The Interface Is Obsolete: A Critical Investigation of the Digital Interface in Interactive New Media Installations.

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This is to confirm that the materials presented in this thesis are my own.

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Abstract: *The Interface Is Obsolete: A Critical Investigation of the Digital Interface in Interactive New Media Installations*

My thesis proposes a critical framework for understanding the digital interface in interactive new media installations. I aim at dispelling the instrumental, cybernetic, "action-reaction" myth that surrounds the functions of the interface and that constitutes one of the main limitations in its conceptualization today. I argue that a rethinking of the digital interface in terms of its aesthetic and cultural properties is essential if we are to take digital interfaces seriously as devices that *inform* or even, to some extent, *structure* our relationship with technology.

Theorists who work in the interdisciplinary field of interface studies have historically been preoccupied with the technical and instrumental functions the interface performs – specifically with how it acts and reacts to pre-programmed information. To do this, they have predominantly drawn on computer science and engineering perspectives. Thus digital interfaces have commonly been understood as the symbolic software that enables humans to use computers. My thesis approaches the digital interface from a different direction, concentrating on the aesthetic and cultural aspects of the digital interface, and drawing on scholarship from the fields of art history and media studies. In particular, I focus on critically examining how various interfaces are defined within art environments and how they influence the way subjects, objects, and the relationships and processes that exist between them are understood in these disciplinary fields and practices. Throughout, I propose a more expansive definition of the digital interface in interactive new media installations, positioning it as a dynamic, hybrid, aesthetic and cultural process. I thus reformulate the problem of the digital interface as a problem of making the often invisible aspects of the device legible.

Ultimately, I argue that the interface mediates, thus creates, to an extent, relationships between viewer/participants, artists and artworks as well as influences the movements and perceptions of those interacting with it. This reading enables me to conclude that the digital interface can be seen as an important actor in positioning and (re)shaping specific ways in which the self relates to technology, to artistic practice and to other human and nonhuman beings in the current media culture. At the heart of this thesis is the notion that the digital

interface matters and that a critical exploration of it in aesthetic contexts can help us understand and possibly reconfigure our human relationship with technology.

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Preface: *What is the Interface in this Artwork?*

For the past two years, I have been taking a group of digital media arts students on a trip to the Victoria and Albert Museum, in London, UK. The purpose of this visit is to get the students to engage with digital media art in person. The trip begins with a guided tour of the museum's computer art collection.[1] It ends with a viewing of the interactive installation *Swarm Study / III* (2011) by new media art collective Random International.[2] Commissioned by the museum, *Swarm Study / III* is installed in the ceiling directly above the stairway that connects the architecture gallery to the ceramics wing.[3] The piece is visible from both spaces as well as from the stairway.[4] My group approaches the installation from the architecture gallery. We walk half-way up the stairs, look up – and there it is. (Figure 1)

Figure 1: Random International, *Swarm Study / III,* (2011).

Swarm Study / III is aesthetically simple yet striking. It consists of a series of brass rods covered in LED lights, a computer and closed-circuit cameras. The rods are arranged in a grid-like formation. They are suspended from the ceiling and placed in four large cubes.[5] The students stand in the landing and stare at the work. The most daring of the group step

[1] For information about the Victoria and Albert Museum's computer art collections, please visit: http://www.vam.ac.uk/content/articles/t/v-and-a-computer-art-collections/
[2] Victoria and Albert Museum. *Swarm Study / III* (2011). Found online at: http://www.vam.ac.uk/__data/assets/pdf_file/0011/179336/Random_international.pdf
[3] Ibid.,
[4] Ibid.,
[5] Random International. *Swarm Study / III* (2011). Found online at: http://random-international.com/work/swarm-study-iii/

forward and slowly begin their ascent up the staircase. The cameras immediately detect the student's movements and the piece is activated – its lights turn on. (Figure 2)

Figure 2: Random International, *Swarm Study / III* (2011).

As the students walk up and down the staircase, the lights follow them, moving from rod to rod, from cube to cube, flickering off and on. Soon, all students are interacting with the artwork. Some even go so far as to attempt to "break" it. "Breaking" the piece is relatively easy. *Swarm Study / III* runs on a cybernetic action/reaction loop. It tracks and records the action occurring below it and then produces a pre-programmed reaction to it in real-time.[6] The action being tracked and recorded in this particular case is the students walking up and down the stairs at a standard gallery visitor pace. The pre-programmed reaction the artwork produces to this action takes the form of blinking lights, which resemble swarming patterns found in nature.[7] Given this, all the students have to do to "break" the work is intervene in the cybernetic action/reaction loop. They do this by running up and down the stairs, instead of walking at a standard gallery visitor pace. This action (running instead of walking) is a particularly effective form of intervention because if the students are moving too fast, the camera cannot track them and record data. If there is no recorded data, then there is no action: therefore, there can be no reaction. If there is no reaction, then there is no art, as the art is the pre-programmed reaction (swarming) to the action (student movement) in this particular piece.

[6] Random International. *Swarm Study / III* (2011). Found online at: http://random-international.com/work/swarm-study-iii/
[7] Ibid.,

After interacting with *Swarm Study / III* for a short period of time, we begin to discuss the artwork. We briefly talk about surface-level aesthetics: we discuss representation (how well the piece represents the thing it is trying to depict, i.e. behavioral patterns in animals, swarming), expression (our emotional responses to the work, or "how it makes us feel") and form (organization, unity, complexity, technical skill – including, but not limited to, where the piece is installed in the museum and how its location affects the way we engage with and think about it). These questions lead to a conversation around the conceptual idea behind the artwork: What is the aim of this work? What is its ultimate purpose? Why did the artists make it? What are they trying to achieve with it? How is this idea realized and/or communicated through the artwork? And how effective is it?

The exercise culminates in a discussion about interactivity and interfaces – specifically, what interaction and interfaces mean to this work, what they signify and are significant of. The questions continue: How and why is interaction is deployed? What kind of change (to the artwork, to the way you think and act) does interaction cause? And, most important, what *causes* it to work? That is to say, what is the thing that influences your movements and perceptions – the thing that allows interaction to occur, that reveals the artwork to you? What is the interface in *Swarm Study / III*? The answer the students give to the final question, "What is the interface in *Swarm Study / III*?" is always the same: "Our bodies," they exclaim, "are the interfaces in this work because our bodies are the things that make the lights on the piece turn on and off!" The students are, of course, correct. Their bodies *are* the forms that mediate the relationship between them, the artists and the artwork. Their bodies *are* the things that allow them to interact with the piece, and reveal the artwork to them. Therefore, their bodies *are* the interfaces in *Swarm Study / III.*

Swarm Study / III and my students' responses to it are important to my thesis, as they not only serve as examples of what an interface is or could be, but they also show *why* the deployment of the interface in interactive new media installations matters to new media art and to contemporary society. The interface matters because it is representative of the increasingly messy relationship between bodies, spaces and technologies in our culture. For instance, when embedded into environments and rendered imperceptible, like it is in *Swarm Study / III,* the interface allows us to reimagine what a body, be it human, technological or something in between, actually is, or can possibly become. Hence, the student's response: "our bodies are the interface". Since the interface is representative of the reimagining of different types of bodies in interactive new media installations, its use is significant because

the interface, when utilized as a device that regulates and dictates movements and actions in space as explained earlier, rapidly becomes an issue of power, control and regulation of these types of bodies. Given this, what is at stake in my investigation of the interface is not what a technological device like an interface is or may be, but rather what bodies are and who regulates the shape or form they assume as well as who controls the narratives created about them. The issues around the control and regulation of bodies I briefly discuss above are exactly why the deployment of the interface in interactive new media installations is so important: the interface is important because it raises issues of control and the regulation of bodies. Thus the use of the interface in interactive new media installations highlights how the interface can serve as a potential site of intervention into the control that the interface exerts, as represented by the students' attempts to "break" the action/reaction loop that underlies *Swarm Study / III*.

The Question of Digital Media Art

My thesis explores a specific technology and its use in a particular subset of digital art: the digital interface and interactive new media installations. It examines concepts related to the aesthetics of the interface (chapter 1); the politics of the interface and the body and embodiment (chapter 2); as well as, the issues that notions such as instruction as deployed through the interface and the ubiquity of the digital interface raise around interactive new media art installations (chapter 3 & 4). The underlying argument that my thesis advances is that the interface establishes particular relations between technologies and bodies. In this way, I approach the digital interface in interactive new media art installations not so much in terms of what it is, but what it does, or what it may be. Five conceptualizations of the interface that emerge from recent literature and are prevalent in interactive new media art installations are introduced and discussed throughout my thesis. These five conceptualizations of the interface comprise the typology of interfaces (the aesthetic interface, the agential interface, the embodied interface, the cybernetic interface and the ubiquitous interface) discussed in the introduction. They each address specific characteristics and challenges of the use of the digital interface in interactive new media installations, as discussed above and push my argument further.

However, compiling any kind of academic text on any facet of digital media art, as Christiane Paul (2016) tells us, is both a challenge and an impossibility.[8] The field of digital media art, for example, is vast, the terminology used to describe it, constantly in flux – inevitably, something (an artwork, a scholar, a theory) always gets left out. Given this, it is, as Paul writes: "inconceivable to cover all the histories, expressions and implications of digital art in one volume."[9] The first, and most significant challenge scholars encounter when creating these texts, as Paul rightfully states, is defining the art form (in her case, digital art, in my case, interactive new media installations and the interface) and delineating its territory.[10]

Rising to the challenge, the aim of this section is to delineate the territory of digital media art I am exploring: the role and status of the digital interface in interactive new media installations. In order to do this, I have divided this section into three parts. Each part addresses the challenges briefly discussed by Paul above (delineating the territory and defining the art form). In addition, I explain the criteria behind my selection of the artworks found throughout my thesis. In the first part, I clarify my motivation behind the selection of reviewed artworks. The claims to knowledge I make throughout my thesis – specifically knowledge about interactive new media installations – are partial, located, embodied and situated relative to personal, social and geographic contexts. That is to say, my thesis is not a detached, disembodied or objective way of knowing the digital media art world. Rather, drawing on Donna Haraway's (1988) notion of Situated Knowledge, I argue my selection process was informed, in part, by my curatorial and educational experiences. In the second part, I address the question of broader contextualization, in terms of the digital interface and digital media art history and theory. I do this through a discussion around the positioning of the selected artworks and the particular approach I took to theorizing them. Specifically, I discuss my reasoning behind the non-linear and non-chronological approach taken in this thesis. This non-linear and non-chronological approach was informed, by Joanna Zylinska and Sarah Kember's (2012) arguments around the problems that underlie progressive developmental narratives of media and technology and the notion of finality. In the final part, I explain the relationship between theory and practice, as well as, briefly discuss key literature about the digital interface and interactive new media art installations that was "left-

[8] Christiane Paul. "Introduction" in *A Companion to Digital Art.* First Edition. ed. Christiane Paul. (London, UK: John Wiley & Sons, 2016), p. 1.
[9] Ibid.
[10] Ibid.

out" from my thesis, and the reasons for their omission.

When New Media was New

My thesis spans several decades of critical theory and contemporary art, a period during which interactive new media installations and digital interfaces have evolved massively, as have the terms used to describe them. Originally referred to as computer art, then "cyberarts" (1960s-1990s), art forms incorporating digital technologies became known as "new media art" and more recently "digital media art" in the early 21st Century.[11] The evolution of this term is reflected throughout my thesis. For example, when I submitted my thesis in the fall of 2016 in London, England, UK, the art world was embracing the notion of "digital media art".[12] My thesis, however, was conceived eleven years earlier, in the summer of 2005 in Boston, Massachusetts, USA, a time when digital media art was called "new media art", while new media art itself was considered by many to be "new".[13] I was working three days a week at the Boston Cyberarts Festival (Cyberarts).[14] The rest of my time was spent at Axiom Gallery (Axiom) – a small non-profit art space I was co-directing and co-curating.[15] While working at Cyberarts and Axiom, I noticed that the primary mode of interaction – the digital interface– was starting to "disappear" from interactive new media installations. The installations that these disappearing interfaces were manifesting themselves in were, for the most part, visual and screen-bound.

The digital interface, of course, was not disappearing, in the sense that the physical hardware (the keyboard, the mouse, the joystick) was gone forever. Rather artists were hiding digital

[11] The terms "digital art" and "new media art", are now used interchangeably, however, the term "new media art", as Paul tells us, is problematic. It is problematic because some of the concepts explored like immersion and interactivity are centuries old and have been addressed in various other traditional arts formats and movements. (Paul, 2016) Furthermore, there is the issue of the word "new". "The problematic qualifier of the 'new'" as Paul writes, "always implies its own integration, datedness and obsolescence and, at best, leaves room for accommodating the latest emerging technologies." (Paul, 2016. p. 1)

[12] Digital media art is a term used to describe art that makes use of digital media or technology in its production. Digital media art used to be called "new media art". For more information on the evolution of the terms used to describe this specific type of art, see Paul, (2008, 2016); Rush, (2005).

[13] While not new, new media art was considered to be "new" in the sense that most people had not encountered it in their daily lives at the time.

[14] I worked at the Boston Cyberarts Festival from 2003-2008. I was the assistant to the director of the Festival, George Fifield. The Boston Cyberarts Festival was a biennial arts festival focusing on new media art. It ran from 1999-2011. For more information on the Boston Cyberarts Festival, please visit: http://bostoncyberarts.org/boston-cyberarts-festival/.

[15] I was the co-director and co-curator of Axiom Gallery from 2004-2008. Axiom Gallery is now defunct and its website no longer exists. An article detailing the history of Axiom Gallery can be found at the following websites: http://archive.boston.com/ae/theater_arts/articles/2007/01/05/their_new_station_in_life/; http://bigredandshiny.org/10271/axiomatic-heidi-kayser-phaedra-shanbaum/

interfaces, obscuring them from view, embedding them in walls and ceilings or installing them behind television and projection screens. Since the digital interface was hidden from view, the viewer/participant was required to use her physical body to interact with the artwork. The so-called disappearance of the digital interface from interactive new media installations and its replacement with the viewer/participant's physical body inspired me to examine what I thought, at the time, was a linear shift in gallery-based viewing habits. It was only later I realized how complex, interconnected and misleading the disappearance of the interface in interactive new media art installations actually was.

My experience of working as a curator of digital media art in Boston, combined with a theoretical interest in the use of the digital interface in visual based, screen-bound interactive new media installations informed the selection of the core works found in this thesis. For example, installations created by contemporary artists I collaborated with during this time, like Camille Utterback, Brian Knep, Henry Kaufman, David Small and Scott Snibbe, comprise a third of the works discussed. For historical and cultural reasons, the most famous artists in new media were, and to an extent still are, North American. With very few exceptions, their work is visual and/or screen-bound. It is either located in or projected onto the exterior walls of cultural institutions.[16] Young people working and studying in this area often know these famous names long before they realize that there are other kinds of new media art and artists that deserve attention too. These North Americans, some of whom I have worked with, such as Lynn Hershman Leeson, Luc Courchesne, Natalie Jeremijenko, Ken Feingold, David Rokeby and Rafael Lozano Hemmer, make up another part of the works examined in this thesis. The final third of the works selected were created by the 'other kinds of new media artists': Carmin Karasic, Kelly Heaton and Feng Mengbo. These artists have made enormous contributions to new media art, and to my personal growth as a new media arts scholar, but for reasons like race, gender and geographic location are left out of the larger new media arts story.

Given this, the examples discussed throughout my thesis – which, with few exceptions, are visual, gallery-based, screen-bound and created by North American artists – form a corpus of interactive new media artworks based on my situated knowledge. Coined by Donna Haraway

[16] Exceptions to this statement exist. For example, two of the works discussed in this thesis, are not located in galleries. Natalie Jeremijenko's *Live Wire* (1995) was installed in an office setting and Brian Knep's *Deep Wounds* (2008) was installed in the foyer of an academic building.

(1988) in an article of the same name, situated knowledge, in very simple terms, refers to knowledge specific to a particular situation.[17] Situated knowledge does not simply mean subjective, as in arbitrary or uninformed. Rather, it is a way of learning and seeing the world that emphasizes the importance of the subject (the author, the artist, the scientist) in terms of ethical and political accountability.[18] Situated knowledge, according to Haraway, is a methodological approach to understanding the world that accounts for both the agency of the knowledge producer and the agency of the object of study. Thus it offers "a more adequate, richer and better account of the world in order to live in it well and in critical, reflexive relation to our own [selves] as well as others".[19] Hararway continues, writing that situated knowledge is positioned against notions of objectivity – specifically "Western cultural narratives about objectivity".[20] Haraway is against these narratives because they are, in her words: "allegories of the ideologies governing the relations of…mind and body, distance and responsibility".[21] Situated knowledge then, is not about transcendence and the splitting of the subject and the object, as these approaches to knowledge are, to use Haraway's words, "truth claims".[22] Rather situated knowledge is an approach to knowledge that requires us to become ethically and politically accountable for what we learn and how we see the world. In short, situated knowledge is important to my thesis as it allows me to become accountable for how I construct knowledge. It also allows me to give an account of historical contingency for the claims I make throughout my thesis. It also lets me capture and convey, in writing, the vitality of individual interactive new media installations at the time I encountered them. It also opens a space for meditation on my curatorial practice, whereby an act of making decisions between what was included and what was not is foregrounded in my choice of examples, as well as pairings of artworks for aesthetic reasons.

A Non-linear Approach

Haraway's notion of situated knowledge discussed above, also informed, to an extent, the approach taken to the positioning of these artworks – an approach which is non-linear and non-chronological. Chronological and linear timelines of art movements, like digital media

[17] Donna Haraway. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies.* 14 (3). Autumn, 1988. pp. 575-599.
[18] Ibid.
[19] Ibid. p. 583.
[20] Ibid.
[21] Ibid.
[22] Ibid.

art, can be helpful in that they dispel, to an extent, notions of newness. They dispel these notions by historicizing artworks and concepts that, as Oliver Grau (2007) states, are "frequently encountered [by the viewer/participant] for the first time" and presented to them as utopian or visionary models of the world.[23] Chronological and linear accounts of media and technology, of course, have their problems. The first problem is they limit, as Sarah Kember and Joanna Zylinska (2012) write, "the understanding of complex and multifaceted phenomena and processes by imposing clear-cut distinctions and categories all too early."[24] The second, they state, is that they suggest finality, thus inscribing, to an extent, technologically based mediums like interactive new media installations, into linear developmental narratives of media and technology.[25] Recognizing the limitations around linear and chronological timelines presented above, I chose to take a non-linear and non-chronological approach to my topic. My primary reason for employing such an approach is similar to Kember and Zylinska's: it allows me to raise questions about more traditional perceptions of technology, like interfaces, as a series of isolated, spatialized objects (a mouse, a keyboard). It also allows me to raise questions around traditional perceptions of digital media art as a medium – that is a linear outgrowth or by-product of technologically based art forms like photography and cinema only.[26]

Digital media art is a hybrid medium. It has, as Paul tells us, an extraordinarily complex, cross-disciplinary and multifaceted history – one that interweaves several strands of artistic practice and artistic movements with different industrial and computer-based technologies and technological innovations.[27] One of these histories, she writes, "can be traced from early instruction-based conceptual art to 'algorithmic' art and art forms that set up open technological systems. Another lineage links concepts of light and moving image from early kinetic and op art to new cinematic forms."[28] Another path, I would argue, connects notions of audience participation found in avant-garde movements such as Fluxus and early feminist performance and body art to more interactive art forms, like interactive new media

[23] Oliver Grau. "Introduction" in *Media Art Histories.* ed. Oliver Grau (Cambridge, MA: MIT Press, 2007), p. 9.
[24] Sarah Kember and Joanna Zylinska. *Life After New Media: Mediation as a Vital Process.* (Cambridge, MA: MIT Press, 2012), pp. 2-3.
[25] Ibid. Kember and Zylinska's argument about finality is discussed in full in chapter 4.
[26] Ibid.
[27] Christiane Paul. "Introduction" in *A Companion to Digital Art.* First Edition. ed. Christiane Paul. (London, UK: John Wiley & Sons, 2016), p. 5.
[28] Ibid.

installations, that require the viewer to make a contribution of some sort to the completion of the art work.

These lineages, of course, are not distinct strands and the artworks that compose the corpus of digital media art were not created in isolation. Rather, they run parallel to each other and are non-sequential.[29] Thus, the history of digital media art should be seen, as Paul suggests, as interconnected narratives and processes that feedback on each other and intersect at certain points.[30] For, by and large, digital media art works are experimental, and contain non-linear and open-ended narratives, forms, modes of interaction, interfaces and sometimes creators – or works in which these elements are put into different and critical relationships. The artists creating these installations achieve this by creatively pushing forward both the technical and formal aspects of the medium through a juxtaposition of aesthetics, computation and bodies (both human and technological), and creatively exploring the relationship between the three. The interconnectivity and non-linearity of digital media art, is reflected in the positioning of the artworks in my thesis.

For example, the artworks created by artists encountered in my thesis, which, span several decades, are often grouped together. Under-theorized artworks and artists are often given priority or over well-known artists and artworks. I discuss multiple artworks by the same artist throughout my thesis as well. Given this, it could be argued that there is a seeming lack of discernment of historical, cultural and technical differences between the artworks chosen, forming a questionably arbitrary grouping. While these groupings and my selection criteria may perhaps seem confusing or skewed to some, as they do not provide a linear or chronological historical evolution of the interface or digital media art, they are actually intentional, in that they are a direct reflection of personal conversations with artists, fellow curators and media theorists. In other words, my practical experience as a curator, allows me to make connections between diverse groupings of artworks that are theoretical in basis.

For instance, Lynn Hershman Leeson's *Lorna* (1983) and Brian Knep's *Deep Wounds* (2006) were created in different decades and utilize different technologies, but they are analyzed using the same theory (Sean Cubitt's (2015) notion of digital aesthetics). They are positioned

[29] Christiane Paul. "Introduction" in *A Companion to Digital Art.* First Edition. ed. Christiane Paul. (London, UK: John Wiley & Sons, 2016), p. 5.
[30] Ibid.

as such because, I encountered both of these works as well as Cubitt's theory of digital aesthetics, at the same time in the same place (2006, Cambridge, MA, USA). In 2006, I was de-installing *Deep Wounds* at Harvard University. At the same time, I was introduced to Hershman Leeson's artwork by Bill Arning, (then curator of the MIT List Museum), who commented on the similarity between *Deep Wounds* and *Lorna* – specifically their treatment of time. The conversation ended with Arning referencing Cubitt's 1998 text, *Digital Aesthetics.*

As mentioned above, situated knowledge is an approach to knowledge that requires us to become ethically and politically accountable for what we learn and how we see the world. This ethical and political accountability towards the construction of knowledge, is evidenced my selection process through my decision to include interactive new media installations, like *Hu^mann* (2008). *Hu^mann* is an obscure installation with a short exhibition history created by a seemingly unknown artist – Carmin Karasic. It is screen-bound, visual and viewer/participant interactivity is limited. Yet this work is theorized via Amelia Jones's notion of the body and performativity and is positioned alongside seminal works by very well-known artists such as Victoria Vesna and Rafael Lozano Hemmer. *Hu^mann* is one of Karasic's first interactive new media installations. Karasic, however, has been an active digital media artist since 1995. Karasic is a net.art artist (her hypertext artwork *With Liberty and Justice For All*, was created in 1998).[31] She is also a founding member of the hacktivism/performance art collective, Electronic Disturbance Theater (she was their lead programmer and the creator of their software *Floodnet*).[32] Despite this, Karasic's name is conspicuously absent from the new media art cannon, her contributions to the field of digital media art, often wrongly attributed to her male collaborators. This absence is due, in part to issues around race, gender and age (Karasic is a woman, African American and was originally trained as a computer scientist, becoming an artist later in her life). So, while

[31] Carmin Karasic. *With Liberty and Justice For All.* (1998). Found online at: http://www.carminka.net/wlajfa/pledge1.htm. The term net.art refers to a group of artists who worked in the medium of Internet art since 1994. The term is also used as a synonym for net art or Internet art, thus covering a broader range of artist practices. In this broader definition, net.art refers to art that uses the Internet as its medium. For a detailed history of net.art and internet art, see Rachel Greene's 2000 article "A History of Internet Art."

[32] Electronic Disturbance Theater. *FloodNet.* (1997-1998). Found online at: https://www.thing.net/~rdom/ecd/floodnet.html. Electronic Disturbance Theater is a collective of cyber activists, critical theorists and performance artists. Their ultimate aim is to engage in the development of theory and practice of non-violent acts of defiance across and between digital and non-digital borders. Founding members include Ricardo Dominguez, Brett Stalbaum, Stefan Wray and Carmin Karasic.

many readers may not recognize Karasic's name immediately, her contributions to the field of digital media art – which are equal to and in some sense eclipse the contributions of the other artists she is positioned alongside – cannot be understated. In short, including Karasic's work in my thesis may seem arbitrary, but it is an example of my ethical and political accountability towards the construction of knowledge, in that it draws attention to under-represented artists.

What Remains

My familiarity with the core-selected artworks directly informed the relationship between the theory and practice discussed throughout my thesis. In other words, the relationship between theory and practice is dialogical. It is dialogical in the sense that the artwork and theory speak back to, and with, each other in order to build the overarching arguments, as demonstrated in the rationale given for analyzing *Hu^mann* via Amelia Jones's theory of the body and performativity briefly noted above. This dialogue could also be considered a form of situated knowledge, in the sense that it was influenced, in part, by my educational background and the associated epistemological leanings of the institutions I attended.

For example, in 2008, I left Boston to pursue a Master's Degree in Performance, Screen and Visual Studies at University of Manchester. Influenced by my MA advisor, Amelia Jones, my position was that interactive new media installations do not simply negate mainstream contemporary art and technological narratives. Rather my view was that interactive new media installations intervene in mainstream contemporary art and technological narratives through aesthetics. For instance, interactive new media installations emphasize the body via their focus on concepts such as viewer/participant interaction, indetermination and embodiment. Therefore, in my MA I argued that interactive new media art installations should also be analyzed in the context of more embodied or body-based arts practices like performance and body art, rather than simply theorized as an outgrowth of the technological-based visual arts (cinema, photography). In the fall of 2010, I began my PhD. I made a conscious choice to work with Joanna Zylinska, in the Media and Communications department at Goldsmiths, University of London.

