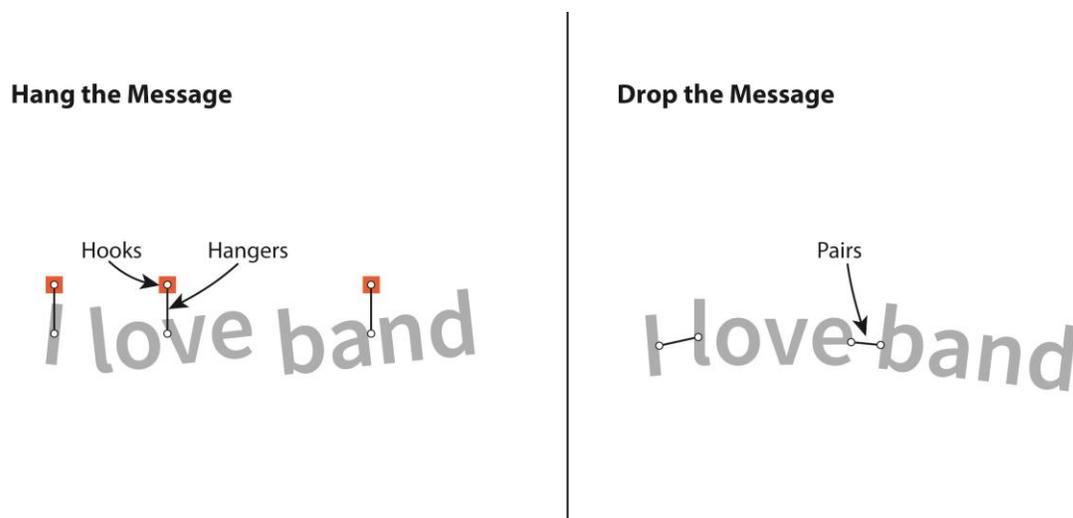


Figure 4.7 Components of the physics simulation (a) hooks and hangers, (b) pairs.

physics simulation at the points where each word should display. The message is then divided up into words, a process detailed in section 4.4.3, and compared to an index of words stored in the base program. The index, called `wordObjectIndex`, is the Rosetta Stone that links textual words to their subsequent object in the physics simulation. Hence, for each word that is new to the system the program creates a new entry to the index and a new object that spawns at the top of the display (see Figure 4.8.a). Concurrently, spring-like connectors, called “hangers” (see Figure 4.7.a), are created within the physics simulation, to bond the word objects in the message to their respective hooks (see Figure 4.7.a). The hangers create an attractive force that pulls words up from the bottom of the display to complete the message at the top of the display (see Figure 4.8.a).

The forces of the hangers creates a visual disruption and draws curiosity and attention to the display. As you can see in Figure 4.8.a and 4.8.b, when a word in the message gets pulled upwards, other words that are not part of the message are also affected until they have cleared the moving word; then they fall back down with the force of gravity. It is difficult to get a sense of this from the static images here, but you can imagine a fish jumping and water droplets cascading off its body as it breaks from the water’s surface.

The second step disposes the message onto the pile of words below. To do this, the program destroys the hooks and hangers holding the message at the top of the screen, and creates new “pair” joints between adjacent words in the message (see Figure 4.7.b). The words, affected by a gravitational force, begin to fall (see Figure 4.8.c), and as they hit the pile stay relative to one another due to the pair joints (see Figure 4.8.d). As there is only a single instance of each word, if a message contains the same word more than once, then multiple joints will be applied to that word and the message will fold in on itself (see Figure 4.9). To balance the upheaval of

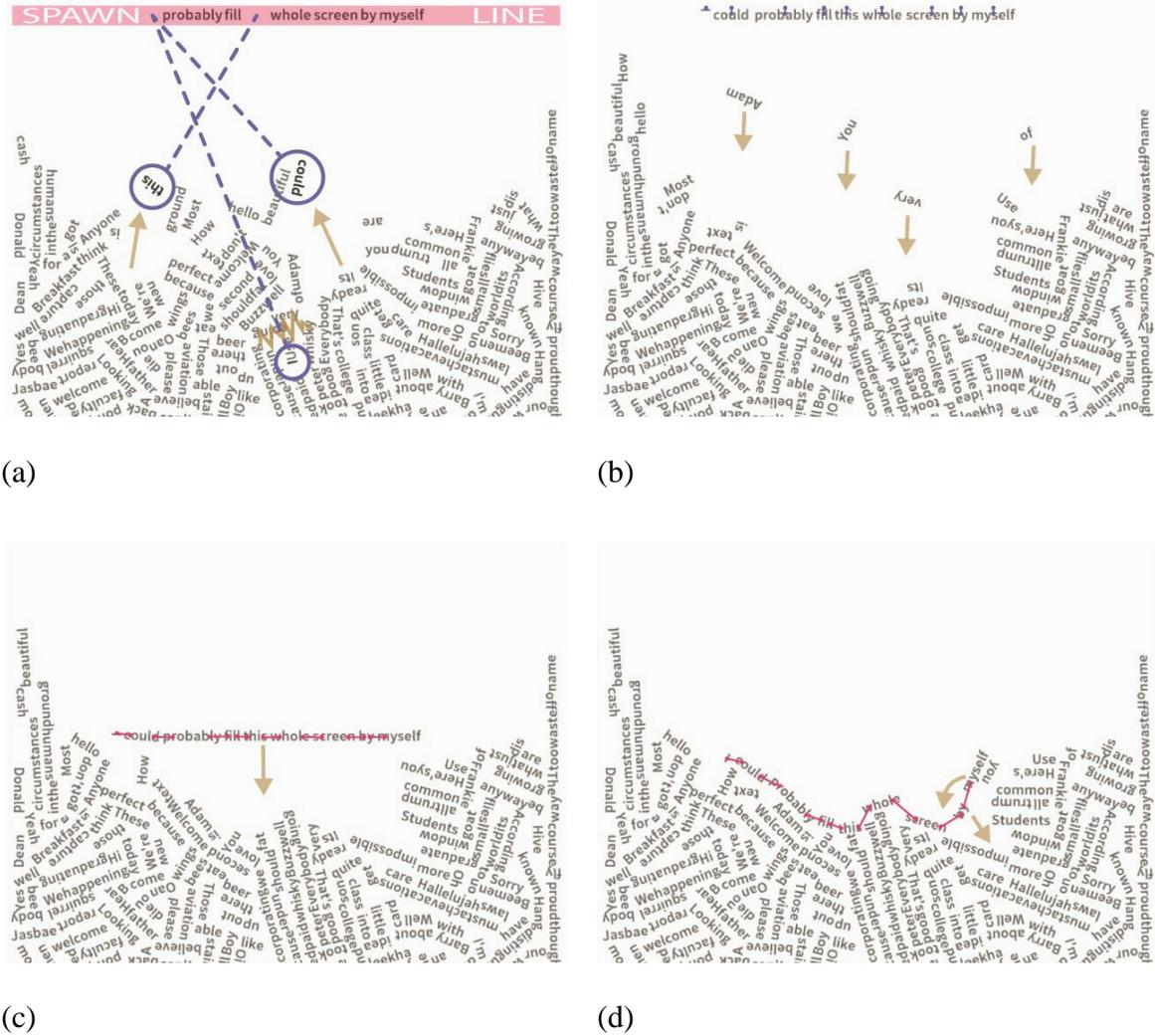


Figure 4.8 Stages of presenting the message on the display in response to public interaction (a) begin reading the message by creating anchor points or “hooks”, spawning new words, and creating a spring joint to propel existing words to the top of the screen and displace other words that may be in the way (b) while words in the message are connected to their “hook” words that are not part of the message are still affected by gravity and fall to the back down, (c) as the message drops new joints form between the words, (d) the pair joints hold the message together until the physics simulation calms down.

the pile when a message is created, the system then waits until the words have completely settled. As discussed in section 4.2.1, this leaves room for contemplation. Once the words have stopped moving the pair joints are broken and the next message will be read.

The program does not actually forcibly break apart the message; it composes a message as a result of interaction then gives it the potential to fall apart by breaking the joints. What causes the message to completely fall apart is the rising of other words, caused by the interaction of other people with the display.

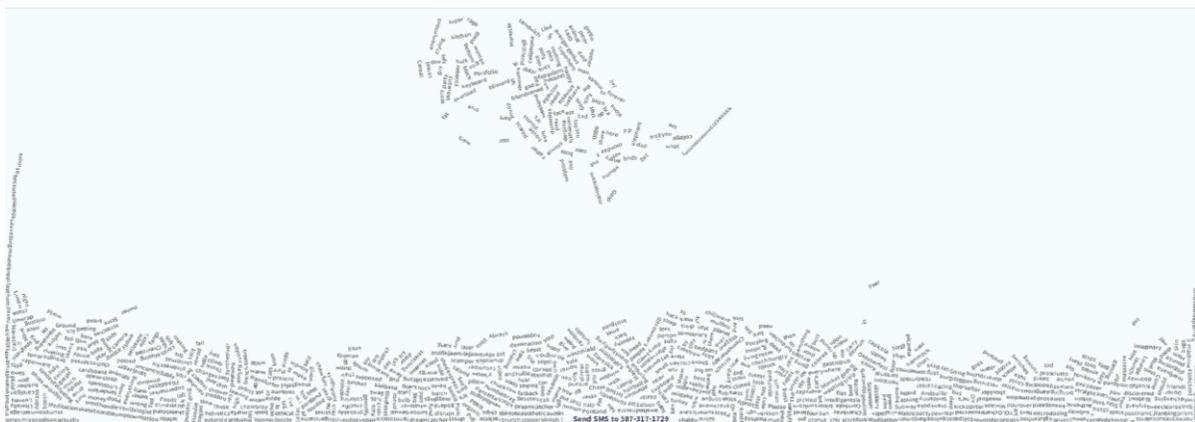


Figure 4.9 This depicts a long message sent to *Objective Meaning* at the time when hooks and hangers have broken and pair joints have been created. The use of a word multiple times in the message will cause the message to fold in on itself.

4.4 Technical Design Methods and Requirements for *Objective Meaning*

I entered into the design of *Objective Meaning* without expertise in programming, therefore, I looked to many other sources in my effort to realize the project. The system builds on open-source libraries and their how-to guides. In addition, I have used sections of code from other artists and programmers in my personal circle as well as many online resources. As a designer, my focus was on the interaction experience and appearance of the installation, rather than

performance or stability. I will first talk about the main components in detail, then give an overview of all the technologies used.

4.4.1 Text Messaging Input Technique

In addition to the subversive use of personal mobile devices discussed in section 4.2.2 that contributes to designing for reflection, the input technique of standard SMS texting also enhances the usership of the system and broadens the discourse due to the potential anonymity of sending messages. Since people look at and use their phone to interact with the installation in a similar manner to how they look at and use their phone for a number of other purposes, it is very difficult to observe a person interacting with certainty. There is no learning curve for interaction through an individual's personal device, and, furthermore, individuals don't have to download an app or visit a website in order to interact. All of these characteristics reduce interaction barriers and potentially increase usership of the installation[11].

The processing of messages for *Objective Meaning* runs through a local program and uses Twilio as a repository where messages can be obtained. Twilio⁸ is an online service that allows for the lease of a phone number and pay-per-use messaging at very low rates (\$1/month per number and \$0.007 per message). The number leased from Twilio for this installation contained a local area code and appeared "normal" to ease potential suspicion individuals might have that they will be subjected to scams or any suspicious activity as a result of interacting. Messages sent to the Twilio number are stored on a server where they can interact with Application Program Interfaces (API) that manage customer service lines for business. An example would be a

⁸ <https://www.twilio.com/> (Accessed September 5, 2017)

customer support line that automatically replies depending on the contents of a message. In contrast to this, *Objective Meaning* simply queries the Twilio server at regular intervals to collect new messages.

4.4.2 Backend Program

This program, written with Processing, uses an internet connection to query the Twilio server for new messages. It asks for a set number of messages at a time, which can be adjusted using a variable called “msgLoad”. It was set to 20 during deployment, but this number would need to be higher if the volume of interactions at a given time were to be significantly increased. The program checks in batches like this because the Twilio index is constantly shifting as new messages are received, which would result in skipped messages if two messages happened to be received at the same time. To save time, the program first checks if the last message sent to Twilio has the same ID as the last message received by the program. It stays in this loop until a change is detected and then asks for the last 20 messages sent. The program checks this list of 20 messages to see where the last sent message falls and then takes all messages that were posted after and writes these to the .txt file to be displayed by the display program.

The backend program initiates its message query through the command line, using an extra piece of software called cURL. During testing and deployment, the system was running on a Microsoft Windows OS (Operating System), therefore cURL had to be installed⁹. The location of the cURL executable file must be updated with each new platform used to run *Objective Meaning*. Additionally, the request requires a unique Twilio account SID, and authorisation token. This is found on the Twilio console dashboard homepage when you log in with a Twilio account.

⁹ cURL comes standard on some other operating systems.