In very simple terms, media studies, is a discipline that studies the history and effects of various media and technologies. Generally speaking, scholarship in media studies fits, as Kember and Zylinska (2012) write, into two methodological frameworks: Social science and

communication-based disciplines and the Humanities.[33] The social sciences and communication-based disciplines, they argue "typically approach the media through a mixture of empirical research and social theory, with questions of political structures, economic influences, social effects and individual agencies dominating the debate."[34] Whereas, those from the humanities, they continue, "predominantly focus on what different media 'mean'; that is, they tend to look at media as texts and at their cultural contexts."[35] It was the second focus – the focus on what different media "mean" – that attracted me to the media studies field. This focus attracted me, as it resonated with my research question: "What is a digital interface in interactive new media installations? What does it signify and what is it significant of?" So while I touch upon performance and body art theories, and I am familiar with scholarship in this field, writings by contemporary live performance and body art scholars on interactive art, beyond those of Peggy Phelan and Amelia Jones, are absent from this thesis. Put simply, I have drawn on many important sources from the art history field in my thesis, and I have tried to account for them in the main chapters. However, there are many regrettable omissions.[36] These omissions are related to issues around, scope, space and domain specificity. These issues have limited the artworks, artists and theories discussed in my thesis.

A similar statement could be made around the inclusion of knowledge generated in the Human Computer Interaction (HCI) and design community around the use of interfaces, interactive art and ubiquity. While not nearly as fluent in scholarship in the HCI and design domain as I am in other fields, I am, to an extent, familiar with core literature published in this area, as seen via references to works by scholars such as Louise Barkhuus, Alan Blackwell, Matthew Chalmers, Paul Dourish, Jennifer Rode and Yvonne Rogers.[37] There are similarities and overlaps between my reading of the digital interface and theirs. This similarity in reading occurs in relation to critiques of Paul Dourish's (2001) notion of embodied interaction and Mark Weiser's (1991) notion of the invisibility of technology, as offered by scholars in the HCI field such as Louise Barkhuus and Matthew Chalmers.

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[33] Sarah Kember and Joanna Zylinska. *Life After New Media: Mediation as a Vital Process.* (Cambridge, MA: MIT Press, 2012), pp xiv-xv.
[34] Ibid.
[35] Ibid., p. xv.
[36] These omissions include scholarship by authors such as Gabriella Giannachi, Chris Salter, Freda Chapple, Adrian MacKenzie and Marquard Smith, among others.
[37] I am deeply indebted to my colleagues Louise Barkhuus and Jennifer Rode, who took time out of their busy schedules and patiently explained the complexities of their field (HCI) to me.

Barkhuus (2006), Chalmers (2004, 2006) and I all argue that the notion of invisibility, as currently theorized in the field of ubiquitous computing, is problematic.[38] For example, throughout my thesis, I argue against notions of invisibility, suggesting that the disappearance of the interface in interactive new media installations, and the word invisibility itself is troublesome as it conflates invisibility with imperceptibility, agency with subjectivity, subjects with objects, and entities (subjects, plural) with individuals (the subject, singular). This term also, I posit, creates separations between the interface (technology) and the ongoing and open-ended processes, entities and relations it brings into being. Chalmers and Galani (2004), in turn, argue that Weiser's notion of disappearance is unachievable or incomplete as it underemphasizes the "interdependence of 'invisible' non-rationalizing interaction and focused rationalizing interaction with ongoing activity."[39] Our critiques differ in the sense that my thesis examines the use of the digital interface in interactive new media installations (the aesthetic realm), whereas they discuss the social implications of seamlessness and invisibility in the socio-technical realm. Thus their focus is on the technical aspects of technology, specifically the constitutive relationship between technology and society, whereas I focus on the aesthetic and cultural aspects of technology.[40] In short I touch upon scholarship in HCI, however core theoretical texts generated in this field are absent from this thesis. While there are overlaps the reasons for these omissions, in short, are related to issues around focus and domain specificity: I focus on the aesthetic and cultural aspects of the digital interface in media studies, whereas scholars who borrow theory from the STS fields, like those working in HCI, focus on the bidirectional relationship between society and technology.[41]

In conclusion, my thesis is not meant to be a chronological art historical survey or a linear report on the history of technology. Nor is meant to be a scholarly examination of the potential technical dimensions of the use of digital interfaces in interactive art. To do any of this would merely reinforce progressive developmental narratives of media, technology, and

[38] Matthew Chalmers, Bell, M., Barkhuus, L., Hall, M., Sherwood, S., Brown, B., Rowland, D., Benford, S. and Hampshire, A., "Interweaving Mobile Games with Everyday life." In Proceedings of *CHI 2006*, pp. 417-426, Montreal, Canada.
[39] Matthew Chalmers and Galani, A. "Seamful Interweaving: heterogeneity in the theory and design of interactive systems." In, *Symposium on Designing Interactive Systems.* 1-4 August, 2004. p. 243.
[40] There are, a few HCI scholars who focus on culture. The most prominent being Jennifer A. Rode, whose focus is on notions of gender, culture and technology. For more information, see Rode, 2010.
[41] Wiebe E. Bijker. "The Social Construction of Fluorescent Lighting." In *The Social Construction of Technological Systems*. ed. W. E. Bijker, Thomas P. Hughes and Trevor Pinch. (Cambridge, MA: MIT Press, 1989).

art. These narratives are, as mentioned earlier, problematic, because they imply that artwork, technology and knowledge all evolve in a straight line, as I argue, via the work of Kember and Zylinska (2010), above and in chapter 4.[42] Rather, my thesis should be seen as a critical exploration of the digital interface and its use in interactive new media installations from a media studies perspective – one that forms and is informed through situated knowledge.

The Digital Interface and its use in Interactive New Media Installations

The aim of my thesis is to offer a critical understanding of the digital interface and its use in interactive new media installations. I examine the interface from two angles: I look at how it is used in interactive new media art installations with its experimental, contemporary and "post-internet" extensions, and also how this use is perceived and analyzed in the theories that surround it.[43] I see the interface in interactive new media installations as a form that has its own internal technical developments and most importantly, aesthetics.

Placing emphasis on aesthetics rather than technical functions in a thesis about interfaces, which for many are first and foremost technical devices, may need some further justification. Yet interfaces most definitely have an aesthetic. Many scholarly books emphasize this point, from Lev Manovich's *The Language of New Media* (2001) and its predecessors, to the widely used engineering-based course textbooks, such as *Interaction Design* (2007) by Yvonne Rodgers and colleagues.[44] So the claims I make throughout this thesis – that interfaces are important and that their aesthetic characteristics matter – are not new per se. Rather, my view is simply that one way to understand the potential that the interface holds is to position it more firmly in the context of new media art, specifically in interactive new media installations. The originality of my position lies in my claim that the interface, its processes *and* relationships emerge out of, shape and are shaped by, our interactions with it in interactive new media installations. Thus, I suggest, the interface holds the potential to (re)configure concepts of subjectivity, agency, the body, embodiment and aesthetics in these environments. Given this, I argue that the digital interface in interactive new media

[42] Sarah Kember and Joanna Zylinska. *Life After New Media: Mediation as a Vital Process.* (Cambridge, MA: MIT Press, 2012), pp. 2-3.

[43] Coined by artist Marisa Olson in a 2008 interview with the online blog "We make money not art", post-internet art or "art after the internet" is a term used to describe art that is about the internet's effects on aesthetics, culture and society. It refers to, in Olson's words: "a mode of artistic activity drawing on raw materials and ideas found or developed online." (Olson, 2008)

[44] Lev Manovich. *The Language of New Media.* (Cambridge, MA: MIT Press, 2000), Yvonne Rodgers, Helen Sharp and Jenny Preece. *Interaction Design: Beyond Human-Computer Interaction.* 3rd Edition. (Hoboken, NJ: Wiley, 2011).

installations can be seen as a key site for the development of different understandings of our relationship to technology. In suggesting this, my aim is both to locate the interface and to try to critically engage with it from outside of what could be considered its regular, or perhaps even instrumental, use (mobile devices, video games, interactive web-based advertisements, keyboards and mice). For, by and large, interactive new media installations are experimental artworks with non-linear and open-ended narratives, forms, modes of interaction, interfaces and sometimes creators – or works in which these elements are put into different and critical relationships. The artists creating these installations achieve this by creatively pushing forward both the technical and formal aspects of the medium through a juxtaposition of aesthetics, computation and bodies (both human and technological), and creatively exploring the relationship between the three.

In this thesis, I position the digital interface in interactive new media installations as dynamic and hybrid, while also highlighting the artistic and creative processes that bring it into being. This way of positioning the interface allows me to shift focus away from the instrumental uses of the interface (its ability to "act" and "react") and from claims made by the technology industry that surround it ("you are the controller", "interaction makes you creative"). It also leads me to begin to develop a different, less deterministic understanding of the digital interface.[45]

The interface, however, is intimately entangled with mainstream commercial technologies (the iPhone, the Kinect, the Oculus Rift) and, therefore, with the narratives perpetuated by the technology industry briefly outlined above. Yet, when used in interactive new media installations, the interface becomes a distinct form of aesthetic practice, with its own autonomy in relation to those commercial practices mentioned earlier. For example, during the first half of new media art's short history, the borders between art, experimentation and industry were particularly leaky. The majority of artists discussed throughout this thesis have computer science or engineering backgrounds. Some, like Carmin Karasic and Brian Knep, come from the media and technology sector (Polaroid, Lotus, Lucas Film).[46] Others such as Camille Utterback, Scott Snibbe and David Small began their careers as artists and their work has slowly become more commercialized. A select few, like Jeffrey Shaw, Alan Dunning,

[45] In this thesis, the phrase technology industry refers to technology companies like Microsoft, Apple, IBM. The claims mentioned above are made by Microsoft in relation to their gaming device the Kinect. These claims will be discussed, in full, in chapter 4.

[46] For information on Knep and Karasic, please visit: http://www.blep.com/about/ (Knep) and http://www.carminka.net/ckbio/ck_2page-resume2015-art.pdf (Karasic).

Paul Woodrow and Lynn Hershman Leeson, have seen the interfaces they developed for their installations co-opted by corporations, re-tooled and then sold at a profit.[47]

Therefore, the diverse interfaces created for the artworks that I examine throughout this thesis, which are co-extensive with their development and use in the commercial sector although they are deployed for different purposes, make up a tradition and are surrounded by theories of a complex and often-contradictory kind. Thus, a further notion pushed forward in this thesis is that the interface in interactive new media installations – an art form and a device located outside of, but always linked in some way to, commercial devices – has the potential to serve as a site of critical intervention into the contradictory and complex theories of new media, aesthetics and technology.[48] In this way, the use of the interface in interactive new media art installations is important as it acts a mode of critique of our relationship to and our use of technology outside the art contexts.

[47] This notion of interfaces developed for new media installations being co-opted by for-profit corporations will be discussed, in full, in chapter 4.

[48] Again, this claim is not new. Artists such as Simon Penny (2013) and Michael Naimark (1998, 2006, 2016), among others, have remarked on the re-appropriation of technology developed in the arts field by large corporations. For a good overview of this topic, please see Simon Penny's (2013) article: "Trying to Be Calm: Ubiquity, Cognitivism, and Embodiment".

Introduction: *Art at the Interface*

This thesis is concerned with the digital interface and its multiple uses in interactive new media art installations. The term "digital interface" has broadly been understood as referring to the point of interaction between two or more parts of a technical system.[49] A digital interface can thus be many different things: a doorknob, a socket, a keyboard, a screen or an operating system. However, throughout this thesis I propose a more expansive definition of the digital interface in interactive new media installations, positioning it as a dynamic, hybrid, aesthetic and cultural process. The interface then is a threshold, a mediator and a boundary, but in a more complex sense than something that simply allows a viewer/participant access to a distinct space, a technology that controls an entity's behavior or a device that shows us glimpses of something (an image, a snippet of code, an artistic practice). With this, I draw on Lori Emerson's (2014) definition of the interface as a technology that mediates relationships between entities and the aesthetic objects they produce, as well as the technical machine-based processes that take place below the surface.[50] I take Emerson's definition further by suggesting that the interface mediates, and therefore creates, to an extent, relationships between viewer/participants, artists and artworks as well as influences the movements and perceptions of those interacting with it.

In this way, my thesis does not just propose a more expansive definition of the digital interface in interactive new media installations, it also entails a critical questioning of the relationship between art, technology and viewer/participants. Specifically, I look at how this relationship establishes systems of interaction, forms of spectatorship, modes of thinking and conditions of contemporary new media artistic practice. I argue that in the past decade a significant transformation has occurred at the boundary of media studies and art history, regarding the way the digital interface has been understood in academic literature. I suggest that this shift in understanding allows what was previously thought of as a viewing subject to embody technology and become a viewer/participant. From here, I propose that this shift in perception and positioning of the subject results in the so-called "disappearance" of the object-based digital interface and the emergence of the physical human body as the locus of interaction in interactive new media art installations.

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[49] Seung-hoon Jeong. *Cinematic Interfaces: Film Theory After New Media.* (New York, NY; Routledge, 2013), p. 4.
[50] Lori Emerson. *Reading Writing Interfaces: From the Digital to the Bookbound.* (Minneapolis, MN: University of Minnesota Press, 2014), p. x.

The disappearance of the object-based digital interface and its emergence as human body in interactive new media installations is an important aspect of the interface to interrogate because, when interfaces are positioned as shape-shifting – when they disappear and then suddenly re-emerge as human bodies – they become a matter of control and regulation. Specifically, they become a matter of power and control over bodies as well as a matter of regulation of communication, interaction, knowledge and movement in time and space in both interactive new media installations and in everyday life.[51] By investigating how interfaces exert control over bodies, as well as regulate communication, interaction, knowledge and movement, I also examine what artistic experimentation with interfaces might reveal about the changing relationship between humans and technology.[52] As such, my aim in this thesis is twofold: to look at the interface in interactive new media installations as actual art objects, but also to build on this positioning to analyze how contemporary subjects are shaped and defined, to an extent, by their interactions with interfaces, both within art contexts and outside them.

The Disappearing Interface

It is important to clarify what could potentially be seen as a problematic use of the word "disappearance" in relation to digital interfaces. When I say the digital interface has disappeared, I am not arguing that it is physically gone. The interface in interactive new media installations exists regardless of whether or not it is perceptible to those interacting with it. Instead, I use the term "disappearance" as a way of signalling what I see as an unresolved difficulty in key texts in computer science, art history and media studies on the interface that conflate, among other things, invisibility with imperceptibility, agency with subjectivity, subjects with objects and entities (subjects, plural) with individuals (the subject, singular). This conflation, I suggest, is troubling, because it leads scholars to separate the

[51] The entity or entities that hold this power and control over bodies and regulates communication, interaction, knowledge and movement varies. It can be a corporation specializing in technology, such as Microsoft, who exerts control over the body of the subject by dictating her actions via commercial gaming devices like the Kinect, and controls who she can or cannot interact and communicate with via the regulation of knowledge on online forums as discussed in chapter 4. This entity can also be a singular human, like an artist, who determines what a viewer/participant can or cannot do, say or see when interacting in their interactive new media installation as illustrated in chapters 1-4.

[52] Issues around the body as the site of power and control and the changes to the relationship between humans and technology this particular configuration may create, are the focus of chapter 2. These issues are also discussed in chapters 3 and 4 through a discussion of instruction (chapter 3) and ubiquity (chapter 4).

interface (technology) from the ongoing and open-ended processes, entities and relations it brings into being.[53]

The Interface

The term "interface", Seung-hoon Jeong (2013) writes, became popular in the field of computer science in the 1960s, referring as it did to the "interface between machine components (hardware or software) and/or the point between these technical machines and human users".[54] What started out as a word that was used to describe a purely technical device studied by a closed circle of engineers and scientists, located in universities and laboratories, Jeong informs us, has now become a buzzword that has been applied to a variety of different entities, processes and relations.[55] Interfaces, for example, can be anything from tangible objects (television screens, mobile phones), human body parts (the finger you use to tap an icon on a tablet), modes of interaction (you "interface" with colleagues), means of connection (computers can "interface" with other machines) and graphic designs (apps, icons). "Interface" can also denote methods of exchange (the "opening-up" of an application, allowing a piece of software to initiate routines and share information within that application).

Florian Cramer and Matthew Fuller (2008) provide a more detailed classification, identifying five different types of interfaces: (1) Hardware that connects users to hardware; (2) Hardware that connects hardware to hardware; (3) Software or hardware-embedded logic, that connects hardware to software; (4) Software that connects software to software (APIs); and (5) Symbolic and linguistic handles, which make software accessible to users via text, sounds, visual representations, or the reappropriation of familiar physical objects – otherwise known as "the user interface" (UI).[56] Cramer and Fuller's typology of the interface will be discussed below, along with a more in-depth theorization of the interface. For now, it is important to note that it is the last definition, the symbolic and linguistic handles which make software accessible to users, or the UI, that is the focus of this thesis – simply because it is the most commonly deployed one in interactive new media installations.

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[53] Other theorists and scientists who posit this include, but are not limited to, Pranav Mistry (2009) and Patty Maes, who, echoing theorists such as Mark Weiser (1991), argue that the digital interface as human body "frees information from its confines by seamlessly integrating it with reality thus making the entire world your computer." (Minstry, 2009)

[54] Seung-hoon Jeong. *Cinematic Interfaces: Film Theory After New Media.* (NY, NY; Routledge, 2013), p. 4.

[55] Ibid.

[56] Florian Cramer and Matthew Fuller. "Interface" in Software *Studies: A Lexicon.* ed. Matthew Fuller. (Cambridge, MA; MIT Press, 2008), p. 149.

Since opening up to a more general population, theoretical research on the interface has also seen a surge in volume. The result of this surge is that we now have access to a great deal of information about the interface in various contexts – for instance, about what it is and what it does in computer science, in science and technology studies (STS) and, to an extent, in the humanities (Ishi et al., 1997; Blackwell, 2006; Cramer and Fuller, 2008). However, much less is known about the digital interface in interactive new media installations. Hence the following questions: What exactly is a digital interface in interactive new media installations? And what does it actually do in these artworks? Although earlier writings on this subject exist (Dinkla, 1994; Penny et al., 2001), and although new texts appear in this area yearly (Mondloch, 2010; Andersen and Pold, 2011; Galloway, 2012; Jeong, 2013; Emerson, 2014), as it stands, I argue that we simply do not know enough about the interface in interactive new media installations.

The Interface in Interactive New Media Installations

Yet what is an interactive new media installation? And why is an understanding of the digital interface in interactive new media installations important to the field of media studies? Nathaniel Stern raises a series of similar questions in his book *Interactive Art and Embodiment* (2013). Is interactive art a genre, he asks? Is it a movement? A medium?[57] Does the fact that these works are interactive and employ interfaces somehow make them more democratic, and subjects' interactions with them more individualistic? Does a switch need to be thrown or a button pushed for the artwork to become interactive, or for the subject to interact with it? Are they institutionally based, screen-bound and purely visual? Or can they exist outside the gallery walls and engage all of our senses? The answers to these questions, as Stern rightfully concludes, are contextual.[58] They are contextual because they provide descriptions of individual artworks, rather than concrete definitions of a medium or genre. Given this, the phrase "interactive new media art installation" does not fulfil a unified set of technical or aesthetic criteria. Instead, the phrase could be seen as a blanket term that covers a broad range of complex and diverse gallery-based installations that incorporate digital technology and that require the subject to act, and the piece to respond, in various ways to this activity.

[57] Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* (Canterbury, UK: Gyliphi Limited, 2013), p. 5.
[58] Ibid.

For instance, some interactive new media installations, such as Char Davies's *Osmoses* (1998), are site-specific, fully immersive, virtual-reality environments that require subjects to don head-mounted displays (HMDs) and data gloves to view and interact with them.[59] (Figure 3)

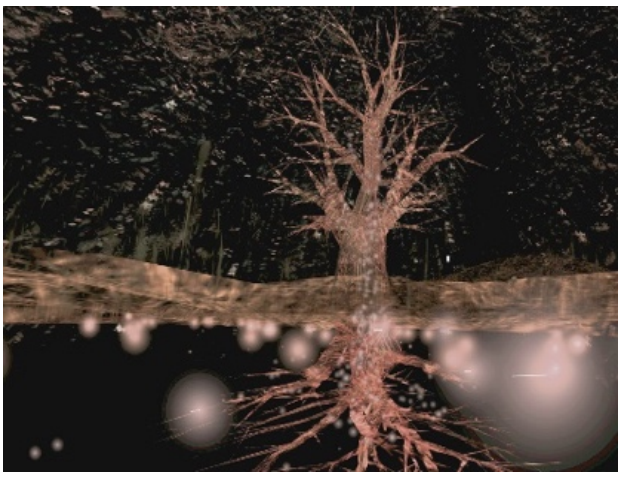

Figure 3: C. Davies, *Osmoses* (1998).

Others, like Feng Mengbo's *Q4U* (2002), are large-scale, augmented reality-based installations that ask subjects to interact with the work through an object-based digital interface.[60] (Figure 4)

Figure 4: F. Mengbo, *Q4U* (2002).

[59] Char Davies. *Osmoses*. (1995). Found online at: http://www.immersence.com/osmose/
[60] Feng Mengbo. *Q4U*. (2002). Found online at: http://www.renaissancesociety.org/exhibitions/428/feng-mengbo-q4u/. The object based digital interface is a remote control.

And some, like Janet Cardiff's *Experiment in F# Minor* (2013), are mixed media installations that incorporate subjects into the installation through the deployment of technology like close-circuit cameras, light sensors and custom-designed algorithms.[61] (Figure 5)

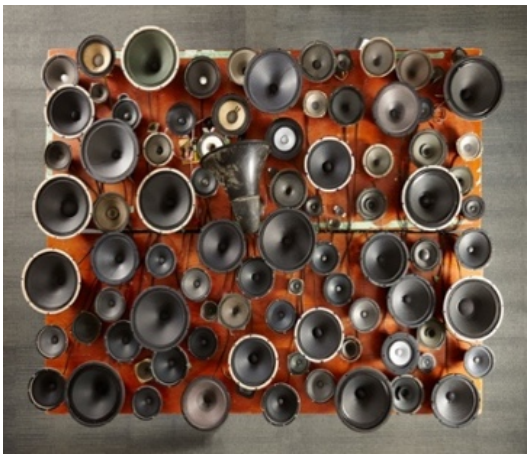

Figure 5: J. Cardiff, *Experiment in F# Minor* (2013).

While definitions and categories can be, as Christiane Paul (2008) explains, "helpful in identifying certain distinguishing characteristics of a medium", they can also be detrimental in that they create limits for approaching and understanding a very diverse and complex art form.[62] In light of all this, I would like to propose the following preliminary definition of interactive new media installations: interactive new media installations are technologically-based artworks that require subjects to make a physical contribution to the completion of the artwork via interaction with a digital interface of some kind. While the interfaces located in these works can be defined as points of juncture or modes of communication between different entities, they encompass much, much, more.

For example, digital interfaces are also symbolic in that they deploy visual and linguistic metaphors (file-folders as icons, the word "desktop" to describe the objects located on computer screens) that, as Cramer and Fuller argue, are used to "hide, and condition the asymmetry between the elements conjoined" as well as describe the "condensations of computational power that computers embody".[63] Thus, they posit "the term interface

[61] Janet Cardiff, *Experiment in F# Minor*. (2013). Found online at: http://www.cardiffmiller.com/artworks/inst/experiment_in_f.html
[62] Christiane Paul. *Digital Art.* (New York, NY; Thames & Hudson, 2003), p. 71.
[63] Florian Cramer and Matthew Fuller. "Interface" in *Software Studies: A Lexicon.* ed. Matthew Fuller. (Cambridge, MA; MIT Press, 2008), p. 150.

emphasizes the representation or the rearticulation of a process occurring at another scalar layer."[64] Interfaces, for Cramer and Fuller, are not just tools for facilitating connections; they are also processes that "articulate, filter, and organize the activities modelled and modulated by the interface."[65]

My own investigation into the interface in interactive new media installations builds on, and then augments, the research briefly summarized above. It starts out, the way Cramer and Fuller's work does, from an observation and recognition of the fact that the interface plays an increasingly important role in mediating and translating, and thus, to an extent, governing, the subject's activities in interactive new media installations. Following from this, the main objective of my dissertation is to develop an understanding of how the interface can be seen as an important actor in positioning and (re)shaping specific ways of relating to the subject, to technology, to artistic practice and to others. In simpler terms, I am not so much concerned with providing a *technical* description of what the digital interface does or *can* do (although this issue is important and will be discussed). Rather, I am primarily interested in examining what a digital interface *may be*, and in exploring potential ways of thinking and doing that it could possibly bring about when theorized in non-instrumental ways, from within aesthetic contexts.

My intent in doing this is to contribute to a widening of the disciplinary focus of media studies by exploring the use of technology (such as digital interfaces) in aesthetic contexts (i.e. interactive new media installations.) Specifically, my thesis argues that the digital interface in interactive new media installations can be seen as a key site for the development of different understandings of our human relationship to technology. Given this, the main aims of this dissertation when it comes to its expected contribution to the field of media studies are: (1) to offer an understanding of the interface in aesthetic contexts; (2) to show how the interface – its processes *and* relationships – can be analyzed as potentially (re)shaping concepts of subjectivity, agency, the body, embodiment, ubiquity and aesthetics, relying on a critical reading of recent theories of the digital interface in the humanities and media studies; and (3) to advance an account of the digital interface – one that positions it as a dynamic aesthetic and cultural process that emerges out of, shapes and is shaped by, our

[64] Florian Cramer and Matthew Fuller. "Interface" in *Software Studies: A Lexicon.* ed. Matthew Fuller. (Cambridge, MA; MIT Press, 2008), p. 150.
[65] Ibid., p. 151.

interactions with it in interactive new media installations.

My exploration of the digital interface is based on the assumption that the interface is an important concept and device in new media art. A proposition which, I argue, should form a significant part of any analysis of artworks that incorporate interfaces, interactive or otherwise. This assumption is based on Kate Mondloch's (2010) statement: "the interface 'matters' for media installation art".[66] Mondloch's statement resonates with some of the questions I have been contemplating around the importance of the interface in interactive new media installations: What types of relationships exist between artists, interfaces and the subjects interacting with them? Why do these relationships matter? Why does the interface matter in interactive new media installations? The overall aim of my dissertation is thus twofold: to introduce a different approach to the study of the interface by examining its use in aesthetic contexts, and to interrogate why the aesthetic processes that bring it into being actually matter in interactive new media installations. Throughout my study I have identified five distinguishable yet interrelated theoretical iterations of digital interfaces commonly deployed in interactive new media installations: the aesthetic interface, the agential interface, the embodied interface, the cybernetic interface and the ubiquitous interface. These five types of interfaces, theorized below, directly relate to the five key concepts (aesthetics, agency, embodiment, cybernetics and ubiquity) that inform my thesis.

The Aesthetic Interface

Aesthetics in this thesis is very broadly defined as a philosophical mode of engagement with, and experience of, art. I draw on Sean Cubitt's (1998, 2005, 2016) understandings of digital aesthetics to theorize this concept.[67] These understandings will be discussed in more detail in the first chapter of this thesis, but to summarize: the term "aesthetic", according to Cubitt (2016), finds its roots in ancient Greek, originally referring to "sensation".[68] Its meaning, he states, was broadened over time and has become attached to "the physical or phenomenal

[66] Kate Mondloch. *Screens: Viewing Media Installation Art.* (Minneapolis, MN: University of Minnesota Press, 2010), p. 4.
[67] Sean Cubitt. *Digital Aesthetics.* (London, UK: Sage, 1998); Sean Cubitt. *EcoMedia.* (Amsterdam, NL: Rodopi, 2005); Sean Cubitt. "Aesthetics of the Digital" in *A Companion to Digital Art,* First Edition. ed. Christiane Paul. (London, UK: John Wiley & Sons, 2016). I draw on the notion of digital aesthetics instead of other theorizations of aesthetics because interactive new media art installations are digital artworks.
[68] Sean Cubitt. "Aesthetics of the Digital" in *A Companion to Digital Art,* First Edition. ed. Christiane Paul. (London, UK: John Wiley & Sons, 2016), Proof copy of article provided by author.

sensations of the body as it senses in the world; the natural or artificial objects that give rise to such sensations (especially pleasurable ones); the specific qualities of beautiful objects, and the emotional and intellectual reactions we have to those objects and sensations."[69] In this way, aesthetics, Cubitt writes, has become connected to the realm of art in that aesthetics describes "a moment when objects and senses come into contact – generating forms, sensations and psychic events".[70]

Drawing on the work of philosopher Alain Badiou (2007), Cubitt historicizes aesthetics by suggesting that it can be roughly divided between two moments: the Classical, which revolves around past notions of transcendent, ideal beauty of singular objects; and the Romantic, which describes future realizations of this past beauty.[71] And yet, if we accept, he argues, that aesthetics is the "moment when objects and senses come into contact – generating forms, sensations, and psychic events then surely the aesthetic is par excellence the experience of the present?"[72] But what is an aesthetics of the present? What does it entail? What form does it take? Is it digital? Interactive? How do we know what an aesthetics of the present actually is? Is it because it has the qualities of being art or it was made in the present day? The circle, as Cubitt rightfully states, "is logically vicious".[73] So if we are to begin to describe an aesthetic of the present, we must do something more radical than simply list off the formal attributes of art that connect one movement to another. Cubitt does just this, suggesting that the thing that connects one digital artwork to another – the "digital aesthetic" – is the mediated experience of time.[74] As he writes:

> If the aesthetic is the event that brings together objects, sensations and subjectivity – the "aesthetic attitude" for example – then it always involves mediation between the world and the mind. Aesthetics in the narrow sense of the appreciation of art, is dependent on mediation by the senses of vision and hearing; and with the benefit of a century of phenomenological studies, we must recognize that these senses are intrinsically temporal.[75]

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[69] Sean Cubitt. "Aesthetics of the Digital" in *A Companion to Digital Art,* First Edition. ed. Christiane Paul. (London, UK: John Wiley & Sons, 2016), Proof copy of article provided by author.
[70] Ibid.
[71] Ibid.
[72] Ibid.
[73] Ibid.
[74] Ibid.
[75] Ibid.

Taking a similar stance to Cubitt, digital aesthetics for Christiane Paul (2016) is not about objectively describing the ideal beauty of a singular object, but about the mediation that occurs between that object, the audience and the world.[76] Aesthetics, Paul continues, is a complex philosophical territory, especially when applied to digital artworks, like interactive new media installations, because the "hybridity of the digital medium makes it particularly challenging to develop a more or less unified aesthetic theory".[77] The development of a digital aesthetic, she continues, is commonly approached by examining the individual characteristics of a digital medium (temporality, duration, computation, interactivity).[78] Yet, each of these characteristics do not necessarily appear in one work and can occur in varying combinations. As mentioned earlier, interactive new media installations are gallery-based artworks that incorporate digital technology and that require the subject to act, via an interface, and the piece to respond in various ways to this activity. In this way interactive new media installations can be described as computational, abstract, temporal, durational, interactive, participatory, generative, ephemeral and performative all at once, or not at all. The fact that interactive new media installations are time-based and ephemeral further complicates any aesthetic theory of the interface because a viewer/participant who spends one or two minutes with an installation might catch a glimpse of only one version of an essentially non-linear, or generative, artwork.

This argument is best explained by way of Lynn Hershman Leeson's interactive new media installation *Lorna* (1983). *Lorna* is an interactive video disc. It consists of a television monitor and a remote control.[79] These elements are located in a gallery that mirrors the set-up of Lorna's onscreen living room. (Figure 6) *Lorna*'s narrative is, on the surface, simple: it tells a story about an agoraphobic woman named Lorna who sits in her apartment all day watching TV.[80] (Figure 7) We are invited into her home – a tiny apartment filled with various objects (a telephone, a TV, a couch). Every object in her apartment has a number.[81]

[76] Christiane Paul. "Introduction" in *A Companion to Digital Art.* First Edition. ed. Christiane Paul. (London, UK: John Wiley & Sons, 2016), p. 9.
[77] Ibid.
[78] Ibid.
[79] Lynn Hershman Leeson. *Lorna.* (1983). Found online at: http://www.lynnhershman.com/lorna/
[80] Ibid.
[81] Ibid.

We can click on these objects, via the remote control. Doing this allows us access to audio-visual material. (Figure 8)

Figure 6: L. Hershman Leeson, *Lorna* (1985).

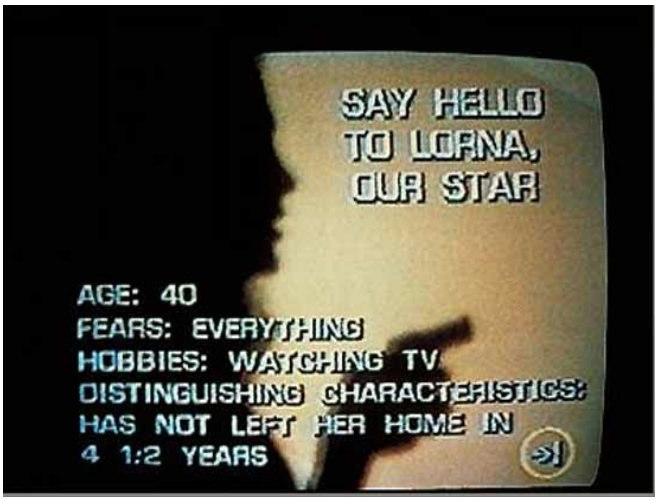

Figure 7: L. Hershman Leeson, *Lorna* (1985).

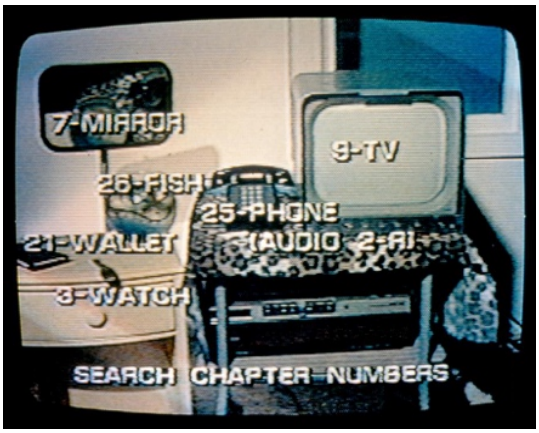

Figure 8: L. Hershman Leeson, *Lorna* (1985).

The disc that *Lorna* is located on consists of 17 minutes of audio-visual material which is broken up into 36 chapters.[82] These chapters can be sequenced differently and their meanings shift as they are recontextualized. For example, some chapters can be viewed backwards as well as forwards, at increased or decreased speeds or from different perspectives.[83] Furthermore, the artwork has multiple endings: depending the choices we make, Lorna may shoot her television set, commit suicide, or move to Los Angeles.[84] (Figure 9)

Figure 9: L. Hershman Leeson, *Lorna* (1985).

[82] Lynn Hershman Leeson. *Lorna.* (1983). Found online at: http://www.lynnhershman.com/lorna/
[83] Ibid.
[84] Ibid.

Given the amount of complexity inherent in this work, we may only end up viewing one aspect of a very sophisticated, non-linear narrative. Therefore, the actual meaning of the artwork may remain unclear to us. The same could be said for the interface.

For instance, *Lorna's* narrative is nonlinear, complex and its outcomes are dependent on the choices we make while interacting with it. Thus it is difficult to draw boundaries around what an interface actually is in this work because we are experiencing it in mediated time. Temporality in *Lorna* is produced via the interface, i.e. through our interactions with it, and with the work of art, as well as through the mediating functions it performs. Since we experience the interface in time, and since time is produced via the interface, the moment we point at an object (the remote control, the TV, the branching structures embedded in the disc, a human body) and we declare it to be an interface, that interface begins to undo itself and it becomes something else – it becomes less an aesthetic process and more a technical device. And yet we need to reassert the existence of the interface as aesthetic process for the work to be called an interactive new media installation, as these types of artworks require interfaces. So we interact with *Lorna* and by doing so an interface is produced – the remote control.

Every digital artwork is embedded in a specific context and has a purpose, however, viewer/participants, as Paul reminds us, "require layers of contextual information, both relating to the materiality of the work and the logic behind its processes."[85] Here Paul is arguing that each digital artwork is unique and complex, therefore an understanding of the digital aesthetic of the artwork requires an understanding of the medium itself (in our case, interactive new media installations) and the conceptual idea behind it. So, what is the underlying idea behind *Lorna?* And how does this reflect the medium it is based in and the interfaces created for it? Well, *Lorna* combines performance, narrative, time, chance (indetermination) and audience participation. These compositional elements are compressed, as noted above, into a pre-programmed disc which offers us multiple perspectives and allows us to make certain decisions for the main character. The protagonist's story and her adventures, however, do not take place in real life or real time. They take place on a television set – in a heavily mediated, pre-programmed, time-based environment that is remotely controlled by its users. Yet, there is, as Hershman Leeson writes, "no hierarchy in

[85] Christiane Paul. "Introduction" in *A Companion to Digital Art.* First Edition. ed. Christiane Paul. (London, UK: John Wiley & Sons, 2016), p. 9.

the ordering of a user's decisions" in *Lorna.*[86] Here, Hershman Leeson is stating that, while the disc is pre-programmed to play in a certain way, she is not trying to predict her users' actions – nor can she in fact.[87] "The lack of hierarchy in the ordering of a user's decisions" simply means she is deliberately positioning the user as active and the main character, Lorna, as passive.[88] She does this in order to comment on our consumption of media and technology – specifically television – and how it directs our behaviors. "Lorna's passivity", Hershman Leeson writes, "is a counterpoint to the direct action of the player. As the branching path (of the audio-visual media located on the disc) is deconstructed, the player becomes aware of the subtle yet powerful effects of fear caused by media and becomes empowered (active) through this perception."[89]

As an artwork, *Lorna* is inherently interwoven with features of computational structures – specifically the structures that underlie the mediums that it is created for (video disc, television). These digital structures (HCI, branching paths, flow charts) are not simply unknowable technical strategies of automation but they have cultural meanings and manifestations as well. For example, for its duration, *Lorna* allows us to explore, on a deep level, the whole screen and its aforementioned underlying computational structures. However, our attention is focused on the most active parts (the numbered objects that we are allowed to click on). As we click on these items, which represent various chapters in Lorna's life, we are repositioned, relative to television, identifying with the main character and reflecting the voyeuristic, fragmented gaze of the medium (television). The digital tools – including the branching paths of the chapters and the remote control – act as means towards other ends. In an article on *Lorna,* Hershman Leeson states that: "Many images on the screen are of the remote control device Lorna uses to change television channels. Because viewer/participants use a nearly identical unit to direct the disc action, a metaphoric link or point of identification is established between the viewer and referent."[90] So, while it was made in 1983 for television and laser disc, *Lorna* is unmistakably an interactive new media installation – and not simply because of its visual appeal or its novel use of audience

[86] Lynn Hershman Leeson. "Private I." Found in *The Art and Films of Lynn Hershman Leeson: Secret Agents, Private I.* By Meredith Tromble. (Berkeley, University of California Press, 2008), p. 78.
[87] Ibid.
[88] Ibid.
[89] Ibid.
[90] Lynn Hershman Leeson. "The Fantasy Beyond Control." in Illuminating Video: An Essential Guide to Video Art. New York: Apeture/BAVC, 1990, p. 267.

participation. *Lorna* is an interactive new media installation for two reasons: because of the aesthetic interfaces developed for the manipulation and mediation of time (the branching narratives and pathways, and the use of the remote control); and because of the relationships between viewer/participant, artist and artwork that Hershman Leeson is able to intervene in through her deployment of these aesthetic interfaces.

My interest in the relationships that the aesthetic interface creates builds on the work presented above. It also feeds into a more theoretical concern around how we might begin to make sense of the interface in interactive new media installations as a field of critical inquiry, as a cultural problem to be examined, rather than simply a technology to be studied. My exploration of the aesthetic interface is therefore not about the object itself; it is rather about the systems – technological, philosophical, embodied, and socio-political – that permit, shape and produce the interface and the wider issues such as interaction and (in)visibility that surround it. In short, aesthetics in my thesis is about the mediated experience of time that the relationship between the artist, the artwork, the interface and the audience creates. When applied to the interface, aesthetics then encompasses everything located below the surface of its glossy (or non-glossy) exterior, everything that is invisible to the human eye but that remains inseparable from the interface and without which the latter would not exist. In this way, I seek to contribute to an understanding of the aesthetics of the interface not in terms of what interfaces look like or do, but rather in terms of how they came to be and what they have or will become via a critical exploration of the processes built into them – as well as our comprehension of them as art objects.

The Agential Interface

Traditional conceptions of technology in Western philosophy, as Timothy Clarke (2000) tells us, have roots in Aristotelian thought.[91] In Clarke's words: "The traditional, Aristotelian view is that technology is extrinsic to human nature as a tool which is used to bring about certain ends. Technology is applied science, an instrument of knowledge."[92] Here, Clarke is arguing that technology, when theorized from an Aristotelian point of view, is instrumental. It is considered to be separate from the subject, an extraneous tool used by humans to

[91] Timothy Clarke. "Deconstructions and Technology" in *Deconstructions: A User's Guide*. ed. Nicholas Royle. (Basingstoke: Macmillan, 2000), p.238.
[92] Ibid.

accomplish specific goals. Expanding the criticisms of traditional theories of technology expressed above, Bernard Stiegler (1999) remarks that Western philosophy "at its very origin and up until now … has repressed technics as an object of thought. Technics is the unthought."[93] Using this proposition as a starting point, Stiegler proceeds to rethink the traditional conception of technology. In short, Stiegler posits that ideas about technology in Western philosophy are constituted on the basis of a false separation between the philosophical concepts of *episteme* (human knowledge) and *tekhne* (art or craft). This separation, he tells us, is troublesome because it has led Western philosophy to devalue technology and the technical.[94] Be it a stone axe, a pencil or an interface, technology in these conceptualizations is simply considered a means to an end. The devaluation of technology, as well as the separation of *episteme* from *techne*, Stiegler writes, means, among other things, that "technical beings" lack an ontological status.[95]

Arguing against Aristotelian configurations of the relationship between human and technological beings above, Stiegler posits that humans have access to "originary knowledge".[96] Originary knowledge for Stiegler means that humans do not acquire knowledge from the outside world, but through acts of remembering – acts which he argues are always already contaminated by technics. Hence, the history of the human, he writes, "is nothing other than that of the exteriorization of memory, or rather, of a memory become such only through exteriorization, constituting qualities and capabilities that only become human in this same originary supplementation and prosthesis."[97] For this reason, Stiegler posits that humans can experience themselves only through technology.[98] No longer seen as a mere instrument tacked onto the outside of the body, technology, he suggests, destabilizes notions of the "originary human", instrumentality and interiority. In this way, technology is positioned by Stiegler as the very condition of human existence.[99] Thus he concludes that humans can never be, and have never been, separate from technology because they are

[93] Bernard Stiegler. *Technics and Time, 1: The Fault of* Epimetheus. tr: Richard Beardsworth and George Collins. (Palo Alto, CA: Stanford University Press, 1998), p. ix.
[94] Ibid.
[95] Ibid.
[96] Ibid., p.99. In his article, "Deconstructions and Technology", Timothy Clarke defines Originary Technicity as "catachretic term that resists the inherited system of mutually supportive concepts by which notions of the human and technics have always been defined." (Clarke, 2000. p. 240).
[97] Timothy Clarke. "Deconstructions and Technology" in *Deconstructions: A User's Guide*. ed. Nicholas Royle. (Basingstoke: Macmillan, 2000), p. 246.
[98] Bernard Stiegler. *Technics and Time, 1: The Fault of* Epimetheus. tr: Richard Beardsworth and George Collins. (Palo Alto, CA: Stanford University Press, 1998), p. 152.
[99] Ibid.

fundamentally constituted by, through and with technology (starting from early technologies such as fire or a flint stone).[100]

Stiegler's critique of traditional conceptualizations of technology assumes a particular importance in the context of this thesis. This is because his statements about "technical beings" lacking an ontological status bring important questions about the agency of the nonhuman to the fore. Significantly, a central premise in both Stiegler's argument and my thesis is that agency is not merely confined to humans in the classic Aristotelian sense, but encompasses the nonhuman and/or the technological as well. I turn to Lucy Suchman's (2007) investigation into agency and nonhuman entities to develop this concept further.[101]

Suchman (2008) argues for an expanded understanding of agency by including nonhuman entities in what, in her words, is "the question of just what constitutes agency… for humans or nonhumans".[102] She continues, positing that "the prevailing figuration in Euro-American imaginaries is one of autonomous, rational, [human] agency" and projects like interactive new media installations reinforce that very culturally specific imaginary.[103] At stake, she suggests, is the exploration of "what other possible conceptions of humanness there might be, and how those might challenge current regimes of research and development".[104] Given this, questions I explore throughout this thesis that are related to the agency of the self and of others are complicated and, to an extent, reconfigured by the complex dynamics of both the nonhuman and human entities that make up the digital interface and interactive new media installations. In simpler terms, there are multiple agents and agencies (both nonhuman and human) at play in the construction and deployment of interfaces in interactive new media installations. These agents and agencies, I argue, are not neutral. Rather, following Suchman, I suggest that they aid in the articulation and construction of the way in which subjects conceptualize and classify entities, as well as the way they experience and interact with interfaces in interactive new media art installations. In this sense, my dissertation seeks to contribute an understanding of the multiple types of agency, as well as bodies, at play in

[100] Bernard Stiegler. *Technics and Time, 1: The Fault of* Epimetheus. tr: Richard Beardsworth and George Collins. (Palo Alto, CA: Stanford University Press, 1998), p. 152.
[101] Lucy Suchman. *Human Machine Reconfigurations: Plans and Situated Actions.* (Cambridge, UK: Cambridge University Press, 2007).
[102] Ibid., p. 228.
[103] Ibid.
[104] Ibid.

the articulation of the interface in interactive new media installations. Through this, it aims to offer an expansion of the notions of subjectivity and agency beyond their traditional humanist conceptualizations. Here, new media installations become a testing ground for this conceptual expansion.

However, interfaces are, as stated above, a productive part of the phenomena they create. What subjects see, what they can do, or know, or what they cannot know by interacting with the interface, are all the result of complex material-discursive practices that involve both human and nonhuman actors. If we take this to be the case, if what subjects are able to see, know or do emerges out of and with their interactions with the interface, then it could be assumed that interfaces contain, among other things, normative and prescriptive structures or rules that instruct subjects' behaviors in interactive new media installations. It is taken for granted, to an extent, that interfaces constitute and are constituted by power relations, in that they are created, as Suchman argues above, by "specifically located individuals."[105] Thus, I argue that the issue that needs to be addressed when discussing interfaces is not whether these power relations exist (they most certainly do), but rather how they are manifested, what exactly they control, and what the possibilities for intervention into and a resistance to them are. How do interfaces exert power? Is it through instruction? How is this power transmitted? Through design? Theory? Language? What types of socio-cultural assumptions are embedded in instructions? What types of subject interactions do they bring to bear? How does instruction influence what a body, both human and nonhuman, does or becomes? That is to say, what kinds of bodies and subjects does instruction produce? What kind of bodies and subjects does it close down on? And who or what benefits from such instruction?

The Cybernetic Interface

Interfaces in interactive new media installations, as briefly discussed above, are multi-layered structures of code that allow two entities to communicate with each other. While the bottom layers of this code communicate with the machine, the top layers are oriented towards, and communicate with, the subject. At each layer, the interface translates information, functioning mainly to visualize the meanings inside the system. In order to accomplish this task, the subject must be able to read and interact with the interface easily. This is an act that

[105]Lucy Suchman. *Human Machine Reconfigurations: Plans and Situated Actions.* (Cambridge, UK: Cambridge University Press, 2007), p. 228.

Alan Blackwell (2006) argues is achieved through the deployment of metaphors that depict the "real world" experiences of the subject in order to help them understand the abstract operations and capabilities of the interface.[106] These metaphors describe both the functions of the interface and the actions of the subject.

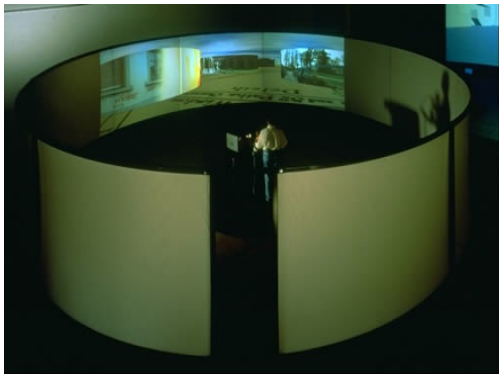

Figure 10: J. Shaw, *Place – a user's manual* (1995).

For example, the interface in Jeffrey Shaw's installation *Place – A User's Manual* (1995) is a modified video camera.[107] (Figure 10) The video camera is an interface because, by rotating and using its zoom and play buttons, the subject can interact with and view the artwork. (Figure 11)

Figure 11: J. Shaw, *Place – a user's manual* (1995).

[106]Alan F. Blackwell. "The Reification of Metaphor as a Design Tool" *ACM Transactions on Computer-Human Interaction (TOCHI)*, 13(4), p. 494. These metaphors and models include terms such as desktops and trashcans that are used to describe the contents of computers as mentioned above.
[107] Jeffrey Shaw. *Place, a users's manual*. (1995). Found online at: http://www.jeffrey-shaw.net/html_main/show_work.php?record_id=96.

However, the video camera as interface not only allows the subject to view things, but it also acts as a metaphor that positions the subject as a cinematographer or artist. By presenting the interface as video camera, Shaw is both describing the role the subject will play (cinematographer, artist) and he is, to an extent, dictating the subjects' movements as well as teaching her how to navigate and contribute information to the installation.

Therefore the interface not only instructs but also mediates a conversation between the subject, the artist and the machine, while at the same time allowing the subject to question and experiment with the causes and effects that her actions have. Although the subject's intent is never completely reflected in the resulting actions of the interface, I argue that this experimentation and questioning of cause and effect has the potential to produce different types of communication, which ultimately afford the subject a chance to create different relationships to both the artwork and the interface.

New media artist David Rokeby reinforces this point. In a conversation about his installation *Very Nervous System* (1986-1990) with Roberto Simanowski, Rokeby states that in the current model of HCI, any interactive system must "construct some sort of model of the user… then in some way reflect this limited model of the user back to the user."[108] Rokeby argues this reflective effect creates, among other things, distance between the user, the interface and the artwork, as the user is not considered the locus of interaction in this particular instance. The user is instead viewed as an outside entity, whose actions are "constructed" by the artist and then incorporated into the machine in order for it to work.[109] Separation is then amplified by what Rokeby terms the "feedback loop of interaction," which allows the whole system to operate as a type of filter, or mediator – one that reinforces, restricts and reflects certain types of information.[110] Over a period of time this type of instruction results in the creation or modification of certain types of behaviors.

For example, after interacting with Mary Flanagan's interactive new media art installation *[giantJoystick]* (2006), the subject is able to relate the images appearing in the installation to

[108] Roberto Simanowski. "Very Nervous System and the Benefit of Inexact Control". Interview with David Rokeby. (Providence, RI: Brown University, 2003). Interview available online at: http://www.dichtung-digital.de/2003/issue/1/rokeby/index.htm.
[109] Ibid.
[110] Ibid.

certain types of movements (pushing, pressing, swaying, touching) that she makes with the interface.[111] (Figure 12)

Figure 12: M. Flanagan, *[giantJoystick]* (2006).

The subject can do this because when she touches different parts of the interface – a 10-foot tall joystick – images appear on the screen. (Figure 13)

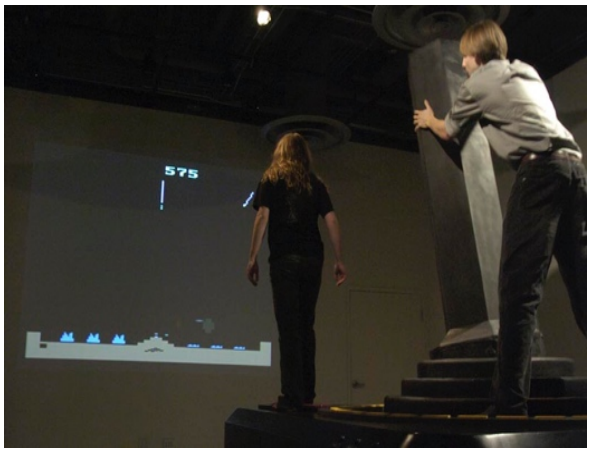

Figure 13: M. Flanagan, *[giantJoystick]* (2006).

Successful navigation of the installation is pre-programmed and based on the subject's ability to easily understand and operate the interface. Therefore, the subject's interactions (touching, pressing) are not only prescribed by the shape of the interface and the way it is constructed: Flanagan also provides the user of her installation with a set of instructions allowing them to successfully navigate the installation. The fact that the interface resembles a familiar object (a

[111] Mary Flanagan. *[giantJoystick],* 2006. Found online at: http://www.maryflanagan.com/giant-joystick.

joystick), only reinforces these lessons. In this context, then, the subject has become an "object presser or toucher" because her experience in the installation has taught her that touching and pressing objects cause images to appear on the screen.

Scholarly debates on the use of the interface as a mode of transmitting instruction and the power that this instruction has in relation to subjects – specifically, in relation to how subjects interact with artworks – can roughly be loosely described as either positive or a negative camp. The positive approach regards the ability of the digital interface to instruct as empowering.[112] By placing emphasis on how the interface is able to draw on "elements of our daily experience.... [and] gain their meaning from the network of social interactions in which they figure", instruction, Paul Dourish (2001) argues, has the potential to create more embodied, more "user-friendly", and thus "better" experiences for the subject.[113] The more skeptical scholars position this ability as a sort of false-flag operation. These scholars see instruction as reinforcing, among other things, problematic definitions and concepts of interactivity and participation.[114] In short, they argue, as Mondloch does, that the use of instruction creates active vs. passive dichotomies, in effect turning "open-ended participatory experiences" into "environments of controlled passive response".[115] Despite the different analytical frameworks employed to understand the effects that instruction has on the subject and the differing conclusions that scholars studying it come to, a common denominator in research into instruction in interactive new media installations is the belief that the subject has the ability to resist or intervene in it, and thus generate moments of rupture in the spaces she is located in. While this ability exists, the model of an interactive subject briefly critiqued above, and the modes of spectatorship that scholars such as Mondloch claim it promotes, persist and can still be found both in interactive new media art installations and in the theories that surround them.[116] One of these theories is ubiquitous computing (ubicomp).