Parts of this code were adapted from code in the newspaper box piece presented in section 4.1, which was sourced from Craig Fahner, a Calgary-based artist that frequently uses computational media in his installations.

4.4.3 Display Program

This program, written with Processing, reads all of the messages, breaks them apart and displays them on the screen; meaning that it visually mediates content sent to the installation. This program is separate from the backend program to avoid disruption to the animation. Network communication, such as the message query, sometimes breaks or takes a long time and this causes visible delays on the screen. The animation of the words on the display is handled by a physics simulation called Box 2D, as mentioned in section 4.3 . Messages are read one-at-a time, from the .txt file output from the backend program, and separated out into individual words using

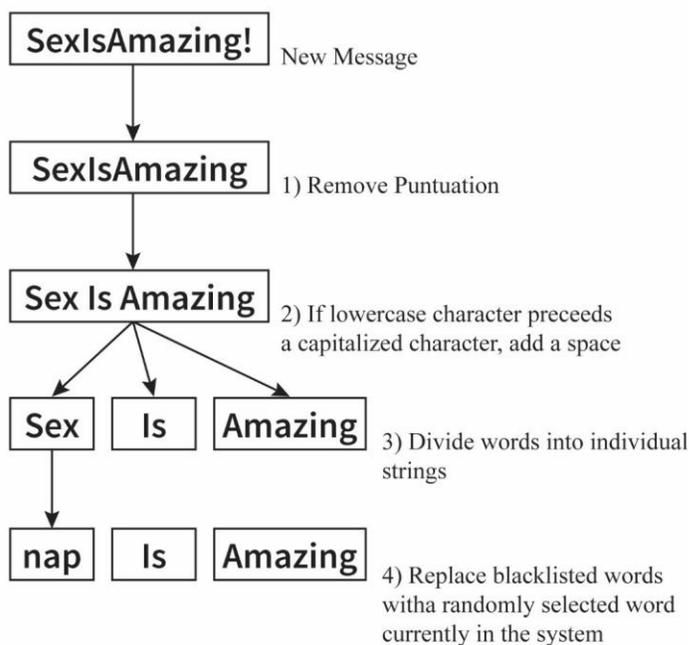


Figure 4.10 This diagram shows the processing stages of new messages into word objects.

spaces as the delimiter. The individual words are then compared to the words that exist in the system. It creates new word objects for new words in the physics simulation, and creates attachments to the words that already exist, as detailed in section 4.3 .

At the time messages are divided into words, several processes take place that manipulate the output.

Firstly, the messages are stripped of all punctuation and special characters

display has to undergo a calculation of its movements in the simulation and be redrawn to the display each frame. If the number of words becomes too high, the computation time will exceed the frame rate and the animation on the display will visually lag. For these reasons, words must be removed from the display once they have reached these thresholds on the given display and processor where *Objective Meaning* is installed (see Figure 4.11)

4.4.4 Requirements for Deployment

Before the deployment of *Objective Meaning* at the University of Calgary's, Taylor Family Digital Library (discussed further in Chapter 5), changes were required to the initial concept to comply with policies of the library. For this reason a blacklist of words to be censored from the display was implemented. The blacklist was provided by the library, to additionally mediate profanity, sexually explicit or crude terms, and racial slang. In the implementation of this censorship the system responds to blacklisted words by replacing them with a random selection from the pool of words that have already been sent to the display. This design redirects attention from the censorship to the obscure results of the mad-libs type replacement, and to the physics simulation pulling a word from the bottom of the screen.

In addition to the initial list of ~500 words, the library wanted to be able to remove words ad-hoc should something inappropriate appear. To avoid having to shut down the whole system when adding a word, a new feature was added that uses the SMS input to add a word to the blacklist and remove that word from the display currently. To activate this, a message with a special code is sent to the display which redirects the program from the reading of the message to the editing functions.

4.4.5 Overview of Technical Systems and Scalability

To recap, *Objective Meaning*, is java-based and built with the open-source integrated development environment, *Processing 3.2*, and its associated libraries. This platform allowed for quick iterations and ‘tinkering’ [36] of the visual display. The system is divided into two separate programs: The first program collects messages and stores them in an external file, and the second program grabs messages from the file and animates them on the display. To interact with *Objective Meaning*, a person uses their standard text messaging or SMS app on their mobile device to send a message.

When running *Objective Meaning* there must be an internet connection available, as the backend java program queries the Twilio server and receives message data in XML. The front end program animates and displays the words using the physics simulation library Box 2D and Daniel Shiffman’s library¹⁰.

The display program will span the display/displays attached to any computer that is running the software. The program will scale automatically to the given display. However, *Objective Meaning* is heavy on processing power and will slow down as the number of words increases. Consequently, it utilizes Open-GL to delegate rendering processes to the graphics card of the computer. This mitigates most of the issue, provided that the platform has an adequate graphics processor for the size of the display.

Putting aside the motivations presented in this thesis, as a program *Objective Meaning* is scalable/adjustable in a number of ways. The program can run on multiple displays and simultaneously query the same messages, but they will differ in the random replacement of blacklisted

¹⁰ <https://github.com/shiffman/Box2D-for-Processing> (Accessed September 6, 2017)

words in addition to discrepancies to the timing and composition of animation if the displays are not consistent across devices. The program can be duplicated using a different phone number entirely. This could be useful if suggesting different topics or curating different groups of people to contribute and displaying the variability of those factors side-by-side. Additional characters could be permitted to display as the program can handle Unicode (16 bit) format, which would allow many other languages to be expressed through the installation.

The major technical limitation of *Objective Meaning*, is the speed at which the Twilio server is queried and the number of records passed through. As mentioned in section 4.4.2, the program was set to collect 20 records with each pass of the program, which typically runs just over 1 fps. This means that the program can only receive ~20 messages per second and ~1200 messages per minute. However, given the design of *Objective Meaning* to read/display messages slowly by requiring them to complete the cycle (as described in section 4.3) this technical limitation is not likely to be observed.

4.5 Chapter Summary

In this Chapter I have provided point examples of various stages in the iterative design process of *Objective Meaning*, and I have related them to theories for reflective design and relational aesthetics. Examples include the importance of subverting expectations, and mimicry of nature. I have also detailed the visual mediation technique of breaking apart messages by describing the computational process implemented to create this animation. And finally, I have discussed the system breakdown and technical requirements for the installation of this system.

into the wall (see Figure 5.1). It is highly visible from many vantage points (see Figure 5.2 a) and typically displays a slideshow of messages related to university programs and library policy. The area in front of the display connects the library with other buildings through a walk way and therefore is highly frequented by library visitors and people travelling through the space (see Figure 5.3 and Figure 5.4).



(a)



(b)

Figure 5.2 Taylor Family Digital Library (TFDL) second floor area where *Objective Meaning* was deployed. a) Shows a view of the space looking out from the display itself, which shows the spaces that can see the installation. b) Shows the installation in context, during a high-traffic time.

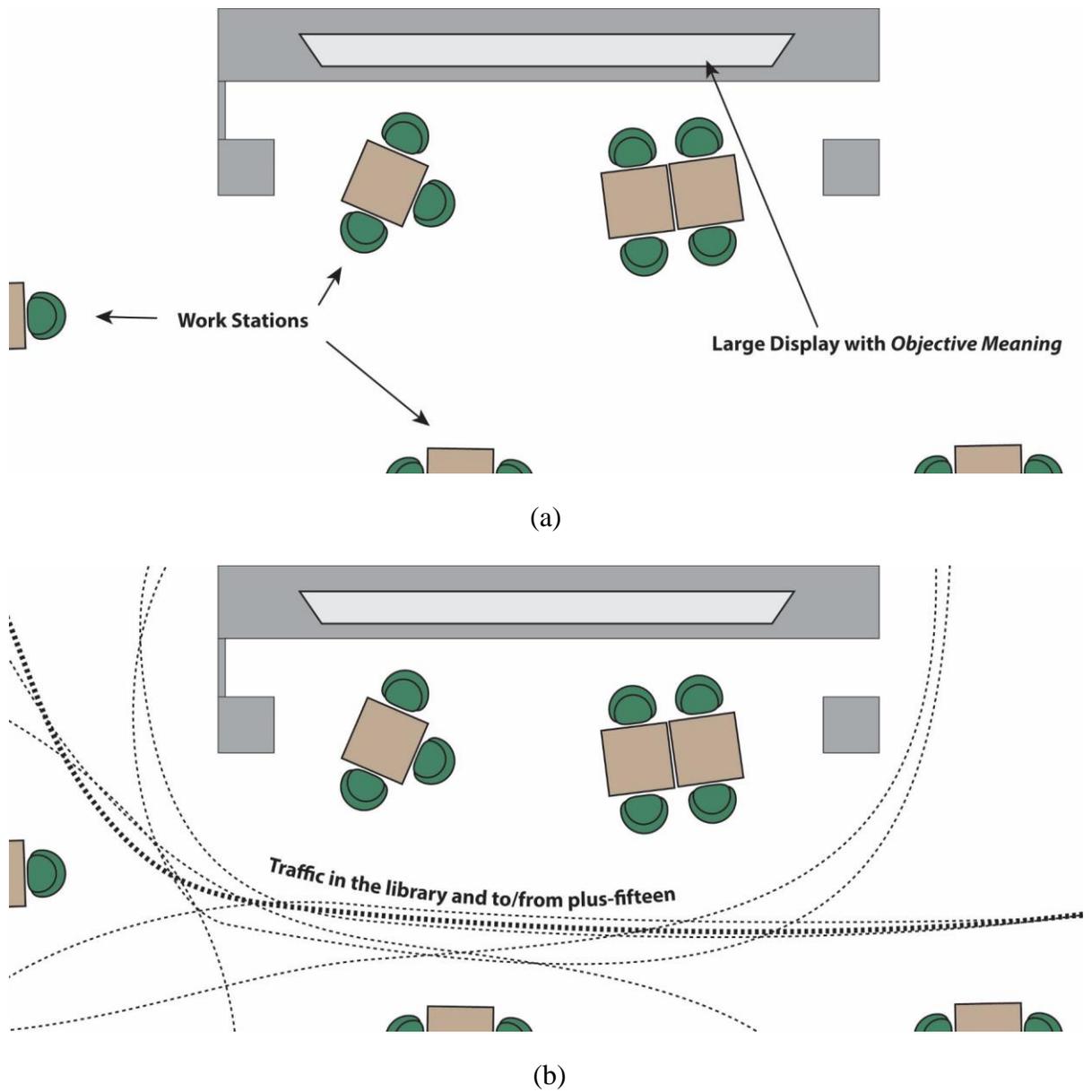


Figure 5.3 These illustrations depict the immediately surrounding space of the installation from a birds-eye view. a) Shows the representation of the display and work stations in the space. b) Shows traffic pathways observed during the deployment.

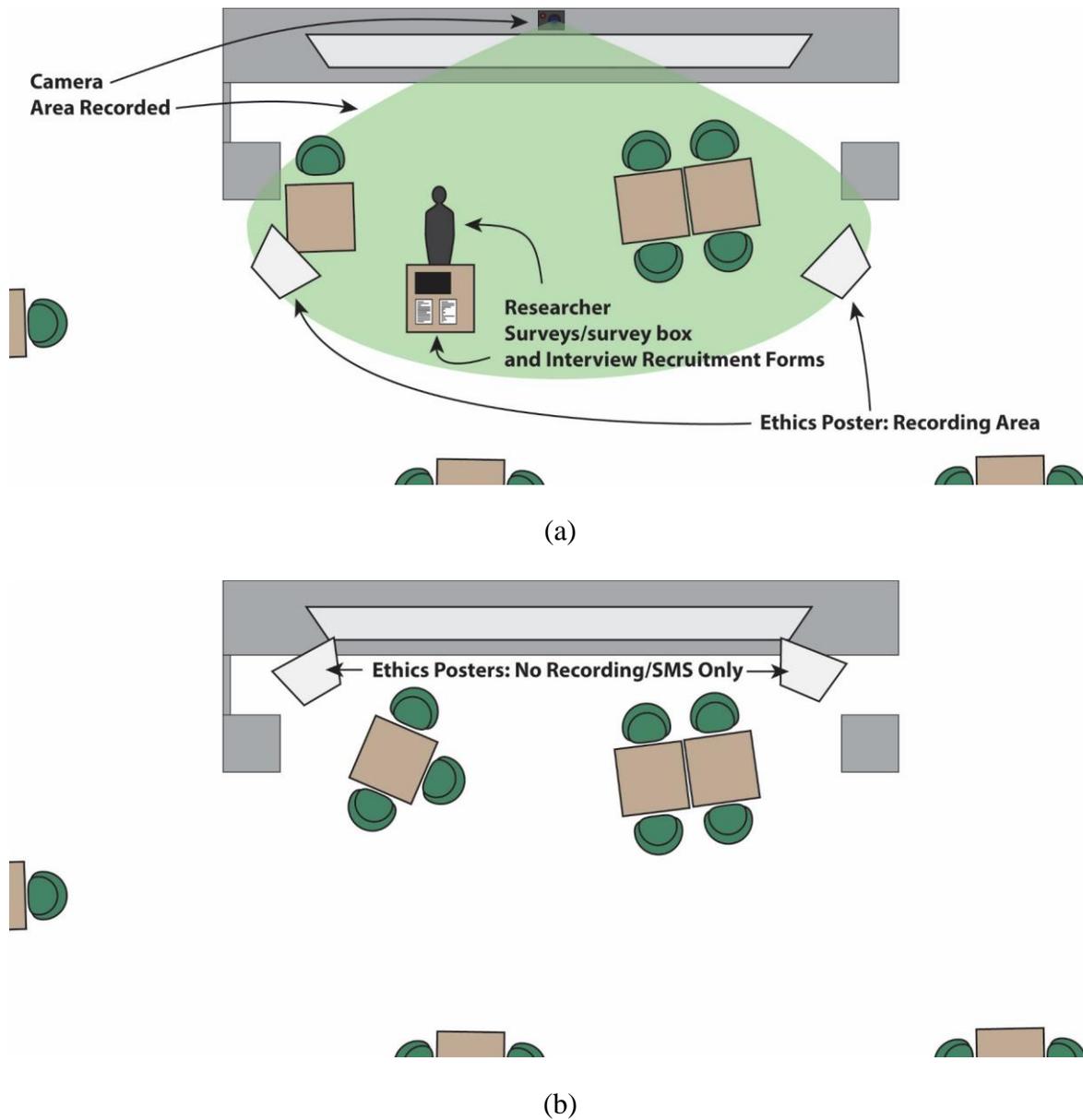


Figure 5.4 These illustrations depict the study set-up in the space of the installation from a birds-eye view. a) Shows the researcher present with surveys and recruitment forms while the area is under recording. b) Shows the subsequent set up when individuals who interact would be sent a link to an online survey

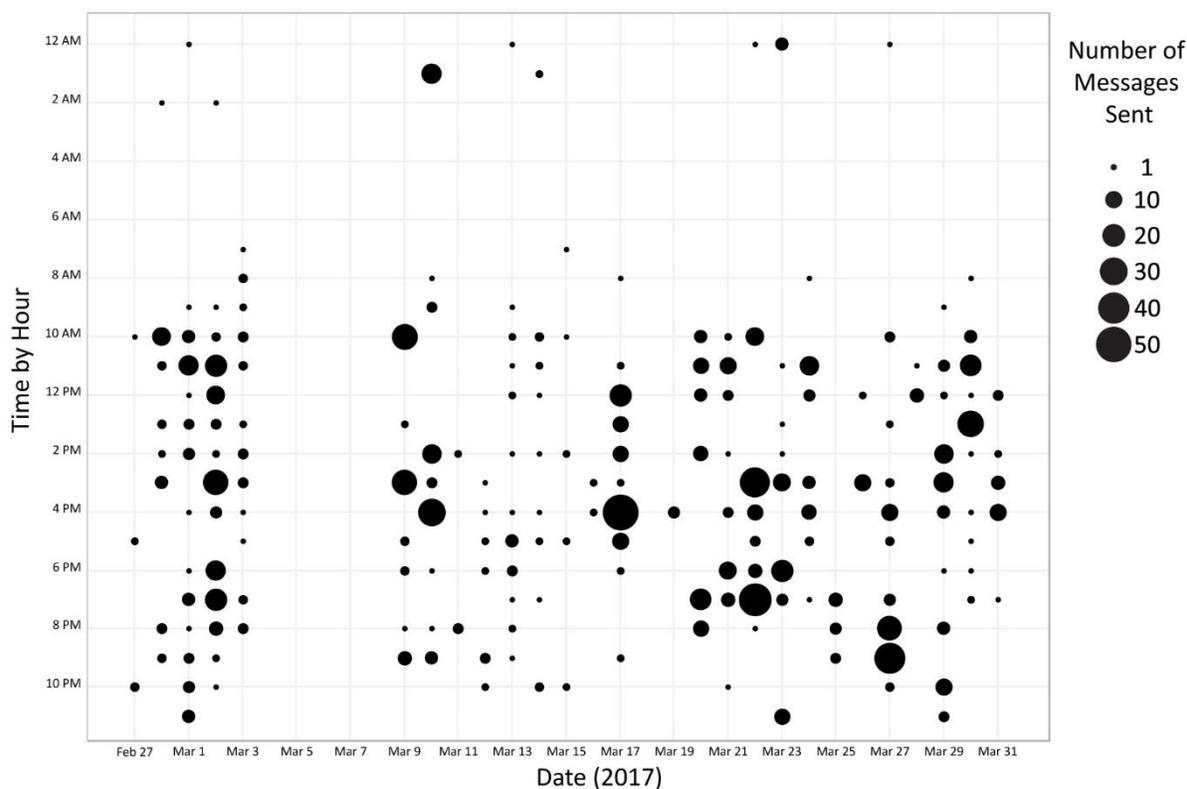
5.2 Data Collection and Analysis

Objective Meaning was displayed at this location for approximately one month. However, there was an outage between the first and second weeks of the installation, resulting in a total of 27 days when the installation was active. During this time, messages sent to the installation were logged. This included the sender of the message, a timestamp, as well as the content of the message. At the outset of the deployment, the study also included the solicitation of people who interacted to complete a survey and and/or interview about their experience. I hoped to ask people if the work gave them a sense of freedom to express themselves, and how they perceived the breaking apart of messages. With this the space was cordoned off for recording and I was clearly visible to people in the space as a researcher (see Figure 5.4 a). After three two-hour sessions, at different times of the day, over the first week, it became clear that people who were interacting were doing so outside the recorded area, and took no interest in being known to me or giving feedback. Consequently, I chose to rescind my efforts for face-to-face feedback, and sent out the survey via text message to the numbers that interacted with *Objective Meaning*. As you can see in Figure 5.4 b the space was reconfigured to remove the cordoned off area and recording no longer took place for the remainder of deployment.

After this time, I did engage in periodic observation of the work, to ensure the systems continued operation and to see if interaction becomes apparent through a covert lens. This, in addition to the small amount of online feedback from the survey I sent out, resulted in a few thought-provoking anecdotes that I will present in section 5.6. However, the primary data collection for the duration of the exhibition comes from the logs, which I have analyzed visually by coding the content of the messages and field notes relating to activity in the space.

5.3 Results

Objective Meaning was sent a total of 1084 messages from 216 different people during its deployment in TFDL. The daily use of the system fluctuated, with the number of messages received per day varying between 0 and 100 (see Graph 5.1). On average the display received 47 messages per weekday and 8 messages on Saturdays and Sundays. The variation by day and time is related to how many people frequent the library at that time, and the social atmosphere. In particular, usage of the system would see an upsurge when a friend-group decided to augment their socialization through the piece. This often happened during the afternoon, as I observed this to be the time of day when the space transitioned from focused study to socialization. This space in

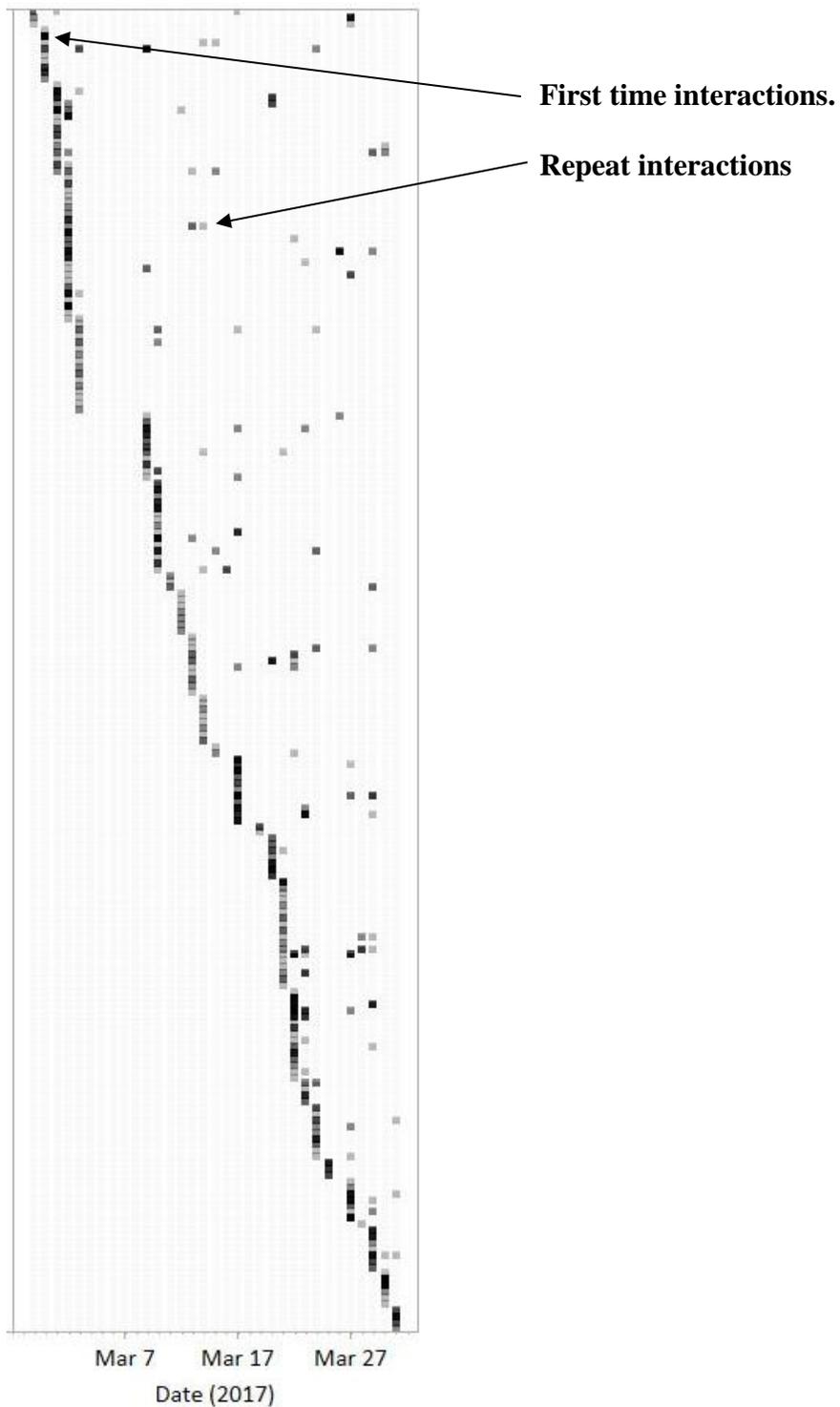


Graph 5.1 Messages Received by Day and Hour.

the Library was open 24 hours during the time when *Objective Meaning* was on display, however, the most active time was between 10 am and 10 pm, and was never used between 3 am and 7 am (see Graph 5.1)

The log analysis indicates that repeat interactions were common. In particular, 71% (154 people) sent more than one message to the display. Many of these messages are concentrated at the initial interaction with the installation (see Graph 5.2). However, several of those who interacted with the installation over multiple days, appear to do so spaced out over the remainder of the deployment (see Graph 5.2). On average people sent 5 messages to the display over the course of its installation and the maximum number of messages sent by the same person amounted to 32. This suggests that the installation sparked interest in the library visitors and motivated people to engage with it repeatedly.

In some cases I was able to observe interactions with the display directly. Some people walked closer to the screen to be able to read the number and one person ran up to the display to photograph their message as it got received. Mostly, however, interactions were not directly identifiable. Mainly this is due to the design choice to allow for anonymous messaging. Since people are constantly stopping to look at their cellphones around the area of the display and the installation accepts messages independently of the location of the sender, it was usually not possible to identify who sent a message that was received by the display.



Graph 5.2 Repeat Interaction over Time. Ordered by first interaction (the y-axis represents unique individuals who interact), opacity indicates multiple messages sent on the same day.

5.4 Expression through *Objective Meaning*

The content of the messages sent to the display shows a large variety in the types of expression people shared. Analysis by coding was difficult in this area given the nuances of all the different types of messages. One prominent trend, however, was the inclusion of names. Approximately 34% of messages sent to the screen included a name. Some of these messages sent through the display were directed at the named person who seems to be physically co-located to the person sending the message:

“Nawaf I am waiting for you downstairs”

“HappybirthdayJaspreet”

“Annum study please!!!!”