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[112] Scholars who fall into the positive camp include, but are not limited to: Dourish, (2001); Dourish & Bell, (2010); Galloway, (2012); Rode et al. (2012).
[113] Paul Dourish. *Where the Action is*. (Cambridge, MA: MIT Press, 2001), p. 99.
[114] Scholars who are skeptical include, but are not limited to: Gaver, (1996); Manovich, (2001); Chalmers, (2003); Barkhuus & Dey, (2003); Mondloch, (2010); Bishop (2010).
[115] Kate Mondloch. *Screens: Viewing Media Installation Art*. (Minneapolis, MN: University of Minnesota Press, 2010), p. 26.
[116] Ibid., p. 24. Artists are able to achieve these moments of rupture through the integration of closed-circuit video feedback loops in early video installations in the 1960s and 1970s, or the use of ambiguous input sources that operate outside the artist's control in early interactive installations in the 1990s and early 2000s. (Mondloch, 2010)

The Ubiquitous Interface

Ubicomp, according to Mark Weiser (1991), refers to the seamless integration of technology into every place, object, building and body.[117] Weiser posits that technology must become an integrated tool through which we work, rather than an attention-grabbing machine that performs and dictates tasks and actions. He continues by stating that focusing the subject's attention away from the "single box" allows technology to "fade into the background", thus rendering technology invisible.[118] This invisibility, he states, results in the formation of "new" relationships between humans and machines – relationships that focus on smaller details instead of foregrounding the "attractiveness" of the technology being used.[119] Attractiveness, for Weiser, refers to technology that makes itself the center of attention. Thus attractiveness of technology for Weiser is troublesome because attractiveness "is the opposite of invisible."[120]

In many ways, Weiser's theory of ubicomp echoes the problems found in the traditional Aristotelian conceptions of technology discussed above. For example, by arguing for invisibility, Weiser positions technology as something exterior to the human using it, thus creating a separation between the human and the machine.[121] His specific configuration of invisibility denotes the disembodiment of the subject. Theories of technology that promote invisibility, as N. Katherine Hayles (1999) posits, are worrisome, because they render the human body as excess "meat" and treat human consciousness as something separate from the human form.[122] Yet the art world has adopted ubicomp narratives and applied them to the interface in interactive new media installations. Interestingly, here, narratives, in particular those around disembodiment exposed by Hayles in 1999, have resurfaced as notions of the disappearance and are used to describe interfaces in interactive new media installations.[123] The adoption of these theories is highly problematic, not only because of the disembodiment

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[117] Mark Weiser. "The Computer for the 21st Century". *Scientific American*, September 1991. Found online at: http://www.ubiq.com/hypertext/weiser/ACMInteractions2.html.
[118] Ibid.
[119] Mark Weiser. "The World is not a Desktop". *ACM Interactions,* November 7, 1993. Found online at: http://www.ubiq.com/hypertext/weiser/ACMInteractions2.html. These smaller details can include anything from actions occurring in the periphery of an environment to technical and non-technical functions of the device that have been deemed unimportant to the task at hand by the artist or engineer.
[120] Ibid.
[121] Mark Weiser. "The Computer for the 21st Century". *Scientific American*, September 1991. Found online at: http://www.ubiq.com/hypertext/weiser/ACMInteractions2.html
[122] N. Katherine Hayles. *How we Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics*. (Chicago, IL: University of Chicago Press, 1999)
[123] See Dourish, 2001, 2011; McLean, 2013; Hansen, 2004, 2013; Stern, 2013 among others.

that comes with them but also because they erase the aesthetic processes and relationships (i.e. the attractiveness) that bring them into being. This is an act that I suggest widens separation between the artwork and the subject, the artist and technology discussed above. Interfaces, as posited earlier, are not simply separate objects created by the artist that subjects use to navigate an installation or view images. Rather, I argue that *the interface has productive capacities, and these capacities appear not merely through mediating "the world", or disappearing from it, but through the subject's ability to interact in conjunction with and embody it.*

The Embodied Interface

Embodiment is, in simple terms, the process of uniting the Cartesian separation between the body and the mind. Maurice Merleau-Ponty (1962) considers the concept of embodiment to be a human or nonhuman body that embraces and constitutes the world through perception.[124] As he writes: "by thus remaking contact with the body and with the world, we shall rediscover our self, since, perceiving as we do with our body, the body is a natural self and, as it were, the subject of perception."[125] Donna Haraway (1991, 2007, 2008) builds on Merleau-Ponty's theorization. Positioning the body as a cybernetic organism, "a hybrid of machine and organism, a creature of social reality as well as a creature of fiction", Haraway argues that the insistence on behalf of scholars that the body ends at, or is encapsulated by, the skin, fails to recognize the body's specific situatedness in the world.[126] The term "situatedness" for Haraway does not refer to a previously specified location in a reified body. Rather, she argues this notion is about conceptualizing the body as "nodes in fields, inflections in orientations, and responsibility for difference in material-semiotic fields of meaning."[127] Here, Haraway is suggesting that bodies are constantly in communication with, and are never separate from, the technology that aids in their production.[128] Thus, embodiment she tells us "is about significant prosthesis."[129]

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[124] Maurice Merleau-Ponty. *Phenomenology of Perception*. trans. Colin Smith. (London, UK; Routledge, 1989), p. 239.
[125] Ibid.
[126] Donna Haraway. "The Cyborg Manifesto" in *Simians Cyborgs and Women*. (London, UK: Free Association Books, 1991), pp. 149 & 164.
[127] Donna Haraway. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies*, Vol. 14, No. 3. (Autumn, 1988)
[128] Ibid.
[129] Ibid.

Building on Haraway's ideas, Bernadette Wegenstein (2008) argues that the "collapse of body, materiality of expression and environment" irreducibly links technology to the embodied experience of the subject.[130] She continues by claiming that this collapse is enacted in relation to the (re)medialization of the body and the increased use in meditative extensions. It is a process, she writes, that is "marked by an eventual complete substitution of immediate and intimate bodies facilitated by the logic of new media."[131] In short, by engaging with technology, the subject, for Wegenstein, is not simply operating technology, but rather she is embodying it. The ability to embody technology emerges out of the fact that the subject can manipulate and create digital information in the space she is located in. The embodiment of technology thus represents more than the subject's interaction with physical and virtual images in interactive new media installations. It also denotes the subject's participatory status as an embodied subject, or viewer/participant in them.

My use of the term "viewer/participant" to designate a fully embodied and participatory subject is indebted to Mark Hansen (2004, 2006), who deploys it in order to foreground what he sees as the creative potential "implicit within the re-conceptualizing of (human) perception as an active (and fully embodied) rendering of data".[132] Drawing on Henri Bergson's concept of the human body as the center of indetermination, Hansen believes that perception is embodied and affective. The subject's interactions with technology alter its embodied and affective perceptions by reconfiguring the subject's senses. For instance, Hansen argues that rather than simply filtering a series of composed images, the subject is able to frame and create images out of "something that has no form".[133] The subject, for Hansen, has therefore become the "active source of framing," rather than being merely a "passive site of inscription."[134] The subject can thus now be considered a "viewer-participant" because perception is understood as an embodied and affective experience, albeit one that has been modified by technology prior to conscious perception.[135]

[130] Bernadette Wegenstien. *Getting Under the Skin: The Body and New Media*. (Cambridge, MA: MIT Press, 2006), p. 38.
[131] Ibid., p. 40.
[132] Mark Hansen. New Philosophy for New Media. (Cambridge, MA: MIT Press, 2004), p. 105.
[133] Ibid., p. 73.
[134] Ibid.
[135] Ibid.

While his theorization is important, I argue Hansen ends up creating an active vs. passive dichotomy through the designation of the Deleuzian account of the human body as the "passive site of inscription" and the Bergsonian account of the human body as the "active source of framing".[136] He also mimics these same structures through the juxtaposition of the human body (an active entity) against an interface (a supposedly passive one) in interactive new media installations. By doing this, he limits both embodiment and agency to the human domain. So, when I employ the term "viewer/participant" throughout this thesis, I am moving beyond Hansen's notion of the viewer/participant, signalling the fact that the viewer/participant is *participating* in the interactive new media art installation by contributing aspects of her own evolving material ontology to her experience through her engagement with, and embodiment of, technology. I use the phrase "the embodiment of technology" here as a way of theorizing the subject's relationship to technology as an engagement with, and integral part of, interactive new media art installations. I posit that the embodiment of technology on behalf of the subject, and her ability to become an embodied viewer/participant, is not about control. I do not believe that this ability facilitates a shift in control over the outcome of the interactive new media installation from the artist to the subject. Rather, I understand this as a shift in perception and position; one that focuses attention away from the technical features of a computerized device and onto what the subject can do in conjunction with technology when theorized as an embodied viewer/participant.

Summary of Chapters

To reiterate, my thesis has two overarching research questions, which provide it with an overall focus. First, I am interested in what a digital interface is and what it does in interactive new media installations. By this I mean the way in which the interface signifies, and is suggestive of, other processes, subjects and objects in interactive new media installations. In many respects, my first question is thus concerned with relationships – relationships between the viewer/participant, the artist and the other human and nonhuman entities in interactive new media installations. My second question pertains to enquiring as to why the interface matters in interactive new media installations. That is to say, how does the viewer/participant make sense of the interface and the relationships, subjects and objects that it is suggestive of via her interactions with it? Why is it important? The core of my

[136] Mark Hansen. New Philosophy for New Media. (Cambridge, MA: MIT Press, 2004), pp. xx-xxi & 4-7.

dissertation is organized around four chapters that address concepts that I see as crucial to any study of the digital interface: aesthetics, instruction, the body and embodiment, and ubiquitous computing. These chapters examine how the interface informs and codifies modes of spectatorship, artistic practices and the discourses that surround it, how it aids in both the construction and reinforcement of regimes of visibility, and how the interface manages relationships between the viewer/participant and the artist.

Chapter 1, *Aesthetics and the Interface,* situates my dissertation in the tradition of scholarship on new media art and digital technology in the humanities and media studies. It is first and foremost a literature review as it provides details of earlier research and analytical perspectives relevant to the digital interface. It also offers my attempt at rethinking the digital interface. The interface is positioned as an aesthetic process – an unfolding or translation of the multiple relationships and entities that it brings into being. My reconceptualization of the digital interface builds on what Andersen and Pold (2011) term "interface criticism".[137] Interface criticism involves a critical investigation of how we humans perceive the physical and virtual environment we are located in through the interfaces available to us.[138] The chapter furthermore provides an overview of some of the key concepts (subjectivity, media spectatorship, interactivity and aesthetics) used to discuss the digital interface.

Chapter 2, *The Body and the Interface,* provides a conceptualization of the interface by discussing the relationship between the body and technology. In order to understand how the interface signifies and is suggestive of relationships and entities, and how the viewer/participant makes sense of them via her interactions with it, I argue for a post-human understanding of the relationship between the viewer/participant and the digital interface as relational and co-constitutive – a mutually entangled and collaboratively produced experience. Theorizations of the relationship between the body and technology that position it in this way are not new to media studies or to the humanities. And yet, even though multiple discussions about the need to offer more entangled approaches to the relationship between the body and technology have taken place, I argue that we require a more detailed study of the potential effects that the relationship between the body and technology may have on the way in which the viewer/participant interacts with, and thinks about, the digital interface. This

[137] Christian Ulrik Andersen and Søren Bro Pold. "Interface Criticism, Aesthetics Beyond Buttons" in *Interface Criticism: Aesthetics Beyond Buttons*. ed. Christian Ulrik Andersen and Søren Bro Pold. (Arhaus, DK: Arhaus University Press, 2011)
[138] Ibid., p. 13.

chapter therefore attempts to offer a different perspective on what I see as necessary (but not yet sufficient) theories of the digital interface. In doing so, the chapter expands on the key literature discussed in Chapter 1 and provides a more detailed account of the debates and discourses around the digital interface.

Chapter 3, *Instruction and the Interface,* explores the disciplinary aspects of the digital interface. This chapter thus addresses the question of what the interface does in interactive new media installations in terms of its instructional capabilities. My discussion around instruction is grounded in a close reading of Lucy Suchman's (2007) book *Human-Machine Reconfigurations: Plans and Situated Actions* and Norbert Wiener's (1950) cybernetic notion of instruction as a method of controlling biological and technical systems.[139] Building on insights around the relationship between the body and technology mobilized in chapter 2 – specifically notions raised by Amelia Jones (2000) around the relationship between power, resistance and the human body – my focus in this chapter will be on the destabilizing effects, as theorized in the previous chapter, that I see the resistance to, or the intervention into, instruction having on the way the viewer/participant both interacts with and thinks about the interface. Approaching the interface from this perspective will situate my theory of the digital interface in the larger context of media studies, as well as applying it to key issues of agency, autonomy and notions of instruction. This will enable me to begin to study a whole range of variations in behaviors that occur when the viewer/participant resists or intervenes in instruction, and how they affect the way she interacts with the interface in interactive new media installations. Using the concept of instruction as an analytical framework, the argument is made that the viewer/participant's resistance to instruction begins to challenge problematic concepts of separate, discrete, autonomous entities called humans and communicative machines, by presenting the viewer/participant with an opportunity to engage with and restructure (within certain parameters), the underlying narratives that shape her experience in interactive new media installations.[140] This shifts focus away from theorizing the viewer/participant as an outside operational entity whose actions are structured and

[139] Lucy Suchman. *Human Machine Reconfigurations: Plans and Situated Actions.* (Cambridge, UK: Cambridge University Press, 2007), Norbert Wiener. *The Human use of Human Beings: Cybernetics and Society,* (London: Free Association, 1950)

[140] While some aspects of interaction design are explicit, in that they are bounded and understandable, I also want to make a point about interfaces and seamful ambiguity -- specifically the variations in behaviors that occur when the viewer/participant engages with seamfulness. Seamfulness is a notion that interface design can explicitly exploit infrastructure breakdowns. For more information on seamfulness and seamful ambiguity see Benford and Giannachi, (2011); Chalmers and McColl, (2003); Barkhuus et al., (2005).

defined as exterior to technology, towards considering her an integral part of the installation – an embodied subject whose bodily interactions with the digital interface have consequences in, thus matter to, interactive new media art installations.

Chapter 4, *Ubiquitous Computing and the Interface,* provides a critique of the notion of ubiquitous computing defined above. Taking the deployment of the digital interface in works by Brian Knep (2006-8), David Rokeby (2012), Natalie Jeremijenko (1995) and Scott Snibbe (1998, 2002) as its case studies, this chapter critically analyzes how theories around ubicomp shape the forms of visibility, interaction and participation in interactive new media installations. The questions addressed are the following: How are ubicomp systems embedded in the technical, cultural, aesthetic and political structures of society? How does experimentation with these systems in interactive new media installations open them up for different ways of theorizing the digital interface? How does this experimentation affect a change in our conception of notions such as visuality and aesthetics, if it does at all?

Taking inspiration from separate claims made by theorists such as Ulrik Ekman (2011), Lori Emerson (2014), Adam Greenfield (2006) and N. Katherine Hayles (2013) that interactive new media art installations and new media interface aesthetics are sites of actual ubicomp, I will suggest that ubicomp systems are being developed through artistic experimentation with these technologies. Thus these artworks, and the viewer/participants interacting with them, have the ability to intervene in, and possibly reconfigure, previously posited narratives around the body, technology and the relationship between the two. Approaching the digital interface in this way will situate my theory of the digital interface at the boundary of the STS and the humanities field, and relate it to issues of agency, autonomy, the body and instruction as discussed in Chapters 2 and 3.

Ultimately, my investigation into the use of the interface in interactive new media installations is a question of our ever-changing relationship with technology, one that provides an underlying question to the whole thesis. This question around our relationship with technology returns in all of the chapters including the conclusion and introduction: through Sean Cubitt's formulation of digital aesthetics as "a descriptor of the mediated experience of time"; as Lucy Suchman's investigation into the agency of nonhuman forms; via Karen Barad's theorization of entanglement and emergence as an enactment of boundaries between different entities; and as the designation of the human body as interface in interactive new media installations by artists such as Carmin Karasic, Brian Knep and

David Rokeby. However, since I am positioning the digital interface as a dynamic, hybrid, aesthetic process, it is also necessary to ask where exactly the interface is embedded and where concepts around, and accounts of, the interface go. What happens to the interface? Where does the interface end-up? What is done with it physically and conceptually? How do accounts and deployments of the interface operate as an engagement with and/or affect our human relationship with technology?

In short, they go into the hands of a few people, commercial entities or academic institutions and are sometimes redeployed as commercial devices that will change our lives, for the better, forever. Thankfully, they also go into the hands of artists and viewer/participants who make their own, more creative, uses of them. Given this, a more fundamental question is how these commercial interfacial devices operate in relation to the artistic and creative deployments of the interface discussed throughout this thesis. In this case, the question is not how artistic deployments of the interface can somehow make our relationship with technology better, or simply make technology easier to use. Rather, I ask this question to develop a critical understanding of how the interface can be seen as an important actor in positioning and (re)shaping specific ways of relating to the self, to technology, to artistic practice and to others in both interactive new media installations and in the current media culture. In the conclusion, I address these questions and concerns. I elaborate on the main contributions of my dissertation. I draw elements of my thesis together to outline how we can further develop the notions around the interface that I have presented, and provide suggestions for some further ways to think about the digital interface and its use in interactive new media installations.

Chapter 1: *Aesthetics and the Interface: A Literature Review*

In this chapter, I propose a rethinking of the digital interface in interactive new media installations in aesthetic and processual terms. I will outline what is at stake in such rethinking by suggesting that the digital interface can be understood as an open-ended series of relational, co-constitutive processes that influence the movements and perceptions of the viewer/participant(s) interacting with it. With this theorization, I offer an alternative to previously posited notions of the interface outlined by scholars such as Jonathan Crary (1992, 2002), Lev Manovich (1999, 2000), Paul Dourish (2001, 2011), Mark Hansen (2004, 2006, 2013) and to a certain extent Anne Friedberg (2006) and Kate Mondloch (2010). These texts are invaluable to my research, as they begin to critically evaluate what it means to be a viewing subject in a modern technologically based society, as well as question the interface's function as a device that facilitates yet also impedes interaction, mediates experience and attempts to maintain a fantasy of control over unpredictable computerized systems.[141] However, as briefly argued in the introduction, interfaces tend to be defined, and consequently positioned, by these scholars in binary terms (visible or invisible, open or closed, opaque or transparent).[142] Thus the interface in their texts becomes either an active yet empty technological thing that simply provides instruction to semi-passive users, an isolated object framing the experience that an embodied but detached viewer/participant has in an installation, or something that acts as a boundary between the viewer/participant and the virtual world that the interface helps simulate.

Before I expand my analysis, I would first like to examine in more detail what exactly is at stake in proposing an alternative theory of the digital interface. How does theorizing the digital interface as a relational, co-constitutive aesthetic process that operates outside of the traditional action/reaction model of interaction in interactive new media art installations challenge previously posited notions of agency, subjectivity, interactivity and aesthetics? How might these challenges change the way we engage with and theorize the relationship between humans and technology in interactive new media installations? My primary goal in this chapter is to present my alternative theory of the digital interface in interactive new

[141] Friedberg and Mondloch's texts critically rethink what it means to be a viewing subject in a modern technologically based society, whereas Dourish, Manovich and Hansen attempt to question the interface's function in technological environments.

[142] To repeat: Dourish and Hansen perpetuate the invisible vs. visible binary, Manovich and to a certain extent Mondloch's theorizations create open vs. closed dichotomies and Friedberg's analysis produces an outside vs. inside dichotomy.

media installations. Therefore, these questions will be addressed through an analysis of how similar queries have surfaced in recent debates about the interface. In particular, I will focus on key issues such as the importance of aesthetic inquiry, the link between theories of media spectatorship and interaction, and on how these theories can be applied to the digital interface in interactive new media installations.[143] Thus, this chapter serves two purposes: it aims to fulfil a role of critical intervention into thinking about the digital interface in interactive new media installations, and it acts as a literature review in the sense that it establishes a critical framework for the subject area discussed throughout my thesis (digital interfaces and their use in interactive new media installations).

The individual sections of this chapter all delineate the issues that my theory of the digital interface addresses; they establish the key projects, frames of reference, vocabularies and debates that are significant to it. Each section focuses on concerns about the digital interface, specifically those raised by Christian Ulrik Andersen and Søren Bro Pold (2011), Branden Hookway (2011) and Alexander Galloway (2010). While their approaches to the digital interface differ, these authors all partake in a critical evaluation of theories of the digital interface. They then present alternatives, positioning the interface as an integral part of the space that it is located in.[144] The significance of these theories to my research (and the underlying point that I believe they are trying to make, although none state it directly), is that many of the narratives that we employ to describe digital interfaces have become obsolete. I will develop this line of thinking throughout this chapter by arguing that previously posited theories of the interface are inadequate, thus they need to be not so much revised, but rather critically repositioned in relation to the role that the aesthetics of the interface plays in interactive new media installations. This will allow me to propose a different approach to analyzing the digital interface in interactive new media installations – one I am proposing to call, after Andersen and Pold, "interface criticism".[145] Approaching the interface from this

[143] Similar questions have been asked by theorists such as Galloway (2010), Hookway (2011), Andersen and Pold (2011), Jeong (2013) and Emerson (2014).

[144] Galloway and Hookway propose approaches to the interface that move away from previously posited narratives that theorize them as singular objects that "emerge from a linear technological progression or out of the interiority of an isolatable idea". (Hookway, 2011) They then suggest that digital interfaces should be seen as thresholds or "zones of activity" that mediate between socio-political realms and realities. (Galloway, 2010) Arguing against similar theories that position the interface as "something that should be optimized to offer seamless functionality", Andersen and Pold define the digital interface as a dominant cultural form that mediates between culture and data. (Andersen and Pold, 2011)

[145] Interface Criticism, can be briefly defined as a "critical discussion of the computer and how it relates to art and culture today". (Andersen and Pold, 2011) The notion of Interface Criticism will be theorized in full in the following sections of this thesis.

perspective will situate my theory of the digital interface in the larger context of media studies, as well as applying it to issues of subjectivity, media spectatorship, interactivity and aesthetics. The issue of subjectivity is embedded in the notion of the digital interface as a self-referential cybernetic system as argued by Galloway, Hookway and Pold. Questions of media spectatorship and interactivity arise in regards to what the interface is theorized as being by each of these authors, in reference to its visual presence in interactive new media installations and in relation to the viewer/participant's interactions with it. Finally, the aesthetics of the interface will be developed throughout this chapter in relation to Sean Cubitt's (1998, 2005, 2016) understandings of digital aesthetics.

The Interface

The digital interface is the name originally given by computer scientists to both the hardware and/or the software embedded in a physical object that enables humans to use technology. Artists and scholars working in the humanities have creatively appropriated this term, expanded its definition and applied it to a variety of media and technologies used in their fields. In doing so, they have proposed different, more post-humanist theories of the digital interface – ones that begin to take the cultural aspects of technology into consideration.[146] For example, for Pierre Lévy (1997) the digital interface is "a way of analyzing global socio-technological systems… that emphasizes the material and artificial components of human phenomena, and not [an] entity, which exists independently, has distinct effects, and acts on its own."[147] Here, Lévy is arguing that interfaces are products of a society and culture. Therefore, we cannot, he states, separate digital interfaces from the ideas and processes through which they are conceived, and from the humans who produce and use them.[148]

Taking a similar stance to Lévy, interfaces for Manovich (2000) are not neutral devices.[149] They are, he tells us, created by humans, thus they provide us with a very narrow, and often very biased, model of the world.[150] As he writes: "[t]he interface shapes how the computer user conceives the computer itself. It also determines how users think of any media object

[146] I consider these theories to be post-humanist as they place equal emphasis on and critically examine the technological and human factors involved in any given process. The cultural aspects of the interface that are taken into consideration include, but are not limited to, its underlying meanings, the challenges it presents to previously posited linear and instrumental technological timelines and narratives.
[147] Pierre Lévy. *Cyberculture*. tr: Robert Bononno. (Minneapolis, MN : University of Minnesota Press, 1997), p. 4.
[148] Ibid.
[149] Lev Manovich. *The Language of New Media.* (Cambridge, MA: MIT Press, 2000), p. 75.
[150] Ibid.

accessed via a computer. Stripping different media of their original distinctions, the interface imposes its own logic on them."[151] Digital interfaces for Manovich are therefore inherently world-forming processes that operate on a cultural and technical level. For instance, when we interact with an interactive new media installation everything we view – text, music, images, videos – passes through the physical interface we use to access the work (a mouse, a keyboard) and, in turn, the interfaces of its operating system and screen. These interfaces, according to Manovich's description above, "are created by humans" in that they have been programmed in specific ways, by specific people.[152] Therefore, interfaces provide their users with their own model of the world they create – a model that is based on the interfaces' internal pre-programmed logical system and ideology. Given this, the subsequent information passed through these interfaces will reflect, and therefore will be limited by, the underlying system of the device and the ideological perspectives of the people who built it.

But what about the human interacting with the interface? What about her interpretation of the information provided? What effect do her interactions have on the information that she is viewing? How does she shape the "conception of the computer"? And what about the aesthetic processes embedded in the device? Answers to these questions are difficult to find in Manovich's description of the interface. This is because emphasis in his description, as noted above, is placed on the internal machine-based processes of the interface, as it is these processes, not the end-users, that shape and therefore limit the information the user encounters when she interacts with the interface. As a result, the human using (not programming) the interface in Manovich's theorization, has little effect on the information she encounters. So while Manovich's theory of the digital interface captures some of the spirit of the post-humanist analysis of technology (specifically via his acknowledgement of the cultural processes of the interface and the human's ideological influence over it), he removes the critical theorization of it by focusing too much on the technical constraints of the interface. In doing this, the "aesthetic avant-garde strategies" and any acts of human involvement beyond basic programming that he claims are "embedded in the commands and interface metaphors of computer software" are ignored.[153] Technicist by nature, Manovich's theory of the interface eliminates the very element crucial to the artwork he applies his theory to – the aesthetic.

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[151] Lev Manovich. *The Language of New Media.* (Cambridge, MA: MIT Press, 2000), p. 75.
[152] Ibid.
[153] Ibid., p. 258.