Others were about the person, but not directed at them. Some cases exhibit kindness towards the subject:

“Keira Collier is a beautiful human <3”

“Avisa and Samara are awesome”

Others, humiliation or hurtfulness:

“JoannaHasDiarrhea”

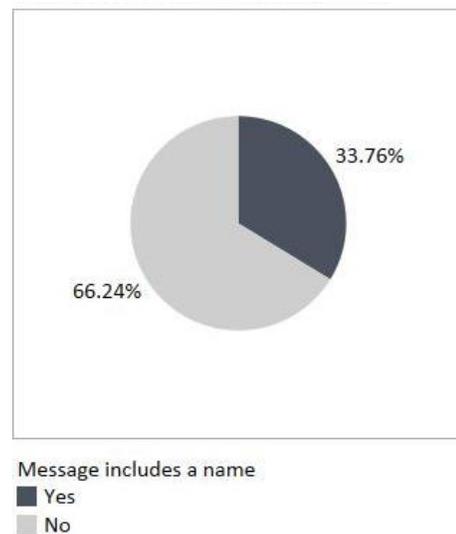
“Jasmine Baring is the biggest L of 2017”

“Christian has a tiny dick”

Some instances that include names appear to be the name of the person sending the message themselves, as an effort to sign their message:

“Woah this is actually so cool –Zainab”

“Hit me up. - rahaf Aburashed”



Graph 5.3 Number of Messages Containing a Name.

Others instances are not so clear with the association between the name and the person sending the message. Some of these are messages that contain only a name:

“Peter Smith”

This could also be an attempt to sign a name, or it could be the person sending the message calling to another person by name. Similarly unclear, is the use of names for advertising relationship status, social media accounts and other personal advertisements, which occurred quite frequently:

“May Hassanin is single and ready to mingle hit her up”

“Mouhamad Chemali is single ladies!”

“FOLLOW @joeetry”

“VOTESTEEVENTOOR4PREZ”

Although the design of *Objective Meaning* allows people to interact anonymously, it is interesting to see that in many of the aforementioned examples people are breaking the anonymity and using the display to augment existing social relations. This is further exemplified by conversations that take place through the display:

Messenger 1: “We should get back to work”

Messenger 2: “No we shouldn’t”

Messenger 1: “I think we should”

Other conversations that take place through the display suggest that the person sending the message is seeking a wider audience, in an attempt to start dialogue with them. Such as with this question:

“What would you name your kid if the name had to be a spice?”

To which someone else responded:

“Masala”

There are several messages, like this, that seem to be directed more generally. Many of them have a distinct sense of awareness towards an audience that suggest, even though the statement might be rhetorical, the person sending the message hopes to participate in a social exchange. This can be seen in messages that are motivational:

“Good luck to everyone writing midterms this week!”

“Have a great day!!”

“Life is difficult, but your soul knows well that you have the strength inside you. Don't give up and remember: you are loved.”

Messages that use the display for storytelling:

“Let me write my thoughts here- life is difficult, but the fruit that comes from it is sweet. Every moment is precious and so is every single life; don't give up like I did.”

“On my way to work, i ate chips and french fries because why not, then my friend came along and ate some with me because fat life and midterms, true, that's my story”

And messages that cry for help in a humorous way:

“If you can read this I am stuck in the library under a pile of physics textbooks send help”

“Someone please send toilet paper to TFDL 2nd floor mens bathroom... Help”

“In TFDL STOP Can't leave STOP Send chocolate STOP”

Others seem less sensitive to their audience but participate in a greater social context by alluding to current events or popular culture:

*“FUCKDONALDTRUMP”*¹¹

*“Harambe”*¹²

*“According to all known laws of aviation, there is no way a bee should be able to fly. Its wings are too small to get its fat little body off the ground. The bee, of course, flies anyway because bees don't care what humans think is impossible....”*¹³

There are some messages where anonymity, provided by the input technique, may have inspired messages that people would not otherwise have the confidence to speak:

“Will you go out with me?”

Several messages suggest a reflectiveness on the system itself. They refer to the representation of text on the display:

“IamTrappedInThisTVHelp”

“Help, I am a message trapped inside a screen”

“Letsfillthisbitchup”

“I could probably fill this whole screen by myself”

Reveal people testing and questioning how the system works:

“What even is this”

“Is this for the text window?”

“Does it move every time I text?”

“Can I get a text back?”

¹¹ Donald Trump was recently elected President of the United States at the time of deploying *Objective Meaning*.

¹² Harambe is the name of a Gorilla who was shot and killed at Cincinnati Zoo during the mauling of a child who had accidentally fallen into its enclosure. This Gorilla subsequently became the subject of numerous internet memes.

¹³ This text is an excerpt from a long message containing copy/pasted introductory script from the DreamWorks production, *Bee Movie*, with comedian, Jerry Seinfeld. In addition to being the subject of internet memes, this particular text is commonly used to troll internet forums.

Getting excited about the display:

“Omg this is sooo weird!!!”

“THIS IS SO COOL”

Playing with anonymity and extending the interaction space:

“I'm not in TFDL!!!!”

“Y'all can't see me”

Attempting to take control by taking on the voice of the installation:

“I am a display. Ask me anything”

“Send SMS to 4039263487”

And undermining the mediation technique by removing spaces to prevent the breaking apart of words which will be discussed further in section 5.5:

“Thisisoneword”

There are also messages that don't appear to be an exploration of the screen, but take place late at night while the library is quite empty, therefore clearly do not have an audience.

Presumably these messages are self-reflective:

“Why am I here still?”

Perhaps this individual wishes they were not so alone, and the installations responsiveness is comforting. Or perhaps the individual is bored or procrastinating, and looking for a distraction. This certainly seemed to be the case with previous examples of group conversation.

5.5 Attempting Subversion of Mediation

Through analysis of the log data I identified several messages that, it seems, attempt to bypass the visual mediation implemented in *Objective Meaning*. The algorithm that breaks the words apart operates on spaces as separators. 64% of messages were formatted like a common

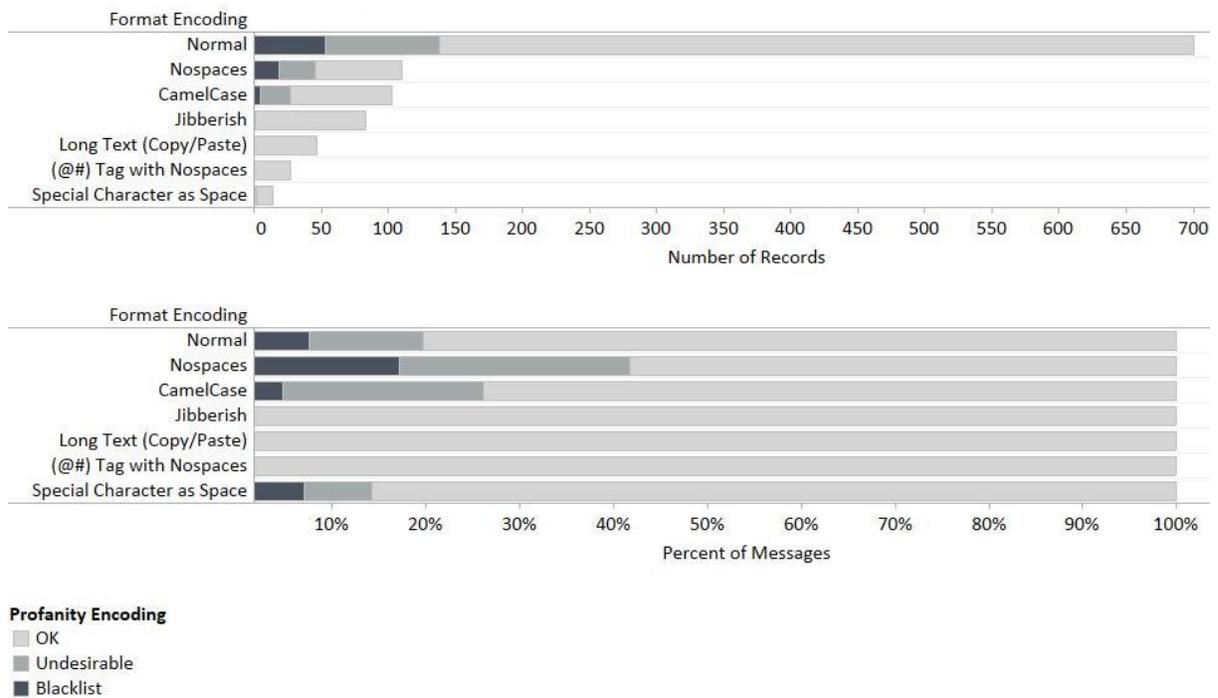
text message causing the installation to properly break the message apart into individual words (see Table 5.1 and Graph 5.4). However, 21% of the messages can be interpreted as a deliberate attempt to bypass the breaking apart of words. This is observed by the omission of spaces in otherwise normal messages, both without capitalizing each word and with the capitalization of each word (which I refer to as CamelCase) in 10%, respectively, of all messages. In a few instances (1%) the use of a character, such as underscore, is attempted in the replacement of spaces. As a result of the frequent use of CamelCase *Objective Meaning* was updated part way through the exhibition to break apart messages that use CamelCase by detecting a capitalized character amidst a string of characters that are not capitalized and inserting a space. Although the 36 messages, using CamelCase, sent after the update would appear broken apart on the display

Spacing Format	Count of Messages	Percent of Total
Normal	699	64%
Nospaces	110	10%
CamelCase	103	10%
Jibberish	84	8%
@/#Tag with Nospaces	27	2%
Long Text (Copy/Pasted)	47	4%
Special Character as Space	14	1%

Table 5.1 Encoding of messages based on spacing format.

this did not seem to reduce the number of messages sent to the display with CamelCase, the percentage of messages using CamelCase actually raised by 1% in relation to other types of messages.

Other messages that were sent without spaces did not seem to directly attempt to bypass the mediation, but rather missing spaces are the nature of the text itself. This was the case for messages containing jibberish, copy/pasted text, or the use of a tag (#) or handle (@) which made up 12% of messages sent to the installation. A number of these messages appear to be copy/pasted content, such as the *Bee Movie* script, mentioned in section 5.4, other text comes from the *Fresh Prince of Belair* and a WWII poem. Given the length of these copy/pasted texts, the text messaging service delivered them as a group of messages rather than just one. As we can see in Graph 5.5, the two people with the highest volume of messages contained large



Graph 5.4 Circumventing Visual Mediation with Message Appropriateness Encoding. These two graphs depict the same data by count (top) and percent of total (bottom).

copy/pasted texts which spanned 20 or more individual messages. These long texts, in conjunction with additional interaction with the display, suggests that users were engaged in the visual effects on the display and were attempting to fill up the display with little effort.

In some cases, people interacting used the lack of spaces as a strategy for getting past the blacklist. This is exemplified by one group dialogue, which took place through the installation by sending the following messages:

Messenger 1: "A woman needs a man"

Messenger 2: "Fuck men"

Messenger 3: "Rahaf wants you"

Messenger 2: "Fuck men"

Messenger 2: "Can you swear"

Messenger 3: "Fuck"

Messenger 1: "YAAAAAAAAAAAAASSSSSSSS!"

Messenger 2: "Fuckmen"

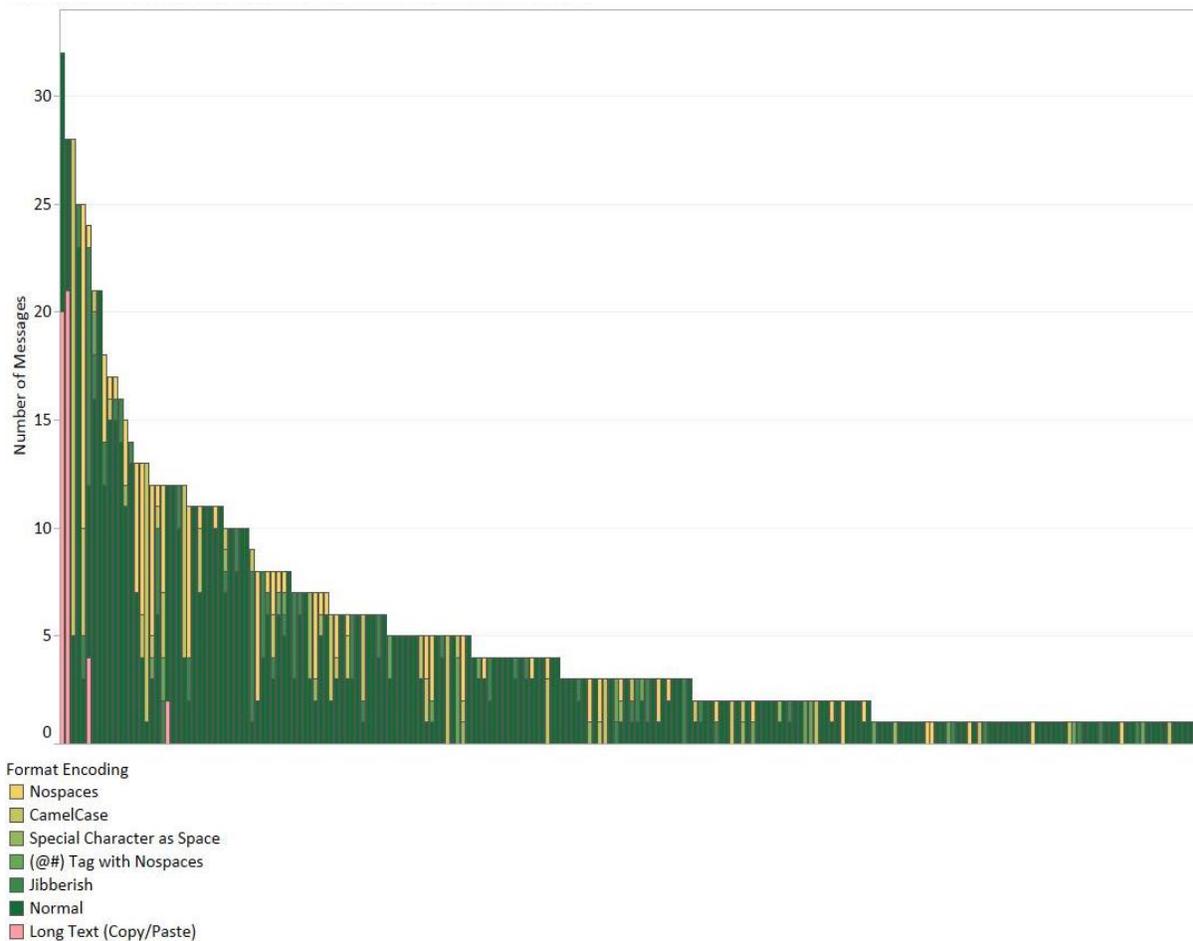
This is further exemplified by the greater frequency of inappropriate content when circumventing visual mediation (see Graph 5.4). However, there are other cases where sending a

Content Appropriateness	Count of Messages	Percent of Total
OK	870	80%
Undesirable	136	13%
Blacklist	78	7%

Table 5.2 Encoding of messages based on content appropriateness.

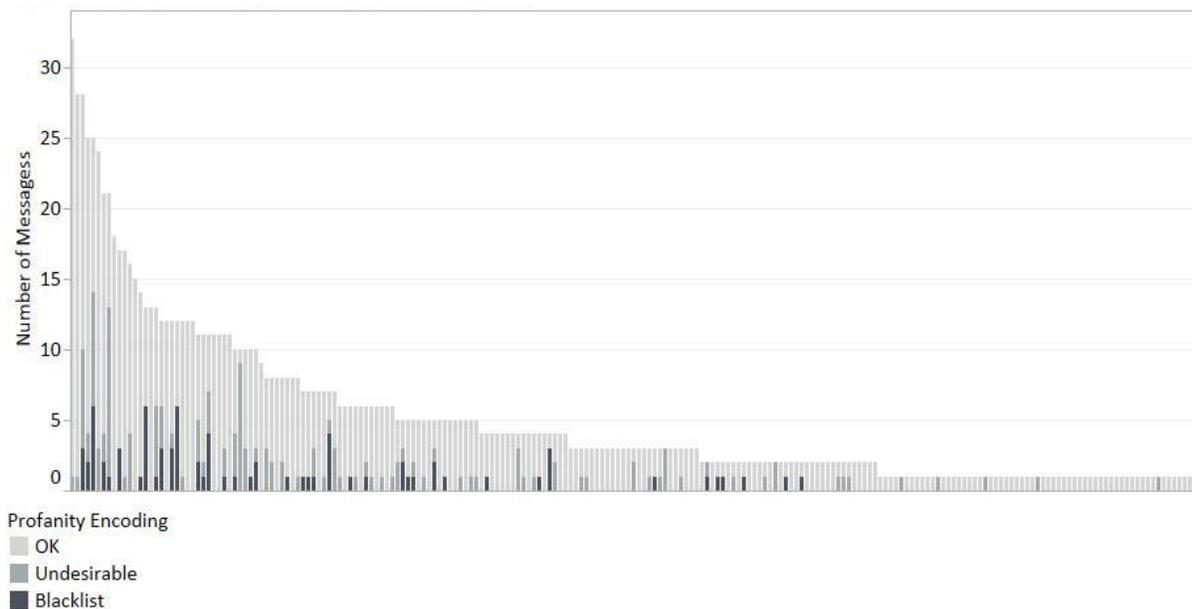
message was independent of the blacklist, e.g.: “SaveThePolarBears”, but still appears to be an attempt to keep the message intact despite the implemented mediation.

The blacklist was moderately effective for filtering specific words, but the breaking apart of messages reduced the impact of other inappropriate messages. In total 80% of all messages sent appeared benign (see Table 5.2). The installation received 214 messages containing inappropriate content. Of these, only 78 messages contained blacklisted words. The remaining 136 instances do not directly use blacklisted words but other undesirable content such as “Send nudes” or individually directed insults. Of all the inappropriate messages, 173 messages were broken up.

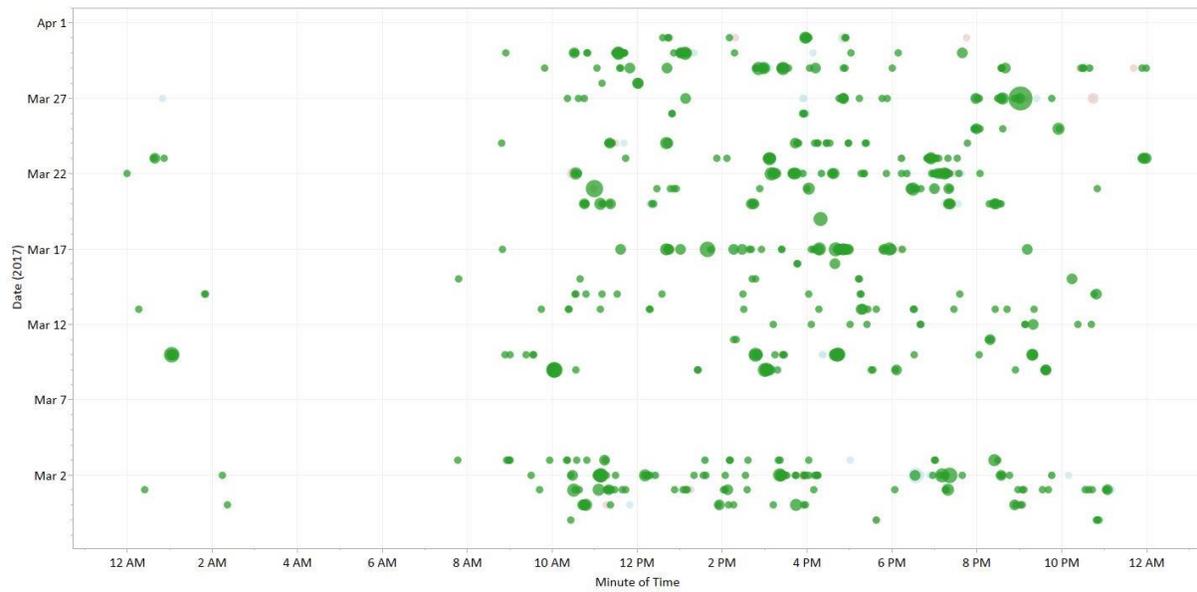
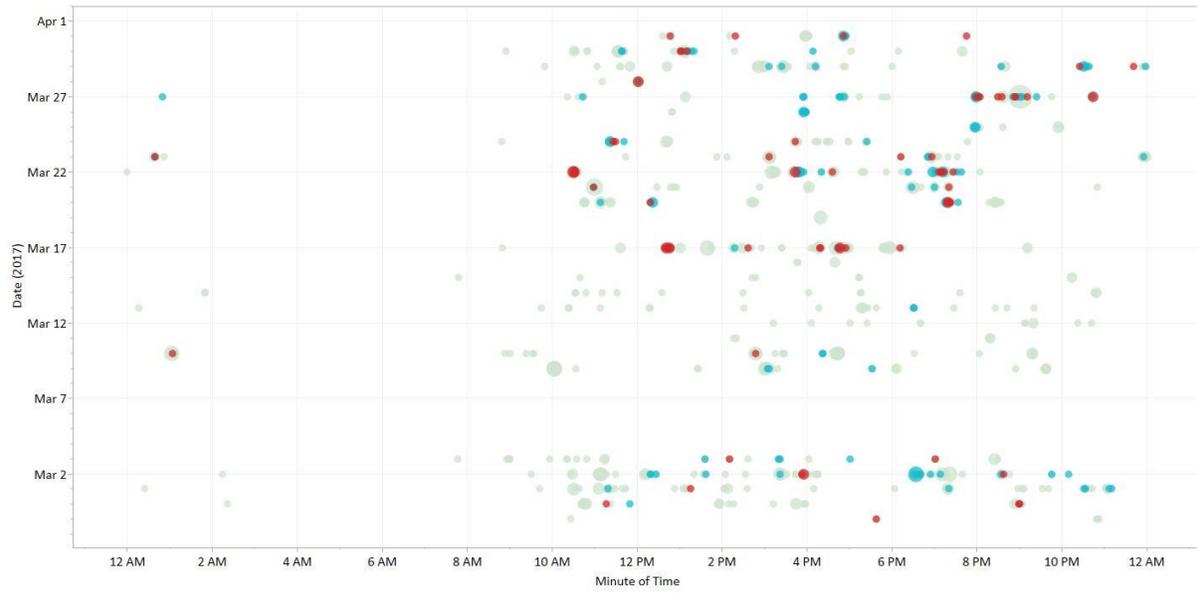


Graph 5.5 Number of Messages Received by Individual with Message Format Encoding.

This left 43 inappropriate messages, either containing blacklisted words or other undesirable content intact to appear on the display. The sending of inappropriate messages appears to be slightly more relevant to the context of the interaction rather than the users themselves. As we can see in Graph 5.6, almost every person who sent inappropriate messages also sent messages that were not classified as inappropriate, and there were no individuals who only sent messages that contained blacklisted words. Few inappropriate messages were sent to the display at isolated times (See Graph 5.7). With the correlation between inappropriate messages and high frequency of activity, this suggests that these types of messages corresponds with group activity, which aligns with field observations.



Graph 5.6 Number of Messages Received by Individual with Message Appropriateness Encoding.



Graph 5.7 Messages by Day and Time with Profanity Encoding (Highlights Inappropriate and Appropriate Messages).

5.6 Observations and Feedback by the Public

Throughout the study feedback was invited from the public during observation times and through an online survey that was sent via link to phone numbers that interacted with the installation. In the following I will describe several anecdotes from such encounters.

While I was present in the library for observations there was a group of people that had been messaging the installation crude things for some time. One person from this group said “why would someone put this [installation] here, of course people will send it things like this”. As it became apparent that I was associated with the installation he approached me and asked: “Can you take this down. This language makes me uncomfortable”. His tone and body language suggested he was trying to be facetious, but the statement suggests that he felt that the crude language was not appropriate for public space as it can create discomfort. It is interesting to note that while being partially liable for the discomforting content, his assertion displaces this responsibility back on to the creator of the display or institution that afforded him and his friends the opportunity to publicly engage in crude discourse, and thus create an uncomfortable space. In opposition to the previous encounter, another comment suggests that it is an individual’s responsibility to maintain a comfortable space. She says “I made an effort to keep my messages positive and friendly”. This demonstrates variability amongst people who interact in relation to where they believe the responsibility for respectful discourse lies.

One individual, who was very interested in the animation of words: “there were plenty of single words which were very cool to string together and pull into the center”, also demonstrates some unintended negative readings as a result of the words breaking apart. She says, “I saw words like Hitler on the board which was disappointing”, but actually the only message containing the word Hitler during the exhibition was a poem that someone sent about a victim of WWII

(previously mentioned in section 5.5). The poem ends with the line “the sun is shining on me as I will shine on the world” which, although somber, is quite wholesome and positive messaging. In this case the mediation that causes the messages to become decontextualized allows the word Hitler to be interpreted in a more negative way than in the context of the poem in which it was sent.

5.7 Chapter Summary

In this Chapter I have presented the results of a one month study of *Objective Meaning* deployed in the TFDL. I have provided a broad selection of messages sent to the display that characterize the varying uses of the installation for expression and dialogue. I have also analyzed usage in relation to the visual mediation technique of breaking up messages and the censorship of words. I have also included some anecdotes from field observations and public feedback. The following chapter will reflect on these results in a broad sense.

Chapter Six: Reflections on Design

With systems that allow for the anonymous contribution of content by the public to be publicly displayed, mediation can be used to encourage a respectful dialogue. With the design of *Objective Meaning* this was largely handled by the presentation mediation technique of breaking messages apart. In this Chapter I reflect on this specific technique and discuss other possible presentation mediation techniques. Furthermore, there is a second form of mediation in the censorship of blacklisted words provided by the library, I will also discuss how this conflicts with the presentation mediation technique. I will then discuss design decisions more broadly as I reflect on the input technology, unboxing of the system that some people engaged with, and group interactions as opposed to individual interactions.

6.1 Reflection on Presentation Mediation Technique

Through the analysis of log data in Chapter 5, the process of breaking apart messages on the screen was moderately effective, however, it was easily thwarted because the system only uses spaces within text strings to break apart messages into words. The space delineator could be discovered and exploited with little effort. This could be improved upon with the use of content comparison to a dictionary. This would be more effective because the system could permit only strings that match words in the dictionary, or it could attempt to extract words from strings without spaces.