The Problem with Aesthetics

In this section, I will suggest that there is a lack of engagement with concepts of aesthetics in media theory, specifically in literature related to the digital interface where its relevance is regarded as a surface-level issue, if it is addressed at all. But why should we be concerned with aesthetics when theorizing the digital interface in interactive new media installations? And what is actually at stake when the aesthetic aspects of this device are ignored? For Christiane Paul (2008, 2016), the answer to these questions is as such: we should be concerned with aesthetics because it offers different approaches to, and perspectives on, a number of key issues in the philosophy of art and technology. These issues include, but are not limited to, artistic appreciation, notions truth as beauty, the value of art, aesthetics as ethics and aesthetics as politics. Speaking specifically to the aesthetics of new media art, Paul suggests that a critical investigation into aesthetics, alongside concepts like materiality and medium specificity, allows us to make distinctions between different artistic mediums and movements.[154] In direct reference to new media art, aesthetics, she argues, helps us to distinguish between practices that use digital technologies as a tool to produce more traditional art objects (photographs, prints, sculptures) and what she refers to as digital-born art – that is "computable art that is stored, and distributed via digital technologies and uses the features of these technologies as a medium".[155]

Like Paul, I argue that a critical understanding of aesthetics is significant because it allows for a better theorization of the role that technologies, like digital interfaces, play in defining an art form (interactive new media installations) beyond their instrumental contributions. However, my motivation behind suggesting such an approach differs from hers. My aim in deploying aesthetics is not to make distinctions between one art form and another (i.e. to determine whether it is digital born or not). Rather, the point of my exploration is to gain some insight into a particular condition of modern artistic practice: the use of the interface in interactive new media installations. More specifically, my aim is to explore how the use of the interface can act as a mode of critique of our relationship to technology and to reflect on the effects this critique has on how we represent ourselves, as subjects, with technology in interactive new media installations. In what follows, I argue that without a deeper understanding of aesthetics, the interface, as well as its functions and its purpose, would only

[154] Christiane Paul. "Introduction" in *A Companion to Digital Art.* First Edition. ed. Christiane Paul. (London, UK: John Wiley & Sons, 2016), p. 2.
[155] Ibid.

be discussed from a rather reductive technical-engineering perspective – an approach that, Andersen and Pold write, has led to the "'what-you-see-is-what-you-get'-text editors and… emphasis on user-friendly and transparent design".[156] This focus results in a very limiting and instrumental concept of aesthetics, the digital interface and interactive new media art in general – one that I argue, echoing Andersen and Pold, reduces the interface to an issue of "look-and-feel", therefore creating separations between the viewer/participant (the subject) the interface (the object) and the artwork.[157] These are, I suggest, issues that a theorization of the aesthetic aspects of the digital interface will not solve, but will hopefully help clarify.

However, the idea that any kind of aesthetic theory, let alone *digital* aesthetics, asks us to "know in some sense what we mean by digital *art* as anything other than a social category or works that circulate in the institutions and discourses of art" opens up a number of problems because digital aesthetics, as Sean Cubitt (2016) argues, "is not something that can be captured the same way [digital] information can".[158] The key qualities (non-identity, ephemerality, unknowability) that Cubitt sees the aesthetic experience of the digital as entailing are not things that are easily quantified, commodified and privatized, despite our attempts to place value on them.[159] Rather, digital aesthetics, according to Cubitt, is dependent on the mediation of the senses of vision and hearing – and these senses are always temporal. Thus the identity of aesthetics, he argues, is always rooted in the present.[160] This fact leads him to begin to theorize aesthetics in such a way that it allows for "the co-presence of not only artwork and audience but also the social that forms both of them".[161] Here, Cubitt is arguing that aesthetic encounters occur in time and are durational, non-identical, non-repeatable and subjective. They are not a "uniquely exclusive collision of perceiver and perceived" and therefore are not located outside of or beyond history.[162] Thus we must formulate this encounter, he writes, in such a way that it incorporates history, which is to say

[156] Christian Ulrik Andersen and Søren Bro Pold. "Interface Criticism, Aesthetics Beyond Buttons" in *Interface Criticism: Aesthetics Beyond Buttons*. ed. Christian Ulrik Andersen and Søren Bro Pold. (Arhaus, DK: Arhaus University Press, 2011), p. 1.
[157] Ibid.
[158] Sean Cubitt. "Aesthetics of the Digital" in *A Companion to Digital Art,* First Edition. ed. Christiane Paul. (London, UK: John Wiley & Sons, 2016), Proof copy of article provided by author.
[159] Ibid.
[160] Ibid.
[161] Ibid.
[162] Ibid.

that "we must recognize the aesthetic, as both property of a work and as an experience of it, as something giving body to ('corporating') the historical present".[163]

I draw on Cubitt's theorization of digital aesthetics throughout this chapter. Like Cubitt, I suggest that the term "aesthetics" when applied to the use of the digital interface in interactive new media installations not only describes the characteristics of the artwork the interface is deployed in, but also encapsulates the characteristics of the interface. In this way, aesthetics does not just shape our experience of digital artworks; it also shapes our interactions with, and, by extension, our experience of the interface.

The Aesthetic Experience of the Interface

The phrase "digital interface", as mentioned earlier, refers to hardware and/or the software embedded in a physical object that enables humans to use technology. We know how the technical capabilities of the interface have aided in the emergence of experimental artistic practices such as the use of geographically distributed materials in a virtual space, visual and aural communication in real and asynchronous time, or data visualization and Geographic Information Systems (GIS) in new media art. However, the aesthetic aspects of the interface are only just beginning to be analyzed. Aesthetics, in the very narrow sense of the appreciation of art, as stated earlier, is dependent on "mediation by the senses of vision and hearing" and these senses, as Cubitt argues, are "intrinsically temporal".[164] Thus, aesthetics can be understood to serve as a descriptor of the mediated experience of time.[165] Interactive new media installations, with their emphasis on viewer/participant action in virtual and physical space alongside their potential to highlight different, non-linear and non-visual modes of thinking and interacting, have the capacity to magnify the mediated experience of time Cubitt speaks of earlier. Here, I propose that new media artist Brian Knep's interactive new media installation *Deep Wounds* (2006) provides a perfect example of art that magnifies the aspects of aesthetics discussed above.

In 2005-6, Knep was commissioned by the Office of the Arts at Harvard University to produce an installation for the University. He chose as a location Memorial Hall.[166] This location was initially picked because of its surface-level aesthetic characteristics (stained

[163] Sean Cubitt. "Aesthetics of the Digital" in *A Companion to Digital Art,* First Edition. ed. Christiane Paul. (London, UK: John Wiley & Sons, 2016), Proof copy of article provided by author.
[164] Ibid.
[165] Ibid.
[166] Brian Knep. *Deep Wounds*. (2006). Found online at: http://www.blep.com/works/deep-wounds/

glass windows, marble floors and walls.) However, this attraction faded when Knep researched the building's history.[167] Built between 1874 and 1877, Memorial Hall honors Harvard graduates who died in defence of the Union during the American Civil War (1861-1865.)[168] Names of 136 deceased alumni, along with other identifying information (year of graduation, place of birth, battle/place of death), are inscribed in red into the 28 marble panels that line the walls of the hall. Information about Harvard graduates who fought and died for the Confederacy is omitted from the building.[169] (Figure 14)

Figure 14: B. Knep, *Deep Wounds.* (2006).

With this in mind, Knep created *Deep Wounds. Deep Wounds* is installed in the transept of Memorial Hall – a dimly lit space designed for silent, sombre contemplation. The aesthetics of the installation reflect this atmosphere. There are no fast-paced moving images, blinking lights or loud audio tracks. Rather *Deep Wounds* consists of three large rectangular images, which are projected onto the polished white marble floor of the building.[170] These images, which were created specifically to resemble the stained glassed windows located above them, are static and face the inscriptions on the wall.[171] (Figure 15)

[167] Brian Knep. *Deep Wounds*. (2006). Found online at: http://www.blep.com/works/deep-wounds/
[168] Ibid.
[169] Ibid.
[170] Ibid.
[171] Ibid.

Figure 15: B. Knep, *Deep Wounds*. (2006).

However, it is impossible, as argued above, to understand the aesthetics of the interface by simply examining the aesthetic characteristics of the artwork that it is located in. While they may share a similar interface and be interactive in the same way, no two interactive new media installations are identical. Aesthetically, *Deep Wounds* is simplistic, computational, dynamic and generative. It employs a similar interface (the viewer/participant's body) to many of Knep's other installations – most notably, the works that comprise his *Healing Series* (2003-present) and *Drift Series* (2004-present). However, these works all have remarkably different aesthetic impact in the sense that the visuals they produce look different, as seen in the images below, and the pieces themselves are programmed to respond to viewer/participant action in different ways.[172] (Figures 16 & 17)

[172] The works that comprise *Drift Series* consist of multiple panels of static, geometric shapes, which are projected onto a wall. When a viewer/participant pauses in front of the wall, the shapes begin to move. Thus *Drift Series,* unlike *Deep Wounds*, requires the viewer/participant to remain still in order to view the piece. The works that comprise *Healing Series* consist of geometric shapes that are projected onto a custom-made carpet on the floor. Similar to *Deep Wounds*, the viewer/participant must walk onto the carpet in order to experience the full scope of the work. Unlike *Deep Wounds,* the works that comprise *Healing Series* do not reveal anything extra (text, imagery) to the viewer/participant. Instead, the viewer/participant walks onto the carpet, the shapes tear apart and large swaths of empty space are left in their place. Found online at: http://www.blep.com/works/healing-series/ and http://www.blep.com/works/drift-series/

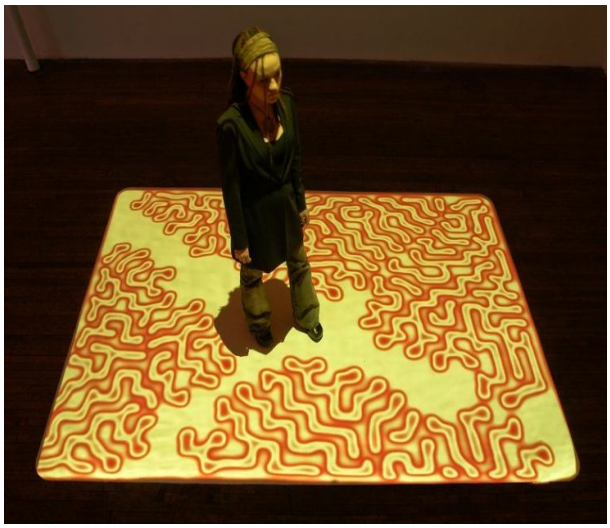

Figure 16: B. Knep, *Healing 1*. (2003).

Figure 17: B. Knep, *Drift Wall.* (2007).

As mentioned in the introduction, interactive new media art installations depend on viewer/participant action in order to work and *Deep Wounds* is not an exception to this rule. To recap: *Deep Wounds* consists of three large rectangular images, which are projected onto the floor. These images are milky in color, yet transparent enough so that, on visiting the installation, I can catch brief glimpses of what lies below them. These hints are enticing, they make me want to explore the work, and so I do. I interact with the work by walking onto the floor. When I do this, the images covering the area of floor I am standing on begin to blister and open-up, revealing another layer of the artwork to me – snippets of blue colored text. (Figure 18)

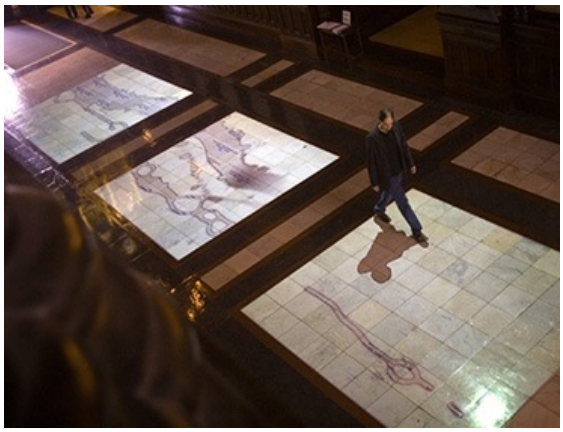

Figure 18: B. Knep, *Deep Wounds.* (2006).

I stand in silence for a few moments, examining the work, trying to make the connection between the imagery the piece has revealed to me and that of my surrounding environment. Making this connection is fairly straightforward: the text on the floor is written in the same font as the names of the deceased Union soldiers that line the walls opposite them, so I assume that they are somehow related. I am correct: the text is an allusion to the dead Confederate soldiers, the implied other half of Memorial Hall. As Knep's artist statement reads: "The content of the text consists of descriptions of the [Harvard University] graduates who died fighting for the Confederacy. Each man's year of graduation, state, date of death and battle of death are projected onto the floor."[173] In lieu of a name, a word describing a relationship (father, son, classmate) is used to identify these soldiers. (Figure 19)

Figure 19: B. Knep, *Deep Wounds.* (2006).

[173] Brian Knep. *Deep Wounds*. (2006). Found online at: http://www.blep.com/works/deep-wounds/

I spend a few moments reflecting on the text below me and then I move on. When I do, the blistered images slowly knit themselves back together, covering the blue text.[174] Since I must walk across the images on the floor to reveal the full nature of the artwork (the blue text) and to experience the installation, my body functions as the interface in this work. Given this, it could be argued that viewer/participant interaction with the interface forms the backbone of the aesthetics of *Deep Wounds.*

Katja Kwastek (2013) makes a similar argument about interactivity to the one I make above. Interactive art, she writes, "places the action of the recipient at the heart of its aesthetics".[175] This is because the recipient's action is the "activity that gives form and presence to the interactive artwork".[176] Thus action, she states, is "the primary source of his [the recipient's] aesthetic experience".[177] Kwastek's suggestion could apply to the majority of performative practices (happenings, performance and body art) that precede interactive art. Kwastek acknowledges this fact, arguing that in contrast to performative art, interactive works "present an action proposition that is generally not modified by the artist while being exhibited".[178] For example, Kwastek states that both the production and the reception aspects of interactive art are distinct from each other, although the artwork, she writes, is involved in both aspects in that in interactive art "production and reception aesthetics collide".[179] However, interactive art – and this is what she claims distinguishes it from traditional visual artworks and the more action-oriented variety listed above – does not "manifest its gestalt in the absence of reception".[180] Given this, interactive works, Kwastek writes, are "conceived with a view to action, which is enabled and to an extent orchestrated by but not performed by the artist… [i]n interactive art, the recipient becomes the performer".[181] Here, Kwastek is arguing that interactive artworks require the viewer/participant to perform, as well as view, the artwork, not the artist. And it is this characteristic, she suggests, that makes interactive artworks unique. The physical activity of the viewer/participant and her ability to become a

[174] Brian Knep. *Deep Wounds*. (2006). Found online at: http://www.blep.com/works/deep-wounds/
[175] Katja Kwastek. *Aesthetics of Interaction in Digital Art.* (Cambridge, MA: MIT Press, 2013), p. xvii.
[176] Ibid.
[177] Ibid.
[178] Ibid.
[179] Ibid.
[180] Ibid.
[181] Ibid.

performer, Kwastek argues, "contradicts a fundamental condition to which the possibility of aesthetic experience of any art form is usually linked: that of aesthetic distance".[182]

According to the prevailing art theories, Kwastek tells us, the aesthetic object is "constituted only in the contemplative act of the viewer".[183] In order to achieve aesthetic distance and truly understand the meaning of the artwork, the viewer must be able to, in simple terms, detach herself from reality and immerse herself in the artwork. Once immersed, the viewer can become an objective observer. She can then contemplate and reflect on the artwork free from any distraction.[184] However, the notion of aesthetic distance, Kwastek writes, does not apply to interactive art.[185] This is because the viewer must interact with the work before she can reflect on it, therefore making the requirement of aesthetic distance extremely difficult to satisfy.[186] Thus, Kwastek concludes: "Physical action on the part of the recipient is indispensable for the materialization of the artistic concept, which the recipient must realize, experience, and reflect upon at the same time."[187]

I agree with Kwastek's conclusions about viewer/participant interaction being a defining aesthetic characteristic of interactive art – one that helps shape our interactions with, and by extension, our experience of, the artwork and the interface. For example, production (the making of the artwork) and reception (the viewing of the artwork) of *Deep Wounds* are distinct elements. However, the aesthetics of both the aforementioned processes clearly manifest themselves in the artwork – most noticeably via the blistering and knitting of the images. Yet, the installation does not work – it is not art – if nobody is there to interact with it. And while he is present and speaks to me during my various visits to the site, Knep is not modifying the artwork in real time. Thus, it could be said that *Deep Wounds* is conceived with a view towards viewer/participant interaction – a view the artist (Knep) orchestrates, but does not perform, making interaction an important aesthetic characteristic of this installation. However, my interpretation veers from Kwastek's analysis slightly in that I do not consider viewer/participant interaction to be unique to interactive art. The ability for the viewer to become a performer via interaction with the artwork is paramount to many different participatory art movements – most notably Fluxus, Situationism and Body and Performance

[182] Katja Kwastek. *Aesthetics of Interaction in Digital Art.* (Cambridge, MA: MIT Press, 2013), p xviii.
[183] Ibid.
[184] Ibid.
[185] Ibid.
[186] Ibid.
[187] Ibid.

art. Furthermore, while the artist may be present and performing the art piece, the majority of works created in the above-mentioned art movements are conceived with a view to viewer/participant action. Rather, following Cubitt, I argue that the characteristic that makes interactive art unique is the mediated experience of time that viewer/participant interaction with the interface creates.[188]

However, in order to fully theorize this concept and formulate an aesthetic of the interface in interactive new media installations, we must, as Cubitt argues above, incorporate the historical and the social into the aesthetic encounter.[189] But what exactly constitutes the social and the historical for both artworks and its audiences? And how do the social and the historical relate to the mediated experience of time that interactive art creates? The answer to these questions, Cubitt states, lies "in the artworks themselves, that is if the theory is correct, we will discover the characteristic incorporation" of the socio-historical aesthetic present.[190]

As explained before, *Deep Wounds* is an artwork about the American Civil War. It is tucked away in a building located on an Ivy League University Campus – a building that is accessible only to students that attend the institution, its employees and their invited guests. Thus *Deep Wounds* is an artwork about inclusion and exclusion, the (post) industrial North and the (post) agrarian South, slavery, racism and reconstruction, forgiveness and responsibility, loss and regret. In a broader sense, it is about past conflicts, the present societal rifts that these conflicts create and our future attempts to reconcile them.

Deep Wounds has received rave reviews from the art world. Public response to the work has not been as positive as it does not overtly acknowledge the underlying reason that the American Civil War was fought – slavery. This lack of acknowledgement is reflected in comments made by members of the public. Members of the public have called the piece "yet another conversation between white men about the Civil War", while one commenter referred to Knep as "literally Hitler".[191] In a rush to critique what could be seen as racist attitudes towards deeply complex and polarized subject matters (slavery, the American Civil War) that

[188] Sean Cubitt. "Aesthetics of the Digital" in *A Companion to Digital Art,* First Edition. ed. Christiane Paul. (London, UK: John Wiley & Sons, 2016), Proof copy of article provided by author.
[189] Ibid.
[190] Ibid.
[191] Magazines that have reviewed this piece include: Art New England (Aug/Sept, 2006), Big Red and Shiny (2006), The Boston Globe (2006). *Deep Wounds* was selected as one of the best public-arts projects of 2007 by the International Association of Arts Critics and Americans for the Arts. It also received an honorable mention in the 2007 Ars Electronica Festival. (Unpublished Interview: Knep, Brian. Interview by Phaedra Shanbaum. Phone call. Helsinki, FI/Boston, MA, USA. 04/09/2014)

still pervade American public consciousness and political rhetoric, one might neglect more basic questions about *Deep Wounds*. How do the conscious and unconscious aesthetic choices made by the artist (making the visuals pretty and interaction fluid instead of ugly and burdensome, selecting a memorial to house the work, making the Confederate soldiers who attended Harvard the subject of the installation instead of the African American slaves who worked there) affect the way the artwork is received by viewer/participants and art critics? Do all of them receive it in the same way? How might the terms of engagement and the underlying narratives of *Deep Wounds* change (or not) if the digital interface was something other than a human body? Something non-subjective, purely technical, pre-programmed, pre-determined, something Knep could, to a certain extent, control?

Cubitt contends that aesthetics is not simply a philosophical sub-discipline, but it is a particular way in which, in a given context, art is identified as art and, by default, a subject is defined as a subject to be discussed.[192] For example, by interacting with digital artworks, he writes, "the viewer selects what *not* to see as much as what to see; and the installation evolves constantly whether viewers are present or not".[193] While made specifically about generative web-based installations, Cubitt's point could arguably be extended to encompass interactive new media installations: how a viewer/participant interprets the narrative of the artwork is entirely dependent on her experience in the world and her interactions with the work. This point could also be extended to encompass the art world as a whole in which the institutions that host the work select, in terms of curation and distribution of funds, what an artist is *not* able to discuss and where she *cannot* exhibit as much as what she is able to discuss and where she can exhibit. The second point applies to *Deep Wounds.*

For example, Knep originally wanted to list the actual names of the Confederate soldiers in his work.[194] However, the Office of the Arts felt that listing these names was too controversial because it would call attention to the fact that Harvard, and many of its former graduates, used to own slaves – a fact that the University has only recently publicly acknowledged.[195] Thus listing the names of the Confederate soldiers would shine a light on

[192] Sean Cubitt. "Aesthetics of the Digital" in *A Companion to Digital Art,* First Edition. ed. Christiane Paul. (London, UK: John Wiley & Sons, 2016), Proof copy of article provided by author.
[193] Ibid.
[194] Richard Klein. *Brian Knep: Deep Wounds.* (Ridgefield, CT: The Alrdrich Contemporary Art Museum, 2013), pp. 2-3. Found online at: http://www.blep.com/files/5513/6910/1141/KnepBrochure.pdf
[195] The most recent public acknowledgement, by Harvard, around this issue took place on April 6th, 2016 when it unveiled 4 plaques dedicated to African American slaves who worked on the grounds. Laura Krantz. "Harvard Unveils Plaque in Memory of Slaves." The Boston Globe, April 6, 2016. Found online at:

discontinuities between the University's past and present socio-economic policies and create uncomfortable discussions around what type of subjects could and could not be memorialized, and thus should or should not be remembered. The question of who could or could not be memorialized became even more contentious due to the terms of the trust that endowed Memorial Hall's construction: these terms implicitly stated that the alumni who fought and died for the Confederacy must never be enshrined there.[196] It was only the erasure of the Confederate soldiers names, in combination with the facts that the installation was temporary (it was exhibited for only three weeks) and ephemeral (projected light) – facts that the University believed would alleviate tensions between what was being shown and discussed in *Deep Wounds* and what was not – that rendered the narrative of the artwork "less offensive" to the University, thus allowing the project to move forward.[197]

Trying to control how a viewer/participant will respond to the narrative of an artwork in the way Harvard tried to with *Deep Wounds*, however, is as impossible as trying to predict how she will interact with the work. These predictions never add up to the over-idealized cybernetic models of action and notoriously unreliable public opinion polls anyways. This is because the "'gestalt moment' of an ending, when the patterns of a narrative or the structures of melody and development make sense as a whole" as Cubitt writes, do not happen in digital artworks (specifically those like *Deep Wounds* that are generative), as they conclude only in the sense that they can be switched off.[198] Rather the freedom of digital artworks, he argues, "lies in their ephemeral temporality, their constant bubbling into and out of existence, and in the operations they perform on the accumulated data of the past to produce the emergent unknown future".[199] Following on from Cubitt, what is interesting about *Deep Wounds*' narrative and the polarized reactions that it elicits is the view of contemporary America that it depicts – a forward-facing, over-idealistic perspective around reconciliation, which is based on data (biographical information) from America's not so utopian past. Instead of appearing as numbers, biographical information (dates of birth and death, full names of people) appears as relationships (Brother, Father, Son, Classmate). Since they are long gone, we know little of

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https://www.bostonglobe.com/metro/2016/04/06/harvard-unveil-plaque-memory-slaves/pjc6lmg8HY0awonqLLE2EP/story.html#comments

[196] Richard Klein. *Brian Knep: Deep Wounds.* (Ridgefield, CT: The Alrdrich Contemporary Art Museum, 2013), pp. 2-3. Found online at: http://www.blep.com/files/5513/6910/1141/KnepBrochure.pdf

[197] Ibid.

[198] Sean Cubitt. "Aesthetics of the Digital" in *A Companion to Digital Art,* First Edition. ed. Christiane Paul. (London, UK: John Wiley & Sons, 2016), Proof copy of article provided by author.

[199] Ibid.

the relationships the soldiers identified on the floor had to those listed by name on the wall. However, the work provides us with enough information to remind us that conflict creates hatred and hatred creates rifts between best friends, brothers and countrymen. *Deep Wounds* asks us to explore and respond to these conflicts and the rifts they create – to interact with and take responsibility for our previous actions in the now. In this sense, *Deep Wounds* is a deeply ethical work: it invites us to reopen old wounds and to reflect on the unacceptable positions of the past in the present day. Recast as relationships the biographical information of deceased soldiers from conflicts past and the values they held cease to be abstract. Through interacting with the work, we embody this information, relocate it into the present, experience it in time, and thus embrace it. By designating the viewer/participant's body as interface, these past relationships become a personalized and subjective, albeit mediated, experience of time. The fact that we must use our bodies to interact with the work and in order to see the potentially inflammatory words that the piece, and the institution itself, attempted to obscure is an important aspect of the work. It makes, as mentioned above, the notion of aesthetic distance difficult to maintain, given that we must become physically involved in, experience, and reflect upon the work at the same time.

Towards an Interface Criticism

A critical reevaluation of some of the basic ideas of what a digital interface is and what it does in interactive new media installations presents a challenge to notions held by historians such as Jonathan Crary (2002), who posits that concepts such as interactivity, media spectatorship and subjectivity are predicated on "the relative separation of a viewer from a milieu of distraction and the detachment of an image from a larger background".[200] Crary's interpretation fits the specific interface (the peep show) and time-period (19th Century) he is describing. However, I argue that notions of detachment and separation when applied to media theory and art, as they consequently have been, can be troubling.[201] This is because they create interiorized and privatized experiences, thus positioning the digital interface in interactive new media installations as an unconscious, "accidental" choice on behalf of the artist. Positioning the interface as such, I suggest, isolates the viewer/participant from the artistic process, ultimately creating separate objects and subjects in interactive new media

[200] Jonathan Crary. "Gericault, the Panorama and Sites of Reality in the Early Nineteenth Century." *Grey Room 09,* Fall, 2002. pp. 5-25. Crary's interpretation has been criticized for prioritizing one particular part of the experience (the visual/sight) over the other forms present, thus glossing over the whole haptic experience of the viewer/participant. (Huhtamo (2011); Gaudreault, Dulac and Hidalgo (2012))

[201] Theorists and historians include, but are not limited to: Manovich (2001, 2005) Dourish and Bell (2011), Marks (2002), Friedberg (2009).

installations. Such a separation, as Andersen and Pold posit, perpetuates a model of aesthetics that favors "beautiful transparency over the sublime opacity of the hidden programming interface".[202] There are, however, ways to begin to bridge these boundaries between subjects and objects in interactive new media art installations. One such approach, as Andersen and Pold inform us, is interface criticism – an approach that involves a "critical discussion of the computer and how it relates to art and culture today".[203]

While not clearly defined, interface criticism, they write, is: "intrinsically linked to our question of interface aesthetics".[204] Interface aesthetics combines art, media and computer science theory, and involves, among other things, "developing a critical vocabulary towards computers and interfaces".[205] Developing this critical vocabulary, Andersen and Pold argue, is significant, as it will allow us to "elucidate how interfaces can embed choices, conduct, languages, and ultimately, values, worldviews and aesthetics into technical infrastructures".[206] They continue by stating that an inquiry into, and criticism of, the digital interface involves more than the development of new discussions around the role that art or technology play in a "rapidly changing interface culture".[207] Interface criticism questions fundamental notions about the digital interface such as agency, medium specificity and aesthetics. Thus, interface criticism requires a critical discussion around how interfaces are related to culture and aesthetics, and how art has developed around interfaces. By doing this, Andersen and Pold argue, and I agree with them here, we can begin to develop an approach to analyzing the interface not as a "stable perspective", but as a "critical paradigm" in the media studies field.[208] Taking seriously the aesthetic aspects of the digital interface in interactive new media installations then becomes important, as doing this could conceivably

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[202] Christian Ulrik Andersen and Søren Bro Pold. "Interface Criticism, Aesthetics Beyond Buttons" in *Interface Criticism: Aesthetics Beyond Buttons*. ed. Christian Ulrik Andersen and Søren Bro Pold. (Arhaus, DK: Arhaus University Press, 2011), p. 13.