The presentation technique of visually de-contextualizing words, as a specific form of visual abstraction, suggests a broader design space of visual abstraction for mediation that could be further explored with other forms of abstraction. For example, by masking content, fading it over time, or entirely transforming its presentation. Visual abstraction is distinct from processes

of mediation that happen behind the scenes, such as the censorship of blacklisted words in *Objective Meaning*. In future iterations this censorship of specific words could also be developed in the same design space so that the blacklisted words become visually abstracted rather than simply not present.

In terms of maintaining a respectful discourse, when the breaking apart of words was functioning, there was little cause for upset. This is due to the removal of words from their context, which disrupts the original intention of messages and by nature opens up the interpretation of the text. This creates scenarios that can de-escalate specific rhetoric, however, in some cases it can also aggravate the meaning of words that are taken out of context, which was evidenced by the individual who associated the word “Hitler” with negative intentions. This is highly dependent on the individual reading the installation and their assumptions about the use of specific words by their peers.

6.2 Thresholds for “Appropriateness” and Community Moderation

In the case of *Objective Meaning*, the capability of editing to manage the displayed content was reserved to me as the designer of the piece. In addition to the list of words supplied by the library, there were a small number of words that I added to the blacklist during the installation. My decision to do this, prompts the question of where the threshold for appropriateness lies. I could see myself wishing to impede messages that don’t align with my political values, yet would allow other strong messages that do align. This type of bias is present in many other aspects of my identity; gender, nationality, etc. I made a conscious effort to only add words that clearly aligned with those of the banned ones, as this was intended merely to safeguard the continued display of the installation. However, with the curation of language, either by an institution or an individual, the system slips into uncomfortable space where it ceases to be supportive of

public expression in favour of some other mandate. As mentioned in Chapter 2, the rooting out of discord does not paint a picture of a healthy society, rather it is the facilitation of multiple points of view that indicate a healthy dialogue.

This leads me to propose future iterations of *Objective Meaning* that might support community moderation as means of fostering a stronger sense of dialogue and ownership of the display. The democratization of defining what is appropriate could be accomplished by sharing editing privileges with the public. Community moderation could also employ visual mediation techniques of abstraction to promote reflection. Websites like *superfreedraw*¹⁴ and Reddit's *Place*¹⁵ allow for community moderation, by letting people draw directly over other people's contribution. However, this is not a space much explored in the physical, public realm.

6.3 Unboxing the Blackbox of Mediation

As mediation moves further from manipulating the visual representation of content, and techniques to filter and transform content are happening behind the scenes, the system becomes more of a black box. The second form of mediation, which is the removal of blacklisted words, is not visible to the people interacting with *Objective Meaning*, but they come to realize it when the system no longer behaves as they expect. Latour talks about the convergence of two agents with two different goals into one blackboxed system (see Figure 6.1). This is the case with *Objective Meaning* because the people who interact with it are not aware of the distinction between the system as I had intended and the censorship of words required by the library.

¹⁴ <http://www.superfreedraw.com/index.php/> (Accessed September 7, 2017)

¹⁵ <http://sudascript.com/reddit-place/> (Accessed September 7, 2017)

Latour also talks about a reverse blackboxing [29], or as we can refer to it here, “unboxing”; which takes place when the utility of the system breaks down. We see an “unboxing” of the system when individuals attempt to use other characters as spaces, or no spaces at all, to circumvent the breaking apart of messages. This can be related to the “breakdown” of blacklisted words not appearing on the screen, which prompts the individual to concatenate their messages to avoid losing a blacklisted word. Or the “breakdown” of the messages falling apart, when people perceive *Objective Meaning* as a tool for expression only and not reflection.

In the context of *Objective Meaning*, “unboxing” was not an intended interaction, however many instances of people interacting in this way suggest reflection. This is especially seen when the content of the message directly relates the interactive system, indicating an individual is reflecting through interaction, not just about the interaction. This makes it worth noting that using basic techniques, such as spaces to denote separate words, that enable individuals to unbox the system, can in itself, be a strategy to engage the public and possibly engage them in reflection. It would be interesting to explore in future if there is a correlation between the individuals

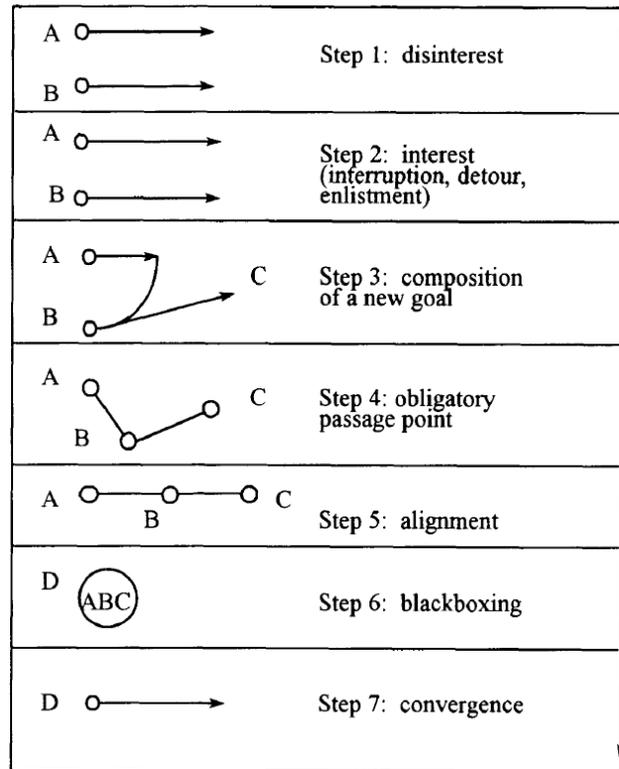


Figure 6.1 *Third Meaning of Mediation: Reversible Blackboxing.* Used with permission of rights holder: Bruno Latour [29]

who unbox the system and familiarity of the same individuals with digital games, or if unboxing is a phenomenon that appeals more broadly to interactive systems.

6.4 Impact of Input Technology on Design for Reflection

The use of personal cell phones and SMS made it easy to interact with *Objective Meaning*, by having only a small upfront effort required to send a message and no barriers for repeat interactions. Although this is typically sought after in the design of public interactive displays [11], I speculate that in the context of designing for reflection, it may have been detrimental. With *Objective Meaning*, there was an extreme casualness with which the installation got used, indicated by tedious dialogues that took place through the installation by people who were already engaged with each other socially. Presumably if the input was more expensive on time and effort, interactions would be more precious. However, this needs to be explored further to determine what the impact would really be on quality of content.

The input method also allows individuals to stay situated during interaction, which during deployment resulted in use by large groups with pre-existing social relationships. Despite a certain lack of anonymity in these scenarios, with the use of names and additional dialogue around the interaction, the social protocol amongst strangers that tempers public dialogue does not appear to affect these interactions. I believe that, because the individuals are able to stay situated in the space occupied by their friend group, there is a semi-private bubble created by the group, and their social protocol overrides the protocol for public appropriateness. This, of course, varies between different social groups, but tends to be more forgiving and in some cases completely antagonistic.

6.5 Thoughts on Group Use and Design for Reflection

Baumer talks about how a system that engages its users in reflection is predicated by interaction from people who are open to reflection [4]. I also believe this to be the case, and in the design of *Objective Meaning* I held the optimism that every person is at least capable and can be affected in a way that opens them up to reflection. This is exemplified in Chapter 4 when I discuss mimicking nature to bring forth a reflective atmosphere. During the deployment of *Objective Meaning* there was a distinct connection between group use and inappropriateness as well as circumventing the system in a way that does not appear reflective. I speculate that there is a shift in perception of the installation when it is experienced individually as opposed to in a group. Individually, the person who sees it will have a process of awareness about the display and the visual representation of words therein, before they notice the instructions and decide to interact. When it is experienced in a group, presumably individuals are learning about it through their friends, therefore may not necessarily pay attention to the visual representation before they start interacting, or they may only appreciate the system for its utility in augmenting socialization amongst their group. This disconnection may explain the discrepancy between different interpretations of where responsibility for respectful discourse lies.

The effect of groups on reflection could be further explored with this installation by mediating interaction from groups. Examples of this could include restricting the number of new people who interact at one time, access to the phone number, or blocking multiple interactions from a single user within a given time frame. Like the censorship of words, these techniques can become apparent through visual abstraction to minimize behind-the-scenes mediation.

6.6 Chapter Summary

In this Chapter I have reflected on the technique of breaking messages apart by discussing how de-contextualization can improve perceptions of words that are used negatively, but can also invite negative perceptions of words that were not intended to be negative. I presented future design options that could improve the consistency of identifying words. I also expressed discomfort in relation to this efficiency because enforced constraints may serve a mandate that contradicts the facilitation of dialogue. I defined this technique as a form of visual abstraction and discussed how other forms of abstraction could be used, and how the technique could extend to other functions of mediation, such as censorship. I defined unboxing as style of interaction that some individuals engaged with, and suggested that the simplicity of the systems afforded this behavior. I also discussed potentially negative impacts of the input device, and a lack of reflection surrounding group use of the installation.

Chapter Seven: Conclusion and Future Work

In this Chapter I will provide a final synthesis of this Thesis, and I will relate it to the challenges expressed in Section 1.4. I will then bring this to a close as I contemplate future work in my art practice and broader implications of rethinking mediation of public discourse through technology.

7.1 Return to Challenges

There is an ongoing conflict between expression and the notion of appropriateness in public space. I have discussed this broadly in relation to Public Art and I have expressed this as a concern for design of systems that allow for public content creation. Nevertheless, there is an attraction to such systems, as exemplified by engagement with *Objective Meaning* throughout the length of its deployment. Additionally, the facilitators that hosted *Objective Meaning* expressed interest in using the system in the future when they wished to stimulate dialogue and feedback around specific events. From this it appears that the use of technology to facilitate expression and discourse on a physical public display is indeed of interest to the public and institutions.

The main challenge I laid forth in this thesis was to investigate how people engage in a unique domain where technology facilitates anonymous expression within physically displayed public discourse. The findings in this regard are nuanced with the specific visual mediation technique of breaking apart messages that is employed by *Objective Meaning*. And they are also nuanced to the specific context in which the work was deployed: a university library. However, there are some clear realizations that emerge from the development and deployment of *Objective Meaning*, such as the use of this system to augment existing conversations and indifference towards the ability to remain anonymous. The anonymity of individual expressions was such a key

design decision based on my previous work that this came as a surprise and prompts me to consider that it is not necessarily the ownership of a message that creates a barrier for interaction but rather face-to-face interaction itself.

In addition to the use of the system to augment existing dialogue, there were numerous individuals who engaged with the system more closely to how I predicted. This was seen with messages that suggested an engagement and reflection on the characteristics of the display itself. It also includes those that utilized it as a means to connect with the social space of the library through storytelling and humour. There were no overall topics that people gravitated towards, there were only clusters of interest that coincided with group use. This range illustrates that there is no consensus on the audience for such an interactive display, people use it for self-reflection, to target individuals or to connect with the social context of the display.

There is also no consensus on who is responsible for the mediation of content on the display. Feedback from individuals who used it suggested the conflicting opinions: that the display should prevent its own misuse, and that each individual should be responsible for their use of the display. *Objective Meaning* strikes a balance between these, as it strives to be transparent and unbiased in its treatment of messages, yet mitigates negative messages through abstraction.

7.2 Implications for Future Work

As I reflect on the work produced in this thesis there are two streams of thought that emerge. The first is that the system of visual representation developed for *Objective Meaning* is a framework that could be explored in other ways. This could be used as a form for storytelling in a more choreographed sense, so that the design for reflection is more prevalent than the novelty of creating content. It could also be a framework for variable social experimentation, something that I touched on in section 4.4.5. Multiple displays could be used to explore differences and

similarities by curating groups of people whom one might assume would interact differently with the installation, or by randomly generating groups. As previously mentioned by Eco (Section 2.3), a complex relationship between utility and contemplation/reflection arises with a work that is participatory. The accessibility to utilize this particular system did not emphasize its potential as point of reflection, but by developing its reflectiveness the work may gravitate towards a more traditional relationship with the audience as observer.

My other stream of thought relates to this artwork's contingency in life and our predominant thoughts around the subjects of self-expression, public discourse, and mediation. In one generation, we have been thrust into a world that allows for unlimited social discourse on virtual platforms, both anonymous and identifiable. How does this discourse influence our social relations in the physical realm, and is it productive or toxic? What is our relationship as individuals who engage with these platforms and our relationship as designers who build them? Much of the work in this thesis focuses on the transparent and unbiased mediation of discourse, yet from my privileged view of the data, I am left thinking about the content sent to the display before it is broken apart. This content relates to individual intentions and notions of responsibility; in the future I think that the concept of reflection that was intended to impact this consciousness can be extended further to explore real social consequences.