[203] Ibid., p. 8. Anderson and Pold are not the only scholars to suggest this type of approach. Theorists and artists including Graham Harwood and Matthew Fuller have made similar statements about the need to develop a critical vocabulary towards computers and interfaces. For example, in a 2010 interview with Anthony Iles, Harwood states, "I do not have any problem with creating media systems that have utility from my art methods. The utility, though, must reveal something about the nature of power in which its mediation is taking place." (Harwood, 2010). For more information, see: http://www.metamute.org/editorial/articles/mud-and-blood-networks-interview-graham-harwood.

[204] Ibid., p. 9.

[205] Ibid.

[206] Ibid.

[207] Ibid., p. 13.

[208] Ibid. This approach, for Andersen and Pold, combines recent theoretical developments in the cultural studies and media theory fields in order to critically investigate interfaces, "what they mean for – and how they function in – contemporary culture." (Andersen & Pold, 2011, p. 10.)

allow us to enact what Karen Barad (2007) sees as an abrupt break with representationalism.[209]

Representationalism, as Barad states, is the "belief in the ontological distinction between representations and that which they purport to represent; in particular that which is represented is held to be independent of all practices of representing".[210] This mode of thinking, she writes, is a "particularly inconspicuous consequence of, among other things, the Cartesian division between 'internal' and 'external'".[211] Representationalist modes of thinking are problematic for Barad because they divide things (subjects and objects) into static, homogenous categories (digital interfaces and viewer/participants).[212] In short, Barad believes that the "faith we place in our access to representations over things" is a historic-cultural belief that is part of "Western philosophy's legacy and not a logic necessity; that is, it is simply a Cartesian habit of mind".[213] Paying critical attention to the aesthetic aspects of the interface, and specifically to those aspects of viewer/participant interaction with the interface that constitutes an abrupt break with representationalism, will be the starting point for my critique of Camille Utterback's interactive new media installation *Untitled 5* (2004). In what follows, I will suggest that a critical theorization of the aesthetic aspects of the digital interface in interactive new media installations will allow us to challenge (via viewer/participant interaction) representationalism and make an intervention in the "Cartesian habits of mind" (such as belief in the need for aesthetic distance and the ontological separation of objects and subjects that follows from it).[214]

In 2007, I had the good fortune to interact with *Untitled 5* at Art Interactive in Cambridge, Massachusetts. *Untitled 5* consists of a closed-circuit camera, a computer and a large projection screen.[215] When installed at Art Interactive, the projection screen took up the

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[209] Karen Barad. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning.* (Durham, NC: Duke University Press, 2007), p. 46.
[210] Ibid., p. 49.
[211] Ibid.
[212] Ibid.
[213] Ibid.
[214] Ibid.
[215] Camille Utterback. *Untitled 5*. (2004). Found online at: http://camilleutterback.com/projects/untitled-5/. *Untitled 5* is the 5th installation in Utterback's *External Measures* series (2001-2005). *External Measures* is a series of interactive installations that, in the artist's words: "explore the possibilities of projected 'kinetic sculptures' or 'living paintings.'" The positions, velocity and existence of various parts of the projected images in all of the works in the series rely on viewer/participant's locations and movements in the gallery space. (Utterback, 2004). In this way, *Untitled 5,* and *External Measures,* builds on the artists earlier works such as *Text Rain* (1999). *Text Rain* will be discussed, in full, later in this chapter.

majority of the back wall of the gallery space. The screen was covered in a series of colorful lines, smudged dots and brush strokes. The brush strokes and dots splattered across the projection screen were visual representations of the past and current presence and movements of gallery visitors. For example, when I entered the gallery, the camera detected my presence, along with the presence and movements of other visitors. This information was processed by the computer and projected onto the center of the screen as a set of brush strokes, or, as Utterback calls them, "painterly marks".[216] For instance, when I waved my hand, lifted a leg or jumped, a mark of a certain size and color appeared on screen. If I stood still a different type of mark appeared on screen. The more I interacted with the work the more marks appeared. (Figure 20)

Figure 20: C. Utterback *Untitled 5* (2007)

In addition to the marks, a colored line appeared on the screen. Whereas the marks were visual representations of my presence and current movements in space, the line mapped my trajectory. So, when I moved to the left, the line followed me and moved to the left of the screen. If I moved to the right, the mark followed me and moved to the right of the screen. What emerged out of this interaction was, as Nathaniel Stern puts it, a digital painting that "continually transforms over time as layers of persistent marks and bodies feed-back between interaction, performance and image".[217] (Figure 21)

[216] Camille Utterback. *Untitled 5*. (2004). Found online at: http://camilleutterback.com/projects/untitled-5/.
[217] Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* (Canterbury, UK: Gyliphi Limited, 2013), p. 133.

Figure 21: C. Utterback *Untitled 5* (2007)

When a visitor left the installation space, the line that mapped her trajectory broke apart and became a set of spots. The size of these spots directly correlated to the "in-activity or stillness" of that particular person.[218] So, if a visitor spent three minutes interacting with the work, and then left, the line mapping her trajectory would become a set of imperceptible dots. If she spent one minute interacting with the work, two minutes standing still and then left, the line would become a set of large splotches. (Figure 22)

Figure 22: C. Utterback, *Untitled 5.* (2007).

[218] Camille Utterback. *Untitled 5*. (2004). Found online at: http://camilleutterback.com/projects/untitled-5/

As a current gallery visitor, I could push these splotches and dots around the screen using my body. As I pushed them, these dots and splotches began to blend into each other. If I did not interact with them, they attempted to migrate back to the center of the screen. (Figure 23)

Figure 23: C. Utterback, *Untitled 5*. (2007).

Together, these marks, lines, dots and splotches formed a composition that, Stern writes, create intersections between "movement paths and who does or does not follow them" as well as connections between "different moments of time [and] different bodies in space".[219] In doing so, Stern argues that Utterback's work creates "slightly different conceptual-material encounters" by highlighting the multiple relationships that gallery visitors are able to form with Utterback's "artwork, and with art- and mark making more generally".[220]

I agree with Stern's reading of *Untitled 5*. I believe the marks, lines, splotches and dots were and are acting in conjunction with each other (as well as in conjunction with the visitor) to create the on-screen composition. Collaborative making and an exploration into the creation of a different type of aesthetic system via embodied interaction are indeed, as Utterback writes in her artist statement, the main aims of her work.[221] However, I argue that this exploration is only partially translated in practice. This is because the compositions that appear on the screen, as another visitor, Boston Globe art critic Ken Johnson, states: "are not

[219] Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* (Canterbury, UK: Gyliphi Limited, 2013), p. 135.
[220] Ibid., p. 136.
[221] Camille Utterback. *Untitled 5*. (2004). Found online at: http://camilleutterback.com/projects/untitled-5/

that captivating".[222] Additionally, I would argue that the aesthetic system that Utterback claims to create via viewer interaction does nothing different. Instead, I posit that the composition simply describes a finite and banal space bounded by the rules of its own system.

For example, the ultimate goal of *Untitled 5*, as Utterback states, is to "create an aesthetic system which responds fluidly and intriguingly to physical movement in the exhibit space".[223] The visitors interacting with *Untitled 5* are expected to engage with the on-screen images. Meaning can be produced, on behalf of the visitors, through embodied interaction. Thus, meaning should emerge out of the visitor's interactions with each other and with the artwork. I argue, however, that the human-to-computer interaction, and the resulting aesthetic composition that this artwork promotes, are too restrictive. This is because *Untitled 5* is organized from within, governed by internal lines of code and specific rules that Utterback has purposefully hidden from the public. Utterback has not revealed these rules to her visitors because she wants them to discover the internal structure and composition via exploration, believing that this will create a less prohibitive and more embodied type of interaction with and in her work. As she writes: "[w]hile the specific rules of the system are never explicitly revealed to participants, the internal structure and composition of the piece can be discovered through a process of kinaesthetic exploration. Engaging with this work creates a visceral sense of unfolding or revelation, but also a feeling of immediacy and loss."[224]

Concealment of the underlying rules, as Florian Cramer (2011) tells us, becomes an issue when applied to computerized devices (like interfaces) used in artworks, as he believes it implies "a separation of 'users' from 'programmers' based on different access privileges to machine functions granted by the respective interface".[225] In other words, the deliberate concealment of the underlying rules that govern the artwork, by Utterback, creates a separation of visitors from the artist, and in effect, the artistic process. Separation occurs because the visitor has no access to the technical or aesthetic systems she is interacting with, other than knowing that she can move the on-screen images around. This separation, I argue,

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[222] Ken Johnson. "Back to the future – New technologies meet old ideals at the Boston Cyberarts Festival". The Boston Globe, April 27, 2007. Found online at: http://www.boston.com/news/globe/living/articles/2007/04/27/back_to_the_future/?page=full.
[223] Camille Utterback. *Untitled 5*. (2004). Found online at: http://camilleutterback.com/projects/untitled-5/
[224] Ibid.
[225] Florian Cramer. "What is Interface Aesthetics, or What Could it Be (Not)?" in *Interface Criticism: Aesthetics Beyond Buttons*. ed. Christian Ulrik Andersen and Søren Bro Pold. (Arhaus, DK: Arhaus University Press, 2011), p. 120.

is telling, as it indicates that Utterback expects her visitors to act, think and feel in a certain way, or that everybody interacting with her work shares a similar ontological system of representation. In assuming this, I posit that she is standardizing, and thus constraining, the interactions and experience that the visitor has in the installation. "Interactions" in this system therefore become a series of pre-programmed behaviors mapped to the physical movements of gallery visitors. The regulation of visitor interaction not only undermines notions of subjectivity, but it also reveals a much more troubling inconsistency hidden in theories of interactivity.

The Difficulty with Interactivity

Some theories of contemporary aesthetics, as Mondloch (2010) tells us, consider the visitor's active participation with art to be progressive because it engenders "an empowered, critically aware viewing subject".[226] The production of empowered and critically aware viewing subjects is important to interactive artworks, Mondloch states, because it allows artists to begin to counter theories that position their viewing subjects, and consequently their artwork, as "passive or resigned" and reposition them both as interactive.[227] Mondloch is skeptical of this automatic praise of participation and interaction lavished on installation art, as she believes it pits: "active, open-ended reception… against passive consumption".[228] As she writes: "by necessitating active spectator involvement, whether implicitly or explicitly, installation artworks may simultaneously constitute environments of controlled passive response."[229] Simply put, Mondloch finds the glorification of interactive aspects of artworks on behalf of theorists and artists like Stern and Utterback disconcerting, as she believes this praise perpetuates, among other things, active vs. passive dichotomies in installation art.[230] While not applicable to every single interactive media installation, this dichotomy, I posit, is evident in *Untitled 5*.

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[226] Kate Mondloch. *Screens: Viewing Media Installation Art.* (Minneapolis, MN: University of Minnesota Press, 2010), pp. 25-6. The theories that Mondloch is referencing here are those related to contemporary art practices that are "influenced by Marxist critiques of alienation, phenomenological critiques of Cartesianism, and poststructuralist critiques of authorship." (Mondloch, 2010. p. 25)

[227] Ibid.

[228] Ibid., p. 26.

[229] Ibid.

[230] Ibid. Active vs. passive dichotomies are rhetorical tools used by academics to describe binary distinctions in specific media and modes of spectatorship. When manifested in installation art, these dichotomies, for Mondloch, are problematic because they assume, amongst other things, that one entity is more involved in the installation and, has more influence over its reception than other entities located in the same artwork that are framed as passive. Thus viewer participation, she argues: "emerges as a form of submission." (Mondloch, 2010. pp. 25-26).

Interaction in *Untitled 5*, for instance, is understood by Stern and Utterback to constitute an open-ended invitation from the artist to the viewer to create, participate and become, to a certain extent, co-creator of the work.[231] Utterback, as Stern states: "invites participants to make and find meaning in and with and as an embodied and relational corpus".[232] Contrary to Stern, I argue that the invitation that Utterback extends to the visitor, while embodied and meaningful, is not reciprocal or interactive. Rather, the interaction occurring in her work can be understood as a set of semi-choreographed reactions performed by a subject who is responding to a very constrained set of computerized actions that have been pre-programmed by an active yet absent Artist. That is to say, the supposedly open-ended interactive exploration occurring in *Untitled 5* is imposed on the visitor by the artist and the technical and aesthetic make-up of the installation itself. In this way, *Untitled 5* unintentionally creates an active vs. passive dichotomy by pitting an active Artist against a passive visitor. *Untitled 5*, I suggest, is not, as Utterback and Stern argue, an open-ended participatory experience, but rather should be seen, to use Mondloch's words, as a "controlled space of passive response".[233]

Given this, I posit that *Untitled 5* is simply reinforcing a standardized vocabulary of visual motifs and modernist categories of art and technical production – specifically an understanding of art as the manifestation of a detached, genius subject as raised by Amelia Jones (2006).[234] Reinforcement of these notions is only exacerbated in Stern's analysis of Utterback's work – particularly in his statement that the on-screen compositions in *Untitled 5* reference "the affective and performative…. possibilities of Abstract Expressionism à la Jackson Pollock".[235] So, while Utterback is attempting to go beyond the surface of the machine by prioritizing the aesthetic aspects of her artwork, *Untitled 5* could be criticized for replicating problematic representationalist systems and contemporary modes of artistic practice.

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[231] Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* (Canterbury, UK: Gyliphi Limited, 2013), p. 134.
[232] Ibid.
[233] Kate Mondloch. *Screens: Viewing Media Installation Art.* (Minneapolis, MN: University of Minnesota Press, 2010), p. 26.
[234] Amelia Jones. *Self/Image: Technology Representation and the Contemporary Subject.* (New York, NY: Routledge, 2006), pp. 2-3. The only difference between Jones's theorization and the way Utterback has been positioned is that Utterback is female instead of male. In this sense, *some* progress has been made.
[235] Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* (Canterbury, UK: Gyliphi Limited, 2013), p. 136. The comparison between Utterback and Pollock's work has only intensified since Utterback received a McArthur Fellowship in 2009. For more information on the McArthur Foundation and Utterback's award, visit The McArthur Foundation website at: https://www.macfound.org/fellows/67/

In a series of conversations and texts, Jacques Derrida (1992, 2000) addresses some of the issues discussed above – specifically those around binaries, dichotomies and the contradictory nature of interactivity – via notions of the gift and hospitality. Derrida (1992) argues that the notion of the gift is a "transcendental illusion".[236] This is because a gift, in the true sense of the word, must be located outside a set of oppositional or binary demands (I give, you take or I act, you react) and beyond any self-interest or calculated reason (I am giving you X because I expect something in return or I am asking you to interact because I want you to contribute to the artwork).[237]

Furthermore, for Derrida, a gift is a transcendental illusion because it is negated by anything that acknowledges it as a direct act of giving (monetary compensation, a simple thank you) as this acknowledgement presumes that one entity (the entity that gives or acts) is no longer indebted to the other (the entity that receives or reacts).[238] Significantly, the entities involved in this transaction enter into an endless cycle of giving and taking in which a gift must be accompanied by an appropriate response. For Derrida, it is this part of the give/take cycle (the fact that a gift is associated with a command to respond on behalf of the receiver) that is an issue, as this response, he argues, is imposed on the receiver. Therefore, Derrida suggests that a gift, in its true form, is almost always impossible because it is almost always conditional.[239] Given this, Derrida argues that a gift, be it a present that you give to a friend, or the invitation that Stern claims Utterback (the giver) is extending to the gallery visitor (the recipient) described above, requires absolute anonymity of the giver to be unconditional. Absolute anonymity is important because it means that no one participating in the give/take cycle can claim any kind of benefit or is obliged to respond. However, this requirement, for Derrida, can never be fulfilled. Thus, the notion of the gift, the act of giving and the possibilities that surround it are inextricably linked with their impossibility.[240] In short, for a gift to be a gift, it must be given anonymously, without any expectation on behalf of the entity that is giving, of a response of any kind from the receiver, or that they (the giver or the receiver) will be able to gain some sort of benefit. A gift for Derrida then is almost always an impossible scenario, as genuine giving does not exist.

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[236] Jacques Derrida. *Given Time I: Counterfeit Money*. tr. Peggy Kamuf. (Chicago; London: University of Chicago Press, 1992), pp. 29-30.
[237] Ibid.
[238] Ibid., pp. 13-15.
[239] Ibid., pp. 4, 29-30.
[240] Ibid., pp. 29-30.

The same could be said for the use of interactivity in *Untitled 5*. When theorized in direct relation to new media, interactivity, according to Martin Lister (2009), signifies the users' "ability to directly intervene in and change the images and texts that they access".[241] Lister argues that: "In interactive multi-media texts there is a sense in which it is necessary for the user to actively intervene; to act as well as viewing or reading in order to produce meaning."[242] Given this, the subject interacting with new media, of any kind, becomes a "'user' rather than the 'viewer' of visual culture".[243] This is exactly the type of interactivity employed in *Untitled 5*. For example, I have the ability to directly intervene in and change, as noted above, the size, shape and trajectory of the images (the dots, the splotches, the lines) in this installation. I am thus interactive – I am a viewer/participant, rather than simply a viewer because I am directly affecting the outcome of the installation via my presence and movements in space. However, there is an expectation of interaction on my behalf, embedded in this piece. In fact, *Untitled 5* demands that I interact with it in order for it to work – a demand that I am obliged to respond to. This expectation is reiterated in Utterback's artist statement. "Integral to the piece", she writes "are the animated mark's cumulative interaction with each other over time. As a person moves through the space, a colored line maps his or her trajectory across the projection. When a person leaves the installation, their trajectory line is transformed by an overlay of tiny organic marks. These marks can now be pushed from their location by other people's movement in the space."[244] In its constant bid for my active involvement, *Untitled 5* and the invitation it extends to interact runs the risk of becoming a command, and in turn I run the risk of becoming a submissive user – an entity that must respond in a predetermined or compulsory way, rather than open-endedly explore and create. Given this, interactivity in *Untitled 5*, like the notion of giving as theorized above, is almost always an impossible scenario, as true interactivity does not exist in this work.

This impossibility for Derrida is intensified in the concept of hospitality.[245] The concept of hospitality, like that of the gift, for Derrida, contains a double logic, as he argues that absolute hospitality is not a possible scenario. Hospitality, Derrida writes, should extend an open-ended, unconditional invitation to those that request it.[246] However, this invitation, he

[241] Martin Lister. *New Media: A Critical Introduction.* (London, UK: Routledge), p. 22.
[242] Ibid.
[243] Ibid.
[244] Camille Utterback. *Untitled 5*. (2004). Found online at: http://camilleutterback.com/projects/untitled-5/
[245] Jacques Derrida. *Of Hospitality/Anne Dufourmantelle invites Derrida to Respond*. tr. Rachel Bowlby. (Stanford University Press: Stanford, California, 2000), pp. 75-59.
[246] Ibid., pp. 17-23.

tells us, is a paradox, in that it always comes with limitations.[247] To summarize his argument, when theorized from within the context of immigration and the right to asylum in the European Union, absolute hospitality should offer an unconditional "right of refuge" to those who request it.[248] Yet, the right of refuge and immigration in general, he states, are always restricted by laws and other various mechanisms of control (citizenship, finance, religion, language, ethnicity) which are implemented by the State or nation. These limitations can create tensions between groups of people (subjects who can and subjects who cannot immigrate) and contradictions between altruistic theories of hospitality and how this concept is enacted in practice.

Derrida continues arguing that in order to be hospitable, to extend any kind of invitation, you must have the power to host – to welcome visitors into your country, or as in this instance to extend an invitation to interact with your artwork. In this way, hospitality is aligned with ownership and, to an extent, self-identity (I am a nation, I am an artist, I run a country so I can issue you a visa, I have created a work of art so I can ask you to interact with it).[249] Furthermore, in order to be hospitable, the host must place limitations on the behavior of their visitors (enter my country but have the correct papers, look at my art but do not touch it). Limitations are put into place precisely because if visitors are given complete unrestricted freedom, then the host is no longer being hospitable as the host is no longer in control of the situation. In this way, hospitality, for Derrida is inextricably linked to notions of power and control and therefore exclusion.[250]

My argument is that the concept of interactivity, like the ideas of giving and hospitality, is a paradox. On the one hand, concepts of interactivity should, as Stern states, provide the visitor with an invitation to explore connections between physical bodies and representational systems and to create different ones; to become co-creator of an artwork.[251] In fact, interactivity is essential to many new media artworks – especially to *Untitled 5*. For example, *Untitled 5* would not work if a visitor was not present to interact with it, as the projected images depend entirely on visitors' presence and movement in the gallery space. So, there is

[247] Jacques Derrida. *Of Hospitality/Anne Dufourmantelle invites Derrida to Respond*. tr. Rachel Bowlby. (Stanford University Press: Stanford, California, 2000), pp. 23-29.
[248] Ibid.
[249] Ibid., pp. 29, 45.
[250] Ibid., pp. 151-5.
[251] Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* (Canterbury, UK: Gyliphi Limited, 2013), p. 134.

a degree of reciprocity, vis-a-vis interaction, happening in *Untitled 5* and therefore the open-ended invitation to become co-creator mentioned above holds some degree of legitimacy.

On the other hand, interactivity in *Untitled 5* is constrained. What a visitor can or cannot do in the installation is regulated by the underlying technological and representational systems that allow the work to function, the interests of the artist and, to an extent, by the invitation to interact itself. While they can be, at times, problematic, these constraints and limitations are of critical importance to the artwork. For example, *Untitled 5,* as Utterback tells us, contains "custom video tracking and drawing software [that] outputs a changing wall projection in response to the activities in the space".[252] So, as discussed earlier, I enter the gallery space and move to the left of the screen. The aforementioned software records my presence and movements, processes this information and it is projected onto the left hand side of the screen as a mark, which I can move. However, I have no control over the shape, size, color and the motion of this mark. Rather these attributes are pre-determined by the software – software that was purposefully created by the artist for this particular installation. Nor am I given control over other attributes of the artwork (the size and shape of the screen, the placement in the gallery). These attributes are also determined by the artist, curators and preparators and by the limitations of the gallery space. Restrictions are put into place, precisely because if I was given complete, unrestricted creative freedom to interact then the artist would not be able to claim creative control over the artwork. Given this, interactivity does not turn me into a co-creator. Rather I become an interloper, a migrant, a "gallery visitor" who makes minor modifications to an artwork, which can ultimately be retracted by the artist (the sole creator) at a later date. Simply put, without regulating visitor interaction, *Untitled 5* would not be interactive new media art, rather, I argue it would be something akin to chaos.

Interaction, especially interaction in *Untitled 5,* I argue, is a paradox, because it extends (or, it could be argued, imposes) an open-ended invitation to the visitor to explore and to create, while at the same time regulating and restricting their behavior. Interactivity then is presented in a relation of contradictions in which notions of unfettered creative freedom and concepts of cybernetic control remain irreducible to, yet also indissociable from, each other. Furthermore, the mere presence of restrictions in *Untitled 5* creates contradictions between what interactivity is conceptualized as being (an open-ended, unconditional invitation to create) and what interactivity actually is in practice (closed, conditional and regulatory).

[252] Camille Utterback. *Untitled 5*. (2004). Found online at: http://camilleutterback.com/projects/untitled-5/

Thus, the use of interactivity in this work raises a series of questions: By asking a visitor to interact, is Utterback demanding a response? If so, how should a visitor respond to this invitation – especially if she does not have prior knowledge of the representational structures that underlie the artwork? Is the visitor actually "interactive" or is she simply participating in a closed cybernetic feedback-loop consisting of pre-programmed actions and reactions? What these questions demonstrate is that interactivity is a contradictory, paradoxical concept that cannot be solved as it exists in a state of irreconcilable tensions. The difficulty of interactivity, I argue, like the difficulty of hospitality and giving, lies in the negotiation the viewer/participant performs between the two contradictory imperatives of interactivity: the invitation to unconditional creative freedom and the restrictive limitations set by the systems that it operates in.

Representational systems, like interactivity, can be, as Barad writes: "sometimes explicitly theorized in terms of a tripartite arrangement… in addition to knowledge (i.e., representations), on the one hand, and the known (i.e., that which is purportedly represented), on the other, the existence of a knower (i.e., someone who does the representing) is acknowledged."[253] When the acknowledgement of a creator happens, Barad posits that "it becomes clear that representations are presumed to serve a mediating function between independently existing entities".[254] Barad argues that this assumption of mediation is significant, because, like the tensions and contradictions discussed above, it creates a gap between the subject and the object.[255] This proposed gap raises more questions, this time around the accuracy of representations, concepts of mediation and of creation, creativity and creators in interactive media installations. What exactly is it that is being mediated and why is it being mediated? Who or what is doing the mediation? Who exactly is the artist in this installation? Is it Utterback? Is it the visitor? Or a combination of both?

In an attempt to explore similar questions, scholars and artists like Barad, Stern and Utterback struggle to develop understandings of the possibilities for interventions that move beyond the restrictive frameworks of representationalism. It is possible to construct coherent philosophical positions that begin to critically question the basic premises of these aforementioned notions. However, completely breaking the dichotomies ((inter)active vs.