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Appendix: Copyright Permissions

Permission from co-authors of articles identified in preface:

Permission to Publish

I grant Sarah Storteboom permission to publish content from the following articles, of which I am a co-author, for inclusion in her thesis, which will be made available in the institutional repository at the University of Calgary (The Vault) and the Library and Archives Canada:

1. Objective Meaning: Presentation Mediation in an Interactive Installation. In *Proceedings of the 2017 ACM International Conference on Interactive Surfaces and Spaces (ISS '17)*. ACM, New York, NY, USA, 360-365. DOI: <https://doi.org/10.1145/3132272.3135079>
2. Exploring Content Creation and Mediation on Public Displays through Visual Presentation (in submission with CHI 2018).

Alice Thudt

Nov 7 17
Date

Søren Knudsen

NOV 7, 17
Date

Sheelagh Cappendale

Nov 8, 2017
Date

Correspondence regarding Figure 1.2:

11/9/2017 Gmail - Re: Permission to Publish copyright material

M Gmail Sarah Storteboom [REDACTED]

Re: Permission to Publish copyright material
6 messages

[REDACTED] Wed, Oct 4, 2017 at 1:09 PM

To: Sarah Storteboom [REDACTED]

Hello Sarah,

I had a look at the link you sent to Reconciliation, the Peacekeeping Monument and was able to find this email address which should hopefully be able to answer your question regarding the image that you would like to use in your thesis. I was not able to find a contact address on the webpage that you sent the link to but did find this email address [REDACTED]

If you don't have any luck I can try and take a picture for you and send it on to you by email - then you won't have any copyright issues.

Kind regards,

Damien Busi [REDACTED]

Sarah Storteboom [REDACTED] Wed, Oct 4, 2017 at 2:04 PM

Hi Damien,
I did try to send the request to the info address, as you suggested, and haven't received any response so far. It is very generous of you to offer taking a photo of the monument! That would certainly be a much appreciated solution if it is not too much trouble for you!
There are still approximately three weeks before the deadline and I will let you know if I get a response on the use of the website image.
Thank you so much,
Sarah
(Quoted text hidden)

[REDACTED] Fri, Oct 6, 2017 at 7:57 AM

To: Sarah Storteboom [REDACTED]

Hi Sarah,

I'll ask amongst my colleagues to see if they have a contact at info@canada.ca

I'll also take a few pictures at the weekend - as no trouble as I live here. I'll try and send them on Monday/Tuesday.

Best,

Damien Busi [REDACTED]

[REDACTED] Mon, Oct 23, 2017 at 7:16 AM

To: Sarah Storteboom [REDACTED]

Hi Sarah,

I tried last week but the light was bad. These are better I hope. You are welcome to have these.

Good luck with your presentation - I hope these are in time.

Kind regards,

Damien Busi [REDACTED]

[REDACTED]

From [REDACTED]
To [REDACTED]
Date: 04/10/2017 04:04 PM
Subject: Re: Permission to Publish copyright material
(Quoted text hidden)

3 attachments

Correspondence regarding Figure 1.5:

10/1/2017

Gmail - Permission to use an image in my Thesis

M Gmail

Sarah Storteboom [REDACTED]

Permission to use an image in my Thesis

2 messages

Sarah Storteboom <[REDACTED]>
To: Varvara Guljajeva [REDACTED]

Tue, Sep 26, 2017 at 3:10 PM

Hello Varvara and Mar,

I am currently finishing up writing my masters degree, and would very much like to include your piece, *Katusepoisid*, in my thesis as related work in interactive public art. It is mandatory for our thesis papers to be published in a national repository, and therefore I must have your permission to include the following image, sourced from your website:



Also, with your permission, I will place an acknowledgment within the image caption in the following manner:
 "Katusepoisid (Roof Guys), Varvara and Mar, 2017. Image source: <http://www.varvarag.info/katusepoisid/> (Accessed September 7, 2017. Used with permission from the rights holder)"
 Please advise if this is not how you would like this work to be acknowledged and I will, of course, accommodate.
 Thank you and best wishes to you!
 Sarah Storteboom

Varvara Guljajeva [REDACTED]
To: Sarah Storteboom [REDACTED]
Cc: mar canet [REDACTED]

Wed, Sep 27, 2017 at 4:30 AM

Hi Sarah,

nice to hear from you!
 sure, you can use the image. We are glad you are mentioning our work in your thesis.

good luck with it!

Varvara

Varvara & Mar OÜ
 [REDACTED]

Correspondence regarding Figure 1.10:

10/3/2017

Gmail - Your request...



Sarah Storteboom [REDACTED]

Your request...

2 messages

Stelarc

To: Sarah.storteboom [REDACTED] >

Sun, Oct 1, 2017 at 7:40 PM

Hi Sarah,

Not a problem about using the images requested with the credits as indicated. So do go ahead with my permission.

The original imaging was of an extra ear on the side of my face. But that was anatomically an unsafe place to construct the ear. Hence checking what might be an alternative site on my arm where the skin is very flexible, sensitive and very ear-like in its smoothness...

Much success with your thesis.

Best wishes-

Stelarc

Performance Artist
Distinguished Research Fellow,
School of Design & Art, Curtin University Perth



Curtin University

On 2 Oct 2017, at 5:32 AM, Sarah Storteboom [REDACTED] > wrote:

Hello Stelarc,

I am a Master's Student at the University of Calgary, and I am currently writing a practice-based thesis on mediation in an interactive artwork. I contextualize this work through a discussion on other artist's work. As such, with your permission, I would like to include one of the following images from your website to help illustrate my description of your work. It is mandatory for our thesis papers to be published in a national repository, and therefore I must have your permission to include any images sourced from your website. As they are both images taken by other artists I am unsure if you are the copyright owner or would be able to grant this permission, thus my request for either one.

<image.png> <image.png>

Also with your permission, I would acknowledge the images in the following manner respectively:
 "Model of Ear On Arm, Stelarc (Photographed by Polixeni Papapetrou), 2007. Image source: Stelarc's website [index for full citation in references] (Accessed September 7, 2017. Used with permission from the rights holder)"
 "Ear On Arm, Stelarc (Photographed by Nina Sellars), 2007-ongoing. Image source: Stelarc's website [index for full citation in references] (Accessed September 7, 2017. Used with permission from the rights holder)"
 Please advise if this is not the manner in which this work should be acknowledged and I will accommodate. This Thesis will go to press on October 27th, therefore I would sincerely appreciate your response before this date.

Thank you and kind regards,



Correspondence regarding Figure 1.12:

11/8/2017 Gmail - Re: Form Submission - Contact Suzanne Lacy - Permission to publish image in thesis

M Gmail Sarah Storteboom [REDACTED]

Re: Form Submission - Contact Suzanne Lacy - Permission to publish image in thesis
2 messages

Suzanne Lacy [REDACTED] Fri, Oct 6, 2017 at 2:43 PM

To: [REDACTED]

hi
you have my permission.
re: photo - have you tried my website - or do you want a better cc from me of that photo?
Suzanne

On Oct 1, 2017, at 5:46 PM, [REDACTED] wrote:

Name: Sarah Storteboom
Email Address: [REDACTED]
Subject: Permission to publish image in thesis

Message: Hello,
I am a Master's Student at the University of Calgary, and I am currently writing a practice-based thesis on the social aspects of an interactive artwork. I contextualize this work through a discussion on other artists work. As such, with your permission, I would like to include an image of your work "The Crystal Quilt" to help illustrate my description. It is mandatory for our thesis papers to be published in a national repository, and therefore I must have your permission to include this image I sourced from the tate website:

<http://www.tate.org.uk/context-comment/blogs/performance-art-101-angry-space-politics-and-activism>

Also with your permission, I would acknowledge the image in the following manner:
"The Crystal Quilt, Suzanne Lacy (Photographed by Gus Gustafson), 1985-1987. Image source:
<http://www.tate.org.uk/context-comment/blogs/performance-art-101-angry-space-politics-and-activism>
(Accessed September 7, 2017. Used with permission from the rights holder)"

Please advise if this is not the manner in which this work should be acknowledged and I will accommodate. This Thesis will go to press on October 27th, therefore I would sincerely appreciate your response before this date.

Thank you and kind regards,
Sarah

(Sent via SUZANNE LACY)

Sarah Storteboom [REDACTED] Fri, Oct 6, 2017 at 3:15 PM

To: Suzanne Lacy <[REDACTED]>

Hi Suzanne,
Thanks for your response! I think when I was looking on your website there was a film, but I had difficult time finding a still image that depicts the work as clearly as the one from Tate. I think this was because of the high angle of the photograph. If it is not too much trouble, and you have a similar shot, I would gladly use an image from you.
Best regards,
Sarah
(Quoted text hidden)

11/1/2017 Gmail - credit

M Gmail Sarah Storteboom [REDACTED]

credit

Suzanne Lacy [REDACTED] Sun, Oct 8, 2017 at 7:25 PM

To: [REDACTED]

*The Crystal Quilt, Suzanne Lacy (Photographed by Gus Gustafson), 1985-1987. Photo courtesy of the artist.

Correspondence regarding Figure 1.14:

11/3/2017

Gmail - Permission to publish image in MSc Thesis

M Gmail

Sarah Storteboom [REDACTED]

Permission to publish image in MSc Thesis

2 messages

Sarah Storteboom [REDACTED]

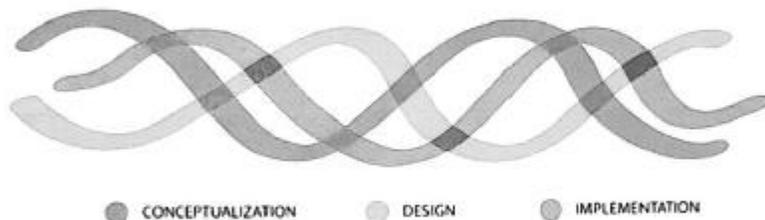
Wed, Nov 1, 2017 at 5:02 PM

To: Lindsay MacDonald [REDACTED]

Hello Lindsay,

I hope you are very well!

In my thesis I have referenced your diagram for a braided development model and would like to include the diagram in my thesis. As such, I am hoping you will grant me permission to publish this figure:



Also, with your permission, I will place an acknowledgment in the caption as follows:

"Used with permission of rights holder: Lindsay MacDonald [Reference to full citation for your thesis that appears in list of references]"

Let me know if this is not the manner in which you would like this figure to be acknowledged and I will accommodate.

Thanks,

Sarah

Lindsay MacDonald Vermeulen [REDACTED]

Thu, Nov 2, 2017 at 1:50 AM

To: Sarah Storteboom [REDACTED]

Sure, go ahead! That's fine with me :)

[Quoted text hidden]

Correspondence regarding Figure 2.2:

11/3/2017

Gmail - Permission to publish image in my Thesis



Sarah Storteboom [REDACTED]

Permission to publish image in my Thesis

4 messages

Sarah Storteboom [REDACTED]

Sun, Oct 1, 2017 at 4:19 PM

To: [REDACTED]

Hello Jane,

I am a Master's Student at the University of Calgary, and I am currently writing my thesis. It is mandatory for our thesis papers to be published in a national repository, and therefore I must have your permission to include any images sourced from your website/blog. With your permission, I would like to include the following image and acknowledge it in the manner below.



"Untitled (free), by Rirkrit Tiravanija's, was first exhibited in 1992 at 303 Gallery in SoHo. This image depicts a recreation of the work titled *Untitled (Free/Still)*, (Photographed by Jane Housham) and exhibited at the MoMa in New York, 2012. Image source: <http://janehousham123.blogspot.ca/2012/01/doing-new-york-day-5.html> (Accessed September 7, 2017. Used with permission from the rights holder)"

Please advise if this is not the manner in which this work should be acknowledged and I will accommodate. This Thesis will go to press on October 27th, therefore I would sincerely appreciate your response before this date.

Thank you and kind regards,
Sarah Storteboom

Jane Housham [REDACTED]

Mon, Oct 2, 2017 at 3:11 AM

Reply-To: Jane Housham [REDACTED]

To: Sarah Storteboom [REDACTED]

Hi Sarah

Thanks very much for your email. I would be honoured if you were to use my photo in your thesis -- what is your title, out of interest?

Jane Housham [REDACTED]

Wed, Oct 4, 2017 at 3:11 AM

Reply-To: [REDACTED]

To: Sarah Storteboom [REDACTED]

Hi Sarah

Thanks so much for your email. Your work sounds very interesting.

I feel a bit foolish for wading in re CC licences etc. Please just use my photo in exactly the same way you're using other similar photos. It's all fine. It sounds as though Open Access doesn't really come into it.

Very best wishes

Jane

Correspondence regarding Figure 2.8:

11/3/2017

Gmail - Permission to publish images in MSc Thesis

M Gmail

Sarah Storteboom [REDACTED]

Permission to publish images in MSc Thesis

Caitlind Brown [REDACTED]

To: Sarah Storteboom [REDACTED]

Wed, Nov 1, 2017 at 5:08 PM

Hi Sarah,

Definitely. Please do. You're welcome to use my images of your work for anything (but thanks for asking anyway).

Actually, because you asked, I quickly re-edited all of your and Lowell's images from Phantom Wing to make them a little nicer / fix the colour a bit. They're attached.

Good luck!

XOXO

c.