[253] Karen Barad. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning.* (Durham, NC: Duke University Press, 2007), p. 46.
[254] Ibid.
[255] Ibid.

passive), bridging the object/subject gaps and resolving the contradictions they create is not as simple as it appears. It requires, as Barad posits, "a rethinking of the nature of a host of fundamental notions such as being, identity, matter, discourse…and agency".[256]

I argue that one such rethinking occurs in *Untitled 5*. For instance, instead of trying to fill this gap between the subject and the object and resolve the tension it creates through the acknowledgement of the existence of a singular creator, or "artist", Utterback exploits it. This exploitation occurs, as Roberto Simanowski (2011) states, because Utterback has turned the body of the visitor into a paintbrush – an artistic instrument employed in an ever-changing visual feedback system.[257] In other words, the visitor's body has become the primary mode of aesthetic expression in *Untitled 5*. Designation of the human body as paintbrush is significant for Simanowski, because it breaks with traditional representational theories that treat the visual experience of the visitor as the object of perception.[258] Thus, it enhances and critically examines, rather than suppresses, the human body's role in the processes of perception and image making. As Simanowski writes: "Although traditional Western art…served the eye as locus of perception, in interactive art, the interface is no longer exclusively focused on vision but engages the entire body and turns it into a privileged site for experience."[259]

Following on, by engaging with *Untitled 5* and the underlying technological and aesthetic systems that bring it into being, the visitor is not simply operating the artwork; rather, she is embodying it. The ability to embody technology emerges out of the fact that the visitor can manipulate information in *Untitled 5*. In this way, embodiment and the embodiment of technology represents more than the visitor's interaction with physical and virtual images. I argue it denotes her participatory status as an embodied subject, or viewer/participant, in it. What is required, then, in *Untitled 5* is not for the viewer/participant to become "interactive", but for the viewer/participant to contribute aspects of her own evolving material ontology to her experience through her engagement with, and embodiment of, the artwork itself. An understanding of *Untitled 5* that takes account of the fact that the viewer/participant, the images projected onto the screen and the processes that bring them into being are not

[256] Karen Barad. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning.* (Durham, NC: Duke University Press, 2007), p. 46.
[257] Roberto Simanowski. *Digital Art and Meaning: Reading Kinetic Poetry, Text Machines, Mapping Art and Interactive Installations.* (Minneapolis, MN: University of Minnesota Press, 2011), p. 124.
[258] Ibid.
[259] Ibid.

ontologically separate entities, has the potential to open up a space for a different, more critical approach to thinking about the digital interface. I argue it points to the development of different ways of working with, in and possibly, beyond, what could be seen as inadequate definitions of the digital interface in interactive media art installations.

The Digital Interface is Obsolete

Before I continue, it is important to clarify what I mean when I say that the term digital interface – defined as a device that acts and reacts to viewer/participant interaction – is inadequate when applied to interactive new media installations. While I am positing that certain definitions of the digital interface are unsatisfactory, it does not mean that I am stating that the interface is not physically there, or that the processes that it embodies are nonexistent in interactive new media installations.[260] The digital interface does physically exist, as will be demonstrated throughout this thesis. Rather, echoing new media artist Stelarc's critique of assumptions about the body and technology in his technologized performances – specifically his statement that "the body is obsolete" – I am arguing in very simple terms that particular understandings of what a digital interface is, its meaning, functions and physical form in interactive new media installations, have, to a certain extent, changed, resulting in the need for some new, more complex articulations.[261] My intention in employing Stelarc's theory of obsolescence is not to argue for "change" via analogy – to say that "old" theories of the digital interface are a priori bad and "new" rethinkings are "good" simply because an artist advocates for obsolescence. My aim in engaging with Stelarc's conceptualization is to reveal contradictions within traditional theories of the body and its relationship to technology, linking my analysis of the digital interface in interactive new media installations to a certain type of philosophical post-humanist critique of technology: one that complicates, and attempts to think beyond, humanist frameworks of the body, technology and art.[262] In this way, Stelarc's practice become a vehicle for me to think about the use of the digital interface

[260] The processes that the digital interface embodies include the biological, the technical, the cultural, the social, the political and the aesthetic.

[261] Joanna Zylinska and Gary Hall. "Probings: An Interview with Stelarc" in *The Cyborg Experiments: The Extension of the Body in the Media Age*. ed. Joanna Zylinska. (London: Continuum, 2002), p. 114.

[262] I am drawing on a post-humanist theorization that Rosi Braidotti (2013) sees as "an opportunity to empower the pursuit of alternative schemes of thought, knowledge and self-representation." (Braidotti, 2013 p. 12). The notion of obsolescence informs Stelarc's practice – specifically his performance-based works like *Ping Body* (1996) and *The Third Hand* (1980-1998), in which he turns his physical body into an interface, via the use of robotic extensions. *Ping Body* and *The Third Hand* are incredibly interesting artworks, which are not analyzed here. Rather, Stelarc's practice – specifically his notion of obsolescence – becomes a vehicle for me to think about the use of the digital interface in interactive new media installations. For an interesting analysis of these works, see Adrian MacKenzie (2002), Gary Hall (2002), and John Appleby (2002).

in interactive new media art installations with. For example, borrowing Stelarc's theory of obsolescence, its particular linguistic figuration and his conceptualization of the body that underpins his statements and practice, and applying it to the interface, enables me to suggest that the digital interface is not a passive, technical device that merely registers the actions of the viewer/participant and then reacts to them. Therefore, any theorization of the digital interface that positions it as this type of device is obsolete in interactive new media installations.

However, as Stelarc rightly points out, while the body, when theorized as "a kind of Cartesian theater of 'I'", may be obsolete, we (humans) "cannot discard the body. It is not the object manipulated by the subject".[263] The body, instead, he writes, is a "…total physiological, phenomenological, cerebral package that operates in the world. The body, for me, is an all-inclusive word – not a word that splits from the realm of mind or that should be distinguished from the realm of the mind."[264] Here Stelarc is arguing for a theorization of the body as a relational site of possibilities – one that positions, and thus reinforces, the co-constitution of the human and technology. The body to Stelarc is "not merely a passenger."[265] Instead, mirroring Bernard Stiegler's (1998) theory of original technicity discussed in the introduction, the body, Stelarc writes: "has always been a prosthetic body.… I've never seen the body as purely biological, so to consider technology as a kind of alien other that happens upon us at the end of the millennium is rather simplistic."[266] So, when Stelarc insists that "the body is obsolete" or that "the self is no longer meaningfully located in the biological body" he is not stating that the physical body itself has disappeared.[267] Rather, I understand him to mean that specific reconfigurations of the body (as separate biological subjects that use technologized objects), positionings of the physical body (as purely biological or located above or inside technology) and notions of the self (as a singular individualized Cartesian

[263] Joanna Zylinska and Gary Hall. "Probings: An Interview with Stelarc" in *The Cyborg Experiments: The Extension of the Body in the Media Age*. ed. Joanna Zylinska. (London: Continuum, 2002), p. 121.
[264] Stelarc, quoted in Meredith Jones and Zoe Sofia. "Stelarc and Orlan in the Middle Ages." in *The Cyborg Experiments: The Extension of the Body in the Media Age*. ed. Joanna Zylinska. (London: Continuum, 2002), pp. 59-60.
[265] Stelarc. "Towards a Compliant Coupling: Pneumatic Projects, 1998-2001" in *The Cyborg Experiments: The Extension of the Body in the Media Age*. ed. Joanna Zylinska. (London: Continuum, 2002), p. 73.
[266] Joanna Zylinska and Gary Hall. "Probings: An Interview with Stelarc" in *The Cyborg Experiments: The Extension of the Body in the Media Age*. ed. Joanna Zylinska. (London: Continuum, 2002), p. 114. Originary technicity, as explicated by Stiegler, is a theory, which positions the human subject as constituted by technology. Humans, for Stiegler, can never be, and have never been, separate from technology, as previously believed, nor do technological entities lack agency, because humans are fundamentally constituted by, through and with technology. (Stiegler, 1998. p. xi)
[267] Ibid., p. 122.

agent) never actually existed as such. The deployment of the digital interface in Romy Atchuv and Camille Utterback's interactive new media installation *Text Rain* (1999), and the resulting viewer/participant interaction that emerges out of it, is a paradigmatic example, for me, of Stelarc's understanding and use of the notion of obsolescence.

Text Rain consists of two large parallel walls located directly in front of, and behind, the viewer/participant.[268] The wall located in front of the viewer/participant serves as a cinematic screen and features projected video. The other wall is painted white, with a wash of bright light down it. Together these walls create a corridor in the gallery space.[269] When a viewer/participant passes through the corridor, a closed circuit camera captures a photographic recording of her.[270] This photographic recording is sent to a computer where it is processed and projected on to the screen. The recording is controlled by the viewer/participant.[271] (Figure 24)

Figure 24: C. Utterback, *Text Rain*. (1999).

Thus, the projected photographic recording becomes the digital interface in this work. The recording is the digital interface because it is liminal; it acts as a mediator between entities (the viewer/participant, the on-screen images) and it allows the viewer/participant to, among other things, navigate the installation and engage with the visual information projected onto the wall. One consequence of this designation is a more radical understanding of the digital interface. That is to say, the digital interface in this work cannot be defined principally by a

[268] Camille Utterback, *Text Rain*. (1999). Found online at: http://camilleutterback.com/projects/text-rain/
[269] Ibid.
[270] Ibid.
[271] Ibid.

medium (painting, sculpture, video) or an occupation with media itself, but should rather be defined by the operations of its own system. The digital interface then is not a particular object or a specific ephemeral artistic practice. I posit instead that the digital interface becomes a digital interface in conjunction with the interactions that the viewer/participant makes with it.

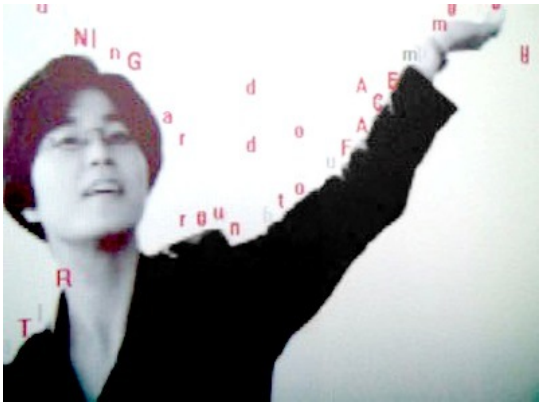

Figure 25: C. Utterback, *Text Rain*. (1999).

For instance, located on the wall of *Text Rain* are colored letters.[272] (Figure 25) These letters fall down from above and gather around the edges of any entity projected on the wall. The letters are pre-programmed to take on the behaviors of physical phenomena that the viewer/participant is intimately familiar with – specifically precipitation.[273] The letters are also pre-programmed to respond to physical forces such as gravity, as well as the movements of the viewer/participant.[274] So, if a viewer/participant holds her arms out or lifts a leg and then stands still, the letters that accumulate around the edges of her limbs begin to form sentences.[275] If enough letters accumulate along her outstretched limbs, she can catch an entire word, or even a phrase. If she moves, the letters resume their fall.[276]

Watching the letters pool around the edges of the photographic recordings, or fall off the surface of the screen, encourages the viewer/participant to, as Jay Bolter and Diane Gromala

[272] Camille Utterback, *Text Rain*. (1999). Found online at: http://camilleutterback.com/projects/text-rain/
[273] Ibid.
[274] Ibid.
[275] Ibid.
[276] Ibid. The letters are taken from Evan Zimorth's poem *Talk, You*. The full poem can be found in Zimroth's book *Dead, Dinner, or Naked* (1993).

(2005) state, "instantly want to play, making visual and verbal patterns by holding the letters in their hands or along their arms".[277] (Figures 26 & 27)

Figure 26: C. Utterback, *Text Rain*. (1999).

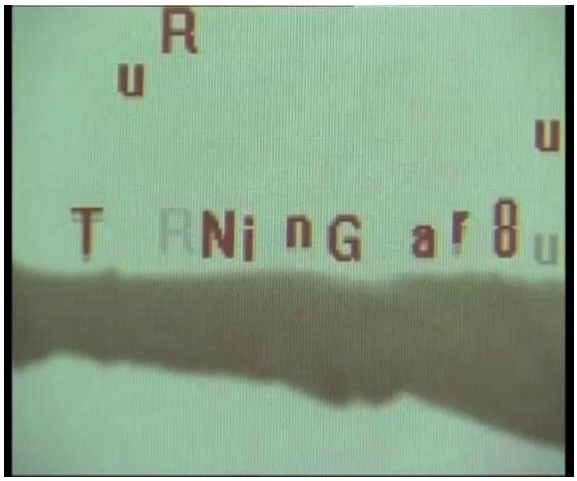

Figure 27: C. Utterback, *Text Rain*. (1999).

This simple, creative act of play performed by the subject in this work, they argue, "transforms the viewer into a user" or viewer/participant.[278] It also, as they suggest, changes the way we think about the digital interface. For without the viewer/participant the piece is incomplete – there is nothing on the screen but the falling letters. As they write: "*Text Rain* is

[277] Jay Bolter and Diane Gromala. *Windows and Mirrors: Interaction Design, Digital Art and the Myth of Transparency.* (Cambridge, MA: MIT Press, 2005), p. 12.
[278] Ibid., p. 13.

a text that its viewer-users help to create, a text that they write in the process of reading."[279] The "viewer-users" experience and the digital interface itself "comes from the interaction of the viewers with the creators' design. *Text Rain* is as much an expression of its viewers as it is of its creators."[280] Thus, they argue that *Text Rain* could be theorized as an artwork about the ongoing co-constitutive process of its own making.[281]

The questions around the inadequacy of the digital interface that I am exploring via *Text Rain* are less directly about how interfaces have changed or how certain definitions of interfaces have become obsolete in a linear or progressive sense (i.e., the move from technical instrument, to symbolic screen, to abstract embodied organism). They rather revolve around how *concepts* that inform the digital interface and *the digital interface as a physical entity itself* are located and relocated in theoretical frameworks in the media studies field. I am also interested in the potential that creative rethinking and repositioning of the interface in interactive new media installations can have for breaking binary narratives around technology. Returning to Stelarc's theory of obsolescence will allow me to begin to suggest some alternatives in this regard.

Rooted in discussions around human-machine interactions and the notion of the cyborg, Stelarc begins his exploration by asking the question of whether "a bipedal, breathing body with binocular vision and a 1400cc brain is an adequate biological form".[282] It is this naturalized definition of the human body, as Gary Hall (2002) tells us, rather than "some machinic post-human hybrid, which is Stelarc's object for re-design".[283] Hall continues by adding that just because this particular definition of the body is obsolete does not mean that we can simply discard it.[284] Doing away with it, he states, would reduce any creative (re)configurations of the body to a "linear teleological narrative, a narrative in which the biologically given human body is abandoned in favour of some post-human cybersystem".[285] Stelarc's notion of obsolescence, then, is not about the end of our physical bodies in lieu of some cybernetic other. It is rather, as Hall states, about "the end of technology – or at least a

[279] Jay Bolter and Diane Gromala. *Windows and Mirrors: Interaction Design, Digital Art and the Myth of Transparency.* (Cambridge, MA: MIT Press, 2005), p 15.
[280] Ibid., p. 13.
[281] Ibid.
[282] Stelarc. Earlier statements. Found online at: http://www.stelarc.va.com.au/earliertexts.html
[283] Gary Hall. "Para-Site" in *The Cyborg Experiments: The Extension of the Body in the Media Age*. ed. Joanna Zylinska. (London: Continuum, 2002), p. 135.
[284] Ibid.
[285] Ibid.

certain conception of technology which… has dominated Western thought for almost three thousand years".[286] The specific view of technology that Hall is referring to here is the Aristotelian one.

As mentioned earlier, Aristotelian positions on technology consider technology as separate from the human being. Thus technology, when theorized from an Aristotelian point of view, is considered to be an extraneous tool used by humans to accomplish specific goals. In these conceptualizations, technology is simply considered a means to an end. These theories create divisions between the human, technology and, by extension, the artwork by positioning technology as something exterior to human nature. Stelarc's concept of obsolescence (and the resulting performances that emerge from it) then should not be seen as Cartesian high-tech fantasies of transcending the body via technology. Stelarc's concept of obsolescence is about revealing the reductive nature of discourses about technology and our human relationship with it in the media studies field, and then about reconfiguring them.

The notion of obsolescence exposes a fundamental problem with traditional theories of digital interfaces: the desire, on behalf of some theorists and artists, to position interfaces as technologized Others – as empty alien objects that are separate from the human interacting with them.[287] By critically questioning narratives about the relationship between the body and technology via notions of obsolescence, Stelarc is able to confront and undermine this position. He accomplishes this, as Hall states, by arguing, and then demonstrating in his art practice, that "technology is both fundamental to, and a disturbance of, our sense of the human".[288] In doing this, Stelarc enables the relationship between the body and technology to be seen, in Hall's words "as an irruption of the other, the unforeseen disrupting the very criteria in which it would have been captured".[289]

In other words, Stelarc's questioning of, and experimentation with, the idea of "the human" and its obsolescence dismantles naturalized descriptions of the human body, technology and our relationship with technology, exposing their simplicity and, in effect, their inadequacy. In doing so, our relationship with technology is not seen as one of opposites (a distinct human

[286] Gary Hall. "Para-Site" in *The Cyborg Experiments: The Extension of the Body in the Media Age*. ed. Joanna Zylinska. (London: Continuum, 2002), p. 137.
[287] Theorists who do this include, but are not limited to Manovich 2002, Chun 2008, Hansen, 2006, 2013, Stern, 2011, 2012.
[288] Gary Hall. "Para-Site" in *The Cyborg Experiments: The Extension of the Body in the Media Age*. ed. Joanna Zylinska. (London: Continuum, 2002), p. 140.
[289] Ibid.

self and an empty technological object) or antagonism (an "originary" or pure human body vs. the alien technological Other) but as a relational and co-constitutive part of humanity. In this way, Stelarc's concept of obsolescence can offer us a theoretical framework to analyze the relationship between the digital interface and the viewer/participant in interactive new media installations. When the relationship between the human and technology is theorized as the merger of one human entity and one foreign technological object, what is at stake is neither futuristic ideology nor a repetition of a symmetrical past and future. Rather, it is similar to the contradictions referenced by Derrida above – or as Hall terms it, "undecidability".[290] Instead of attempting to resolve this confusion by creating conceptual distinctions between objects and subjects, by conflating people (the subject, the artist, the theorist) and things (technology, the artwork), Stelarc, like the viewer/participant in *Text Rain,* described above, embraces it via playful experimentation. "Undecidability" then becomes important because it has the potential to produce different types of communication and interaction that allow for different, more performative and more productive explorations, and for potential repositionings of technologies such as the digital interface in interactive new media installations.[291]

If we take this to be the case, if *Text Rain* can be seen, as Bolter and Gromala argue, as an installation about its own making, and if, as Stelarc argues, the concept of obsolescence and the process of art making itself are about "exposing, undermining and developing alternative strategies and aesthetics" via exploration, then the interface in *Text Rain* cannot be positioned as a neutral object.[292] Nor can the viewer/participant be theorized as a subject that has been absorbed into or negated by technology. These specific understandings of the digital interface simply do not apply to this installation. Instead, I posit the digital interface in this work emerges out of, and in conjunction with, viewer/participant's interactions with it and in doing this it generates contradictions and undecidability, thus providing us with alternative possibilities and strategies for conceptualizing and interacting with the digital interface.

For example, the digital interface in *Text Rain* is not an illustrative or self-explanatory object. Rather, it builds on and remediates the aesthetic mediums (video, film, photography) that

[290] Gary Hall. "Para-Site" in *The Cyborg Experiments: The Extension of the Body in the Media Age*. ed. Joanna Zylinska. (London: Continuum, 2002), p. 140.
[291] Ibid.
[292] Jay Bolter and Diane Gromala. *Windows and Mirrors: Interaction Design, Digital Art and the Myth of Transparency.* (Cambridge, MA: MIT Press, 2005), p. 13. Stelarc. *Earlier statements*. Found online at: http://www.stelarc.va.com.au/earliertexts.html.

precede it. It also borrows from and remediates (not simulates) the "reality" (the gallery space, the viewer/participant's body). It shapes the information that it is conveying (the text, the images of the viewer/participant) and is shaped by the physical space and the viewer/participant interacting with it. So, when I state that certain theorizations of digital interface are inadequate, I mean that the digital interface may sit there, as a piece of preprogrammed hardware, or a projected image of the viewer/participant in an interactive new media installation. However, I argue the "essence" of it – the thing that makes a digital interface a digital interface – does not exist before the viewer/participant interacts with it in interactive new media installations.

My intention in the rest of this chapter is therefore not to argue that the digital interface as a physical object itself has disappeared. It most certainly exists. Rather, I posit the term "digital interface" is the name given to the active form by those that create, analyze and use it, and that draws upon, produces and constantly reproduces the complex and dynamic processes that constitute it. In this way, I can begin to suggest that the processes that make up the digital interface, and to a certain extent the digital interface itself, become both reciprocal and open to reconfiguration. The digital interface, then, as exemplified above, becomes both an active and integral part of the relationships that it contains and remediates, as well as a deeply entangled part of the system that constitutes the interactive new media installation. This system includes the artists, the viewer/participant, the interface and the interactive new media installation itself. By rethinking the digital interface in terms of its specific dynamism (as an object that acts and reacts) in interactive new media installations, I may begin to question how it is perceived by the viewer/participant, constructed and deployed by artists and utilized by the viewer/participant. It also allows me to begin to introduce a much more networked model of the digital interface in interactive new media installations – one that (re)positions the relationship between the digital interface and the viewer/participant as co-constituted and relational.

If the Digital Interface Is Obsolete, Then What Is a Digital Interface?

The digital interface, for Galloway (2012), is the term used to describe the physical device that acts as the point of transition between the "different mediatic layers within any nested [technological] system".[293] He continues by positing that the interface is "assumed to be synonymous with media itself" thus "any given format finds its identity merely in the fact

[293] Alexander Galloway. *The Interface Effect* (Cambridge: Polity Press, 2012), p. 31.

that it is a container for another format, the concepts of interface and medium quickly collapse into one and the same thing".[294] Digital interfaces, he states, are "effects," in the sense that "they bring about transformations in material states".[295] Therefore, echoing Marshall McLuhan's (1964) famous phrase "the medium is the message", Galloway posits that interfaces are "processes", or more precisely, after-effects of these processes that "effect a result of whatever kind" in the space that they are located in.[296]

In his theorization, Galloway presents us with recognizable definitions of the interface: the threshold, the virtual window, the doorway, the cause and the after-effect. He then complicates them by acknowledging that the interface is not as rigid a form as his initial analysis may suggest.[297] Through a close reading of François Dagognet's book *Faces, Surfaces, Interfaces* (1982), Galloway admits that there are indeed "complex things that take place inside that threshold".[298] The interface, for Galloway, is not as transparent and simple a device as his examples (video games, commercial illustrations) and definitions (doorways, frames, windows) may indicate. Interfaces, he argues, exist on the boundary of "something else", in that they construct and then maintain a "purely artificial distinction" between "edge and center".[299] The interface is, he writes, "a fertile nexus… a special place with its own autonomy, its own ability to generate new results and consequences".[300] By acknowledging the fact that the digital interface is an autonomous agent that has the potential to create change, Galloway recognizes (but does not actively articulate), the notion that the interface is a relational, co-constitutive form. Thus, he is able to offer a more media-ecological account of the digital interface.[301]

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[294] Alexander Galloway. *The Interface Effect* (Cambridge: Polity Press, 2012), p. 31.
[295] Ibid.
[296] Ibid. "The medium is the message" is a phrase coined by Marshall McLuhan in his text *Understanding Media: The Extensions of Man* (1964). Very simply, it means that the form of a medium embeds itself in the message, creating a symbiotic relationship by which the medium influences how the message is perceived by the viewer/participant.
[297] Ibid., p. 32. The notion of the door, the window, the mirror and the frame as interface, is as Galloway points out "a myth branded by Microsoft, but is promulgated across all personal computer platforms". (Galloway, 2012. p. 148, n.1). I argue that this myth has penetrated the art world as well and is promoted through both artworks and critical theory. A number of theorists address this issue in full, including Friedberg (2006) and Gromala and Bolter (2003).
[298] Ibid., p. 33.
[299] Ibid., p. 32.
[300] Ibid., pp. 32-33.
[301] Media Ecology, according to Joost van Loon is a trajectory of theorizing media and technology. It reflects the "insistence on the relationship between the development of media and the influence of the impact on their environment as a dynamic system". (van Loon, 2007, p. 21). Galloway's account of the digital interface could be seen as media ecological, as he argues that the digital interface is a relational technological, biological and sociopolitical effect.