On Wed, Nov 1, 2017 at 4:55 PM, Sarah Storteboom [REDACTED] wrote:

Hi Caitlind,

I hope you are doing well!

I am soon publishing my thesis, and would like to include this image you took from Phantom Wing. Please advise if I have your permission to do so and if I may credit you in the image caption as follows: "Photographed by Caitlind Brown". Just let me know if this is not how you would like to be acknowledged and can accommodate!



Thanks and much love!
Sarah

Correspondence regarding Figure 2.9:

11/3/2017

Gmail - Permission to publish images in MSc Thesis

M Gmail

Sarah Storteboom [REDACTED]

Permission to publish images in MSc Thesis

2 messages

Sarah Storteboom [REDACTED]

Wed, Nov 1, 2017 at 6:11 PM

To: [REDACTED]

Hello Mike,

I hope you are doing well!

I am soon publishing my thesis, and would like to include this image you took from Phantom Wing. Please advise if I have your permission to do so and if I may credit you in the image caption as follows: "Photographed by Mike Tan". Just let me know if this is not how you would like to be acknowledged (like if you want me to say: Diane+Mike Photography) and can accommodate!



Thanks and much love!
Sarah

Michael Tan [REDACTED]

Thu, Nov 2, 2017 at 6:57 PM

To: Sarah Storteboom [REDACTED]

Hey Sarah!

Go for it! You can credit it to me, Mike Tan.

Thank youuuuu!

M

Correspondence regarding Figure 2.12 and 2.13:

11/2/2017 Gmail - Permission to Publish Images in MSc thesis

M Gmail Sarah Storteboom [REDACTED]

Permission to Publish Images in MSc thesis
4 messages

Sarah Storteboom [REDACTED] Wed, Nov 1, 2017 at 5:45 PM
To: [REDACTED]

Hi Mia,
[REDACTED]

As you might remember I am currently a graduate student at UofC, and my thesis explores mediated discourse through interactive public displays. The artwork I developed through this thesis, *Objective Meaning*, accepts and displays text messages sent by the public on a large digital public display. I discuss Sophie Farewell's work *However you do it... consider the stars*, as related work in my thesis. As such, I am hoping you (and your collaborators or the photographer of these images, if they be the copyright holder) will grant me permission to publish the following images to help illustrate the discussion:




Also, with your permission (and a little help filling in the [blanks]), I will place an acknowledgment with the caption of each image in this manner:

"*However you do it... consider the stars*, performance by Sophie Farewell (Photographed by [photographer?]), 2012. Image source: <http://www.en-candmia.ca/solo-works/whatever-you-do-it-consider-the-stars/> (Accessed September 7, 2017. Used with permission of rights holder [Sophie Farewell?])."

Please advise if this is not the manner in which you would like this work to be acknowledged and I will accommodate.

Thank you and kind regards!
Sarah Storteboom

Mia Ruahton [REDACTED] Tue, Nov 7, 2017 at 4:32 AM
To: Sarah Storteboom [REDACTED]

Hi Sarah,

Sorry for the delay! Yes, of course you are welcome to use images of *However you do it...*

We don't actually know who took these particular photos. The best way to credit them would be **Nuit Blanche Calgary** as a number of our photos came from them uncredited. **Sophie Farewell** is the correct name to use as the rights holder.

Congratulations on finishing your thesis!

Let me know if you need anything else.
Best,
Mia
(Ousted text hidden)

Correspondence regarding Figure 3.3 and 3.4:

11/3/2017

Gmail - Permission to publish images in MSc Thesis



Sarah Storteboom [REDACTED]

Permission to publish images in MSc Thesis

3 messages

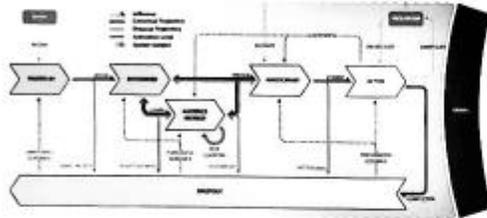
To: Sarah Storteboom [REDACTED]

Thu, Nov 2, 2017 at 5:52 PM

Hello Dr. Wouters,

I am a graduate student at the University of Calgary (Alberta, Canada) and my thesis explores mediated discourse through interactive public displays. The artwork I developed through this thesis, *Objective Meaning*, invites the public to contribute to a public display using their cell phone.

I discuss two papers of which you are the first author, *Uncovering the Honeyypot Effect: How Audiences Engage with Public Interactive Systems* and *OpenWindow: Citizen-Controlled Content on Public Displays*, as they relate to work in my thesis. As such, I am hoping you will grant me permission to publish the following figures to help illustrate the discussion:



Also, with your permission, I will place an acknowledgment with the caption of each image in this manner:

"Used with permission of rights holder: Wouters et al. [Reference to full citation for respective paper that appears in list of references]"

Please advise if this is not the manner in which you would like this work to be acknowledged and I will accommodate.

Thank you and kind regards!
Sarah Storteboom

Niels Wouters [REDACTED]

To: Sarah Storteboom [REDACTED]

Hi Sarah,

Thanks for getting in touch!

I'm more than happy for you to republish the images in your thesis. I've attached full-res versions for your convenience.

Please send me a version of your thesis once finished. The description of your work sounds really exciting, and I'd love to read it.

Let me know if you'd need any other information.

Cheers,

Dr Niels Wouters
Digital Media Specialist

Correspondence regarding Figure 3.5:

11/3/2017

Gmail - Permission to publish images in MSc Thesis

M Gmail

Sarah Storteboom [redacted]

Permission to publish images in MSc Thesis

2 messages

Sarah Storteboom [redacted]

Thu, Nov 2, 2017 at 5:38 PM

To: [redacted]

Hello Jouni,

I am a graduate student at the University of Calgary (Alberta, Canada), my thesis explores mediated discourse through interactive public displays. The artwork I developed through this thesis, *Objective Meaning*, invites the public to contribute to a public display using their cell phone.

I discuss your paper *Personal Device as a Controller for Interactive Surfaces* as it relates to work in my thesis. As such, I am hoping you will grant me permission to publish the following image to help illustrate the discussion:



Also, with your permission, I will place an acknowledgment with the caption of the image in this manner:

"Used with permission of rights holder: Vepsäläinen et al. [Reference to full citation that appears in list of references]"

Please advise if this is not the manner in which you would like this work to be acknowledged and I will accommodate.

Thank you and kind regards!
Sarah Storteboom

Vepsäläinen, Jouni Olavi [redacted]

Fri, Nov 3, 2017 at 11:55 AM

To: [redacted]

Hi Sarah,

You have our permission to publish the image. The acknowledgment is fine as it is.

Best regards,
Jouni Vepsäläinen

Correspondence regarding Figure 3.6:

Sarah Storteboom [redacted]
To: [redacted]

Wed, Nov 1, 2017 at 3:59 PM

Hello Dr. Salovaara,

This message was not successfully delivered to the first author, therefore I am contacting you in hopes that you may grant permission for my to use of an image, as mentioned below, or pass this request on to the first author Peter Peltonen.

I am a graduate student at the University of Calgary (Alberta, Canada), my thesis explores mediated discourse through interactive public displays. The artwork I developed through this thesis, *Objective Meaning*, accepts and displays text messages sent by the public, then abstracts them on the display by breaking apart the messages into individual words and animating them in a physics simulation.

I discuss your work *City Wall* as it relates to work in my thesis. As such, I am hoping you will grant me permission to publish the following image (with my caption below) to help illustrate the discussion:



"This image depicts individuals interacting with 'CityWall' by arranging images submitted via mobile devices."

Also, with your permission, I will place an acknowledgment with the caption of the image in this manner:

"Used with permission of rights holder: Peltonen et al. [Reference to full citation for "Extending Large-Scale Event Participation with User-Created Mobile Media on a Public Display" that appears in list of references]"

Please advise if this is not the manner in which you would like this work to be acknowledged and I will accommodate.

Thank you and kind regards!
Sarah Storteboom

Antti K Salovaara [redacted]
To: Sarah Storteboom [redacted]

Thu, Nov 2, 2017 at 1:30 AM

Hello Sarah,

thanks for your interest in our research! Yes, you have the permission to use the picture, given that you also include the citation data (which you already promised to do).

Good luck with the finishing of the thesis!

Best wishes,

-antti

[Quoted text hidden]

--

Antti Salovaara

Department of Computer Science
University of Helsinki
[redacted]

Correspondence regarding Figure 3.7:

11/3/2017

Gmail - Permission to publish images in MSc Thesis



Sarah Storteboom <storteboom@gmail.com>

Permission to publish images in MSc Thesis

2 messages

Sarah Storteboom <storteboom@gmail.com>

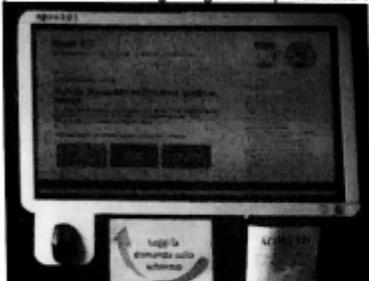
Wed, Nov 1, 2017 at 4:13 PM

To: <storteboom@gmail.com>

Hello Dr. Schiavo,

I am a graduate student at the University of Calgary (Alberta, Canada), my thesis explores mediated discourse through interactive public displays. The artwork I developed through this thesis, *Objective Meaning*, invites the public to contribute to a public display using their cell phone.

I discuss your work *Agora 2.0* as it relates to work in my thesis. As such, I am hoping you will grant me permission to publish the following image to help illustrate the discussion:



Also, with your permission, I will place an acknowledgment with the caption of the image in this manner:

"Used with permission of rights holder: Schiavo et al. [Reference to full citation for "Agora2.0: Enhancing Civic Participation through a Public Display" that appears in list of references]"

Please advise if this is not the manner in which you would like this work to be acknowledged and I will accommodate.

Thank you and kind regards!
Sarah Storteboom

 Gianluca Schiavo <storteboom@gmail.com>

Thu, Nov 2, 2017 at 2:52 AM

To: Sarah Storteboom <storteboom@gmail.com>

Hello Sarah,
thanks for getting in touch - I grant you the permission with pleasure.
Find in attachment a higher resolution version of the picture.

I wish you good luck with your research and your thesis

Best,
Gianluca

Correspondence regarding Figure 3.8 and 6.1:

11/3/2017

Gmail - Permission to publish images in MSc Thesis



Sarah Storteboom [redacted]

Permission to publish images in MSc Thesis

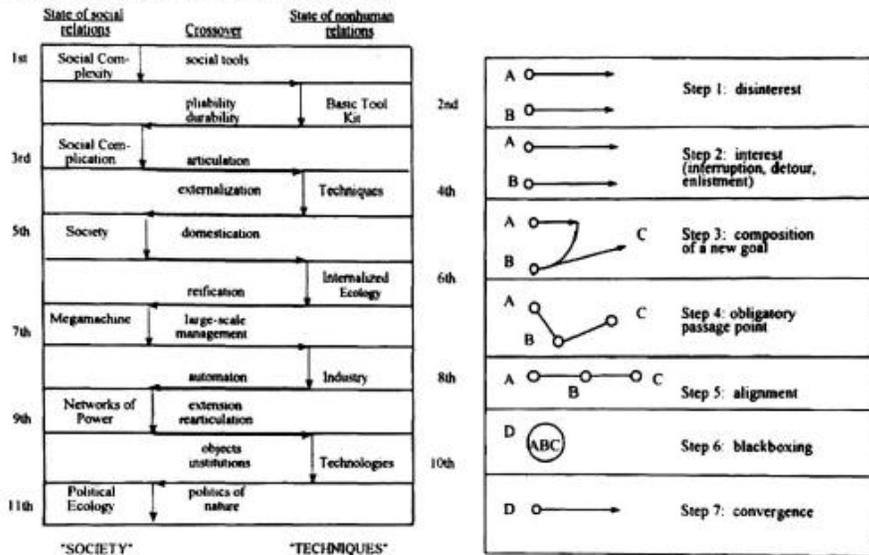
3 messages

Sarah Storteboom [redacted]
To: [redacted]

Wed, Nov 1, 2017 at 4:35 PM

Hello Dr. Latour,

I am a graduate student at the University of Calgary (Alberta, Canada), my thesis explores mediated discourse through interactive public displays. I discuss your concept of delegation of human action to technology, multiple layers of human and technological agents and black-boxing, as it relates to work in my thesis. As such, I am hoping you will grant me permission to publish the following figures from your article in *Common Knowledge*, "On Technical Mediation - Philosophy, Sociology, Genealogy" to help illustrate the discussion:



Also, with your permission, I will place an acknowledgment with the caption of each image in this manner:

"Used with permission of rights holder: Bruno Latour [Reference to full citation for the article that appears in list of references]"

Please advise if this is not the manner in which you would like this work to be acknowledged and I will accommodate.

Thank you and kind regards!
Sarah Storteboom

assistante Bruno Latour [redacted]
To: Sarah Storteboom [redacted]

Thu, Nov 2, 2017 at 9:58 AM

Sure no problème permission granted
Bruno
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