Branden Hookway (2011) builds on Galloway's analysis, focusing on the digital interface and its uses in architecture and computer science.[302] He describes the digital interface as a "theoretical mechanism: a form of relation defined by the simultaneity of processes of separation and augmentation".[303] He continues by stating that while the interface may seem to be a form of technology, it is "more properly a form of relating to technology".[304] Therefore, the interface, to Hookway, is a biological and technical form of relation that is able to draw upon and produce both behavior and action, and to "ascribe meaning to the discrete elements it brings into relation as to the mutualism or system that is its end result".[305] The direct acknowledgement of the relational qualities of the digital interface is one of the multiple things that differentiates Hookway's definition from Galloway's.[306] I argue that it is precisely this acknowledgement that allows Hookway to begin to develop what he terms a more "rhizomatic" theory of the interface.[307]

Like Andersen and Pold's notion of interface criticism, which advocates for a critical exploration of the relationship between the biological and the technological, Hookway's theory involves an investigation into how "problems in the relationship between human and machine are worked through in the realm of the production of subjectivity and experience".[308] Contrary to Andersen and Pold, who believe that the essence of the interface lies in the fact that it is an assemblage, Hookway argues that the key to the interface rests in its ability to blur the boundary between the human and the machine.[309]

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[302] Branden Hookway. *Interface: A Genealogy of Mediation and Control.* Unpublished PhD Dissertation, Princeton University. Ann Arbor: ProQuest/UMI 2011, p. 4.
[303] Ibid.
[304] Ibid., p. 12.
[305] Ibid., p. 4.
[306] Hookway's investigation also differs from Galloway's in the sense that Hookway's goal is to study the use of the interface in architecture, whereas Galloway's goal is to study the use of the interface in the humanities. Hookway takes a more theoretical approach to the digital interface whereas Galloway is more methodologically based.
[307] Branden Hookway. *Interface: A Genealogy of Mediation and Control.* Unpublished PhD Dissertation, Princeton University. Ann Arbor: ProQuest/UMI 2011, p. 4.
[308] Ibid.
[309] Ibid., p. 290. Christian Ulrik Andersen and Søren Bro Pold. "Interface Criticism, Aesthetics Beyond Buttons" in *Interface Criticism: Aesthetics Beyond Buttons*. ed. Christian Ulrik Andersen and Søren Bro Pold. (Arhaus, DK: Arhaus University Press, 2011), p. 10. The digital interface is an assemblage for Andersen and Pold because it is a "combination of signals and signs, computation and medium, executive buttons and alluring metaphors." (Andersen and Pold, 2011)

While this blurring is of critical importance to the development of an interface theory, it can be, as Hookway cautions, problematic when directly applied to certain types of interfaces.[310] Blurring, he writes: "requires the adoption of an additional set of assumptions at a cultural level wherein humanness and machine-likeness are developed as metaphors to be applied to one another and the grounds of their essential difference are leveled."[311] Here, Hookway is stating that while very useful at times, the idea that the interface can blur the boundary between humans and machines can become highly contested when directly applied to certain deployments of the interface, as these theories are predicated on notions of sameness and employ normative definitions of intelligence.[312] Echoing Lucy Suchman's critical reading of the notions of symmetry and asymmetry, Hookway argues that a post-cybernetic interface theory must begin with the assumption that "an elision between the human and machine has already taken place, and that human subjectivity has already fully become a hybrid or cyborg subjectivity".[313]

Additionally, the concept of blurring, as Hookway points out, also operates under the false assumption that the biological has seamlessly merged with the technological and become a hybrid form.[314] Such an understanding of the digital interface, for Hookway, is questionable, because it positions the human and technology as equal.[315] Not only that, but it takes for granted the hybrid nature of the digital interface and its ability to contribute to its environment. In doing this, I argue, and Hookway seems to agree, that the human and the nonhuman, their individual agencies and subjectivities, the differences between and their similarities to each other are sanitized and collapsed into a singular reified object, stripping away any possibility of hybridity from the interface other than through the actual rhetorical performance of it.[316]

One way to combat the issues mentioned above, as Hookway informs us, is to make sure that this blurring is "always specific to its use within the interface where the issue of its

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[310] Branden Hookway. *Interface: A Genealogy of Mediation and Control.* Unpublished PhD Dissertation, Princeton University. Ann Arbor: ProQuest/UMI 2011, p. 291. Hookway is specifically discussing interfaces that incorporate artificial and ambient intelligence and are deployed in a computer science context.
[311] Ibid., p. 290.
[312] Ibid.
[313] Ibid., p. 291. Hookway is echoing, Lucy Suchman's (2007) statement that instead of taking positions "deemed 'true' at a particular moment as explicable by nature, and only those considered 'false' as amenable to social analysis, all scientific positions should be analyzable in the same terms". (Suchman, 2007. p. 28). However, he does not directly reference Suchman in his text.
[314] Ibid.
[315] Ibid.
[316] Ibid., pp. 290-291.

construction and transmission between human and machine is critical and problematic".[317] Here Hookway is arguing for a theorization of the digital interface that takes its ability to blur the lines between the human and machine as medium- (or interface-) specific and inconsistent, instead of believing it to be a standardized, one-size-fits-all solution.[318] The development of any interface theory that is predicated on the notion of the blurring of the human-machine boundary, Hookway explains, must begin "with an assumption of discontinuity" between the two entities that are being analyzed.[319] Analogous to notions of asymmetry as raised by Suchman, this discontinuity, as Hookway states, is described "not through similarities or as a smooth transition but rather as an encounter between entities that remain ultimately incommensurable and yet are nonetheless bound together".[320] Incommensurability, he notes, does not equal illegibility, the way it does for Galloway.[321] The fact that the entities the interface consists of are all distinct from one another, for Hookway, does not render it unworkable.[322] Rather, Hookway claims that the interface's legibility lies in its "production of control".[323] Interface theory, to Hookway, then, is "not a study of how social and cultural factors have impacted the development of scientific methods of technology".[324] Instead, the interface (the technological), he states, enfolds the non-technological (the human, the social).[325] Enfoldment occurs in two ways: through the production of "a hybrid self" and in its "operation upon its human subject".[326] By

[317] Branden Hookway. *Interface: A Genealogy of Mediation and Control.* Unpublished PhD Dissertation, Princeton University. Ann Arbor: ProQuest/UMI 2011, p. 291.
[318] Ibid.
[319] Ibid. p. 276.
[320] Ibid. Asymmetry, for Lucy Suchman (2007) means that humans and computers are not the same, thus they cannot be theorized as being such. (Suchman, 2007) Asymmetry and its connection to concepts of agency and autonomy will be developed in further detail in chapter 3.
[321] Ibid., p. 296.
[322] Alexander Galloway. *The Interface Effect.* (Cambridge, UK: Polity Press, 2012), p. xx. It is important to note that the notion of unworkability, for Galloway does not mean that technology is ineffectual or inert. Rather, the interface for Galloway is always unworkable because a human must interpret it and no two interpretations are ever the same. The intent of the interface is always obfuscated, thus the interface is unworkable. (Galloway, 2012. p. 54)
[323] Branden Hookway. *Interface: A Genealogy of Mediation and Control.* Unpublished PhD Dissertation, Princeton University. Ann Arbor: ProQuest/UMI 2011, p. 277. An example of legibility via control, Hookway states, can be found in the way a pilot flying a plane, air traffic control managers located on land and the automated controls in a cockpit work together to create a path through and navigate airspace. The pilot of the plane receives details of the flight before the flight. S/he reviews this information, maps out the flight plan and files it with air traffic control members. Once approved, the pilot inputs this information into a collection of computerized subsystems that help control various aspects of a flight. The pilot constantly monitors these components, and they react in response to what is needed.
[324] Ibid., p. 291.
[325] Ibid.
[326] Ibid. The creation of this hybrid self, Hookway notes, does not occur through cybernetic erasure but through the maintenance of the "boundary between the human and machine". (Hookway, 2011)

approaching the notion of blurring as an integral yet problematic part of the digital interface, I argue that Hookway is able to position it as an asymmetrical form or medium. Thus, he is able to present a more dynamic theory of the interface – a theory that I believe is far more meaningful and productive than its cybernetic predecessors.

As mentioned above, Hookway states that the hybridity of the interface is produced through the maintenance of the boundary between the technical and the biological, while Galloway declares that the hybridity of the interface emerges through, and out of, its unworkability. This emphasis on the hybrid nature of the interface enables Galloway and Hookway to remain critical and avoid empty instrumentalism. However, I believe that their notions of hybridity when applied to the interface in interactive new media installations are troubling. This is because these notions assume intentionality (on behalf of artists and the viewer/participant) and suggest, among other things, that digital interfaces are produced, and thus become, hybrid forms through some sort of start-to-finish production process. In other words, I am arguing that Hookway and Galloway are conflating the open-ended nature of production and interaction – processes, which Barad (2007) argues, are dynamic, complex and "continually reworked as a result of human, nonhuman and cyborgian forms of agency" – with Fordist assembly line-like repetitions and maintenance of fixed mechanical processes.[327] So while they fit, to an extent, their specific fields and objects of study, Galloway and Hookway's questions about the interface are more about how these hybrid commodities are produced, and the power that they may or may not carry, instead of hybridity itself. Suchman seems to confirm this line of argument: the power of technologies like digital interfaces, she writes, is attributed in part to their "transgressive hybridity, a 'detached and machinist mode of production that provided intimate and private knowledge' for anybody to see".[328] Following on from Suchman, I suggest that the digital interface in interactive new media installations must not be understood in linear terms and reduced to a quantifiable mechanism of production, exchange, agency or power, but as consisting of multiple, open-ended centers of production, power and exchange. More precisely, I argue that the digital interface should be seen as a relational and co-constitutive place of production, power and exchange existing among, and constantly communicating with, itself and with others. Seen from this perspective, the digital interface is an integral part of the installation that it helps create.

[327] Karen Barad. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning.* (Durham, NC: Duke University Press, 2007), p. 238.
[328] Lucy Suchman. *Human Machine Reconfigurations: Plans and Situated Actions.* (Cambridge, UK: Cambridge University Press, 2007), p. 233.

Why, however, is it more productive to think about the digital interface in the terms described above? It is because thinking about the digital interface as a relational, co-constitutive entity that exists among and communicates with other similar, but different, entities allows me to begin to combat some of the more problematic aspects of theories of the interface, as well as provide some alternatives. For example, by conflating open-ended notions of production with linear cause and effect maintenance processes, Galloway and Hookway end up stripping the interface (the nonhuman entity) of agency. They quantify and standardize, and thus erase, the differences that contribute to the construction of the digital interface as a hybrid entity. In doing this, they create boundaries between the human and the nonhuman, therefore their analysis of the digital interface reverts back to the same deterministic control paradigms that they criticize. Galloway and Hookway's explorations then can not only be seen as theories of the digital interface, but I argue they can also, to an extent, be viewed as illustrations of the issues that occur when theorizing complex technological systems like digital interfaces.[329] However, what Hookway's description of the interface and Galloway's notion of unworkability do suggest is that the digital interface is "un-representable" in the sense that the language used to define and describe the digital interface is in no way specific to it. This suggestion opens up possibilities for different theories of the digital interface to emerge – theories that position it, as Suchman does, as an "encounter among the efforts and effects of specifically situated persons and things".[330] These efforts, effects, persons and things operate in a specific cultural and historical framework that Suchman argues, "takes autonomous agency not as an effect of cutting" the system that they are a part of, but rather as "the precondition for participation in it".[331] Thus, the issue, as Suchman rightly points out, is less the attribution of agency to technology and more the fact that "our language for talking about agency… presupposes a field of discrete, self-standing entities".[332] As an alternative, she suggests we view interfaces as "entities achieved only through the on-going enactment of separateness and always in relation with others".[333]

[329] These problems include, but are not limited to notions of symmetry, isolationism, stability and linearity.
[330] Lucy Suchman. *Human Machine Reconfigurations: Plans and Situated Actions.* (Cambridge, UK: Cambridge University Press, 2007), p. 280. In the case of interactive new media installations these efforts and effects include, but are not limited to: the artist(s) the viewer/participant, the media theorist, the digital interface, the aesthetic make-up of the installation itself as well as the multiple processes and practices that bring these entities into being.
[331] Ibid., p. 257.
[332] Ibid., p. 263.
[333] Ibid., pp. 263 & 257.

New media artist Daniel Rozin's *Rust Mirror* (2009) provides one such example of Suchman's suggestion above in the sense that it positions the digital interface as a hybrid entity – one that is separate from (in that it is a different type of entity), but emerges out of and in conjunction with the viewer/participants' interactions with it. *Rust Mirror* consists of a computer, mechanical motors, a camera and an audio system. It is rectangular in shape and its surface is covered in 768 rusted steel tiles.[334] When a viewer/participant walks in front of *Rust Mirror*, the camera captures an image of her, which is sent to a computer, where it is processed.[335] This newly processed data changes the state of the tiles. It sets them in motion causing them to tilt towards the light source, or down, towards the gravel, located at the base of the installation, which also reflects light.[336] The tilting of the tiles creates an image of the viewer/participants' body.[337] (Figure 28)

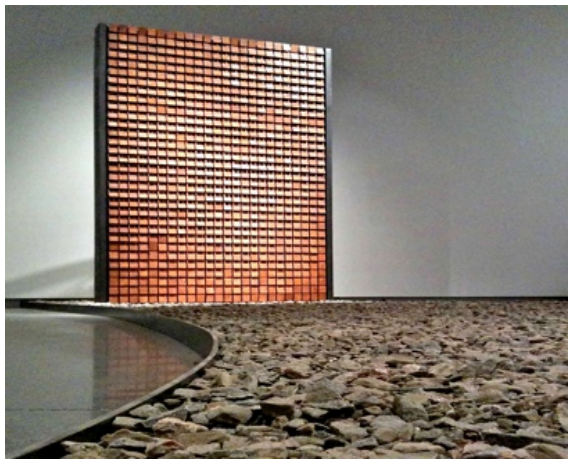

Figure 28: D. Rozin, *Rust Mirror*. (2009)

If a viewer/participant walks directly up to the work to get a closer look, *Rust Mirror* is programmed to zoom in on the image of the viewer/participant and project an enlarged segment of the image onto its surface.[338] The viewer/participant can control this image by moving her physical body. (Figure 29)

[334] Daniel Rozin. *Rust Mirror,* (2009). Found online at: http://www.smoothware.com/danny/rustmirror.html. Rust Mirror is part of Rozin's *Mechanical Mirror* series (1999-Present). These works consist of large-scale interactive display surfaces, or "mirrors" of various shapes, sizes and objects. While they all have different dimensions and consist of diverse materials, the mirrors, as Rozin states: "share the same behavior: any person standing in front of these pieces is instantly reflected onto its surface." (Rozin, 2016).
[335] Ibid.
[336] Ibid.
[337] Ibid.
[338] Ibid.

Figure 29: D. Rozin, *Rust Mirror*. (2009)

For example, if a viewer/participant lifts a leg, or bends down to touch the gravel, the image located on the surface of the mirror also lifts a leg or bends down. In this way, the viewer/participant's projected image becomes the digital interface. This is because the image allows the viewer/participant to, among other things, navigate the installation and engage with the information projected onto the mirror. The more the viewer/participant interacts with the work, the more the tiles move or "rain" until, as Rozin states: "the storm of rain droplets [the moving tiles] completely overcomes the image of the viewer, this also produces a loud rumble of rain produced by the motors and the tiles."[339] When the viewer/participant steps away from the work, the movement of the tiles settles and its surface returns to its original blank state.

However, the projected image (the interface) is not a device that acts and reacts, or a transparent representation of meaning (of the artist) and intent (of the viewer/participant) and therefore they cannot be read in this way. Theorizing the digital interface like this is troubling as it simply replicates the notions raised above that interfaces, and their consequent functions and designs, are intentionally produced and then continually maintained as hybrid forms, that there is no real distinction between experiences and perceptions of the object, and thus it is simply the job of the media theorist to objectively examine them.[340] It also imposes constraints on, as well as suppresses rather than promotes and encourages, creative

[339] Daniel Rozin. *Rust Mirror,* (2009). Found online at: http://www.smoothware.com/danny/rustmirror.html.
[340] My analysis echoes, to a certain extent, what both Jones (2006) and Barad (2007) see as the distinction "between the thing-in-itself and our [human] perception of it". (Barad, 2007, p. 427 n50)

theorizations of the digital interface in interactive new media installations. Instead, building on Suchman's alternative approach to the digital interface briefly explained above, I argue that there is no ontological separation between the objects (the projected image, the tiles that make up the surface of the mirror, the gears and chips located in the mirror) and the subjects (the viewer/participant, the other human and nonhuman entities) located in the same space.[341]

For instance, located inside *Rust Mirror* are a series of computer chips and mechanized motors.[342] These motors flip the rusted steel tiles based on the pre-processed video stream that it has received from the camera, towards or away from the light source located directly above the piece.[343] The image of the viewer/participant that appears on the mirror's surface is based on the ability of the computer chips to break down an incoming, moving color video stream into a black-and-white image and then recreate and sustain this contrast between light and dark patterns. The digital interface in *Rust Mirror* then appears, but not through separate interactions of human and nonhuman agents or the maintenance of these interactions by some other invisible pre-programmed entity located inside the machine. Instead, it manifests itself through the interactions that the entities that constitute the artwork make *in conjunction with* each other. It is through this interaction that I suggest that each one of the 768 squares of rusted steel assumes a new identity and becomes a hybrid entity. They each become a single pixel – or a tiny digital interface – working *in conjunction with* the other rusted steel sheets, gears, microchips, light source and the viewer/participant to become a part of a larger digital interface: the viewer/participant's image.

The fact that the each of these elements must interact *in conjunction with* each other to create the image suggests that the hybrid nature of the digital interface in this work is not inherent. For, as stated above, the image of the viewer/participant located on the surface of the mirror is the result of the open-ended and shifting interaction between the situated elements and entities located both inside and outside the installation space (Rozin, the gears, the rusted steel tiles, the viewer/participant interacting with the work and those observing it). Thus, the entities that form the mirror and their interactions with each other create change, or produce an image of a viewer/participant on the mirror's surface. The image of the viewer/participant in *Rust Mirror* then, is called into being, becomes and is constantly becoming a digital

[341] Suchman's argument is that interfaces, associate "disparate elements both within and beyond its frame at the same time that those elements are essential to its intelligibility and efficacy". (Suchman, 2007)
[342] Daniel Rozin. *Rust Mirror.* (2009). Found online at: http://www.smoothware.com/danny/rustmirror.html
[343] Ibid.

interface in and through the *intra-actions* (mutual co-constitution) that the viewer/participant makes with it. Therefore, the digital interface in *Rust Mirror* can be seen as an example of Suchman's understanding of interfaces as asymmetrical hybrid entities achieved through mutual co-constitution in the sense that they produce themselves. The digital interface is not only a reciprocal, active and integral part of *Rust Mirror*, but the projected image of the viewer/participant, as a digital interface, can be seen as a performative process – one that emerges out of its similarities and differences in conjunction with itself.

If the distinction between the digital interface and the viewer/participant in *Rust Mirror* is not inherent, and if the digital interface emerges as a performative process out of, and in conjunction with, itself, it could be suggested that the digital interface constitutes a relationship that is, as Hookway states, "already given to be composed of the combined activities of human and machine".[344] A digital interface, he states, has "much to say about the processes by which it comes into being".[345] Thus, he rightly concludes, any attempt to define the digital interface would be difficult. As he writes:

> What is essential in a description of the interface lies not in the description of the qualities of a substance or a thing but rather the qualities of a relation between substances or things; it is also to say that such a relating may have its own qualities and characteristics that are attendant to but otherwise independent of the substances or things that are brought into relation and that this relation may have its own tendencies and persistence such that it may be described as possessing a form.[346]

Here, Hookway is suggesting that the interface is a form of relation – one that draws upon its own effects, and the effects of others, and that performatively produces itself.[347] When the digital interface is theorized as an active form of relation, it cannot be concretely defined as this or that. While the relationships and individual parts that make-up the digital interface can be stabilized or separated temporarily to fix a problem or conduct an investigation into how they work, the interface cannot be reduced down to its constituent elements. The digital interface only comes into being (it can be viewed as an entity in its own right) when the activity of the processes that it consists of "brings about the production of a state or system

[344] Branden Hookway. *Interface: A Genealogy of Mediation and Control.* Unpublished PhD Dissertation, Princeton University. Ann Arbor: ProQuest/UMI 2011, p. 1.
[345] Ibid.
[346] Ibid., p. 2.
[347] Ibid.

that is mutually defined through the regulated and specified interrelations of those distinct entities or states".[348] Thus, Hookway argues, the digital interface is a paradox: one can describe, but cannot concretely define the digital interface.[349]

An Exploration of its Processes

Galloway reiterates Hookway's sentiments, proposing a material and semiotic close reading of the interface.[350] Yet Galloway's aim is not to define or describe the digital interface.[351] Doing this, he suggests, would simply re-enact the specific historical relation that he sees the digital interface embodying.[352] Rather, by proposing a material and semiotic close reading, Galloway hopes to "*identify the interface itself as historical*", thus producing a perspective on how technical production and "the socio-historical situation" can come together to create the form that is the digital interface.[353] Galloway's ultimate purpose, then, is to reveal that his specific approach to the digital interface "is itself an interface".[354]

To argue this point, Galloway embarks on his exploration of the digital interface from the perspective of its supposed significations, concentrating on the specific areas of storing, transmitting and processing.[355] He continues by stating that these significations are not the conditions of media, rather they are modes of mediation.[356] Drawing on the notion of dispositif as theorized by Giles Deleuze (1992), Galloway argues that digital interfaces are techniques or after-effects of the "physical systems of power they mobilize, that is more on the curves of visibility and lines of force".[357] Therefore, the movement from thinking about media to mediums, to mediation, from defining digital interfaces as empty objects, to describing them as symmetrical possibilities, to exploring them as performative processes, as

[348] Branden Hookway. *Interface: A Genealogy of Mediation and Control.* Unpublished PhD Dissertation, Princeton University. Ann Arbor: ProQuest/UMI 2011, p. 2.
[349] Ibid., p. 3.
[350] Alexander Galloway. *The Interface Effect* (Cambridge: Polity Press, 2012), pp. 29-30.
[351] Ibid.
[352] Ibid., pp. 29-32. The historical relation, for Galloway is the one between the socio-political and technical or the "new economy." (Galloway, 2012)
[353] Ibid., p. 30. Galloway's emphasis.
[354] Ibid., pp. 29-30.
[355] Ibid., p. 18.
[356] Ibid.
[357] Ibid. A dispositif, for Deleuze, is a multilinear apparatus that is comprised of lines that contain their own individual characteristics and differences. These lines, like the relationships that comprise the interface are not static, but subject to fracture and breakage. As he writes: "These apparatuses…are composed of the following elements, lines of visibility and enunciation, lines of force, lines of subjectification, lines of splitting, breakage, fracture, all of which crisscross and mingle together, some lines reproducing or giving rise to others by means of variations or even changes in the way they are grouped." In this way, these lines and relationships not only constitute the apparatus, but they also play a role in altering and pulling it apart as well. (Deleuze, 1992, p. 162)

linear as it may be, for Galloway is crucial.[358] This is because this movement reveals, among other things, different modes of storage, transmission, processing and interacting that may or may not have been accessible or apparent before.[359] Thus, he suggests a rethinking of the digital interface is not along the lines of "what is its definition?" or "what are its possibilities?"[360] This is because he argues that the digital interface is not "*of* an ontological condition, it is *on* that condition" and, as such, the digital interfaces "does not facilitate or make reference to a specific arrangement of being, it remediates the very conditions of being itself".[361]

Therefore, Galloway finds notions raised by Manovich, and to a certain extent Andersen and Pold, mentioned above, problematic in that they hold that the digital interface must be defined in reference to a specific "language" or described in terms of its material construction. Defining the interface in reference to a language, among other things, leads to, as Galloway writes, "a number of political and theoretical problems, the least of which is that it forecloses on contingency and historicity" of the entity being studied.[362] If we take this to be the case, if as Galloway and Hookway argue, the interface is not the definition of a condition, or a description of the possibilities of these conditions, but rather a critical exploration of them, then any attempt on my behalf to redefine the digital interface (as a sum total of its collective parts) or to separate it and then describe it based on the activities that these separate parts perform (communication, mediation, navigation), would only replicate the aforementioned dualisms that caused this definition to become inadequate in the first place.

Despite these crucial elaborations of the interface as a form of relation, it is not clear if Galloway or Hookway succeed in escaping the determinist definitions that they claim their rhizomatic descriptions and methodological cocktail-like approaches of, and to, the interface avoid. Although they protest against it, I argue that neither Hookway nor Galloway are fully able to avoid defining the digital interface as a sum total, or as an after-effect, of its relational parts. Thus, they end up reducing the digital interface to a facilitator: an epiphenomenon, a tool in service of "something else" (in both cases the socio-political) that they deem to be

[358] Alexander Galloway. *The Interface Effect* (Cambridge: Polity Press, 2012), p. 162.
[359] Ibid., p. 18.
[360] Ibid., pp. 18-19.
[361] Ibid., p. 21. Galloway is quick to point out that just because the interface is "on" an ontological condition does not mean that it "marks the way for some cyborg *Dasein*". This is because he argues that: "Being is its [the digital interface's] object, not its experience." (Galloway, 2012, p. 22)
[362] Ibid., p. 20.

more important. This, combined with the gap that exists in Galloway's theorization of the digital interface, seems to leave a question mark over Hookway's ability to articulate in clear terms how and why it is that the "interface as a form of relation emergent and operational from within a genealogy of mediation and control" accounts for the way aesthetic and cultural experiences contribue to, thus (re)shape, the digital interface.[363] Therefore, questions surrounding the artistic deployments and the power the aesthetic aspects of the interface hold seem to hang in the air, unaddressed, in both of these texts.[364] While theorized as co-extensive, the digital interface in their works functions as a symmetrical tool, a means to an end. Thus, these theorists do not so much remove, but ultimately alienate, the viewer/participant from the artistic process of both the artwork they are examining and the digital interface. As such, Galloway and Hookway's theorizations of digital interfaces only widens what Cramer (2011) sees as a rift between "the two cultures of science and humanities, engineering and contemporary art".[365] The type of interface that Galloway and Hookway propose, then, could be criticized for reducing the interface to a series of visual tropes, but also for perpetuating the notion that interfaces in fine art contexts are simply, as Cramer argues, "[a] pleasing rendering of visible, audible and touchable controls". [366] This is because Galloway and Hookway stretch the notion of the aesthetic in such a way that the examples they use to support their theorizations, to borrow Cramer's words, "miss the mark of any critical contemporary aesthetics".[367] In this way, I argue that Galloway and Hookway's analyses of the interface have, to a certain extent, removed themselves from contemporary aesthetic discourses, outside what is seen as functional play (video games), or utilitarian, craft-based systems (architecture, commercial illustration). Instead of being seen as aesthetic representations of interfaces operating from within a fine-art context (as both Galloway and Hookway claim they are), these examples become metaphors for the socio-political and technical processes that they see the interface consisting of.

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[363] Branden Hookway. *Interface: A Genealogy of Mediation and Control.* Unpublished PhD Dissertation, Princeton University. Ann Arbor: ProQuest/UMI 2011, p. 8. The gap is his avoidance of the cultural experiences of the relationship between the body and technology in lieu of a close reading of the socio-political and technical aspects of the digital interface.

[364] I do not think Hookway and Galloway are ignoring art. They use architecture, video games and commercial illustration as examples of interfaces. My point here is that their analysis leaves out critical components – specifically how the interface operates in a fine art context.

[365] Florian Cramer. "What is Interface Aesthetics, or What Could it Be (Not)?" in *Interface Criticism: Aesthetics Beyond Buttons*. ed. Christian Ulrik Andersen and Søren Bro Pold. (Arhaus, DK: Arhaus University Press, 2011), p. 122.

[366] Ibid., p. 123.

[367] Ibid.

In summary, Galloway and Hookway correctly call for a relational theorization of the digital interface. Ironically, however, they seem to assume that this relation and its consequential descriptions are ultimately derived from the socio-political and technical realms. They then support this theorization with utilitarian or craft-based aesthetic examples. That is to say, in Galloway and Hookway's aesthetic theorizations, there is very little fine art, and the fine art that does exist has been replaced with a socio-political ideology. I suggest that their theories of the digital interface fail to recognize, thus do not account for, the role that the aesthetic plays in the formation of the digital interface as an active and relational form. Hookway's "rhizomatic" descriptions and Galloway's methodological cocktail-like approaches of, and to, the digital interface then become exactly what they attempt to avoid – a reductionist definition of the interface as an after-effect of, or mediator between this and that, therefore simplifying the complex and ongoing relationships that the interface embodies.

So if, the digital interface constitutes a mutually productive relationship between the social, the political and the technical, and if the digital interface produces and constantly is producing itself, then what aspects of these processes are theorists like Galloway and Hookway actually accounting for? Are their theorizations of the interface as simply a socio-political and technical form the end result of a purely human or biological behavior? If so, how can we begin to develop an understanding of the digital interface that takes into consideration the dimensions that were intentionally or unintentionally excised?

To begin to unravel the meaning of these questions, we might consider Kelly Heaton's interactive new media installation *The Pool* (2000-2001).[368] *The Pool* consists of a 90" x 90" custom-designed wall.[369] The wall is painted white and shaped to resemble a meniscus.[370] Embedded into the wall are four hundred toy robots called Furby.[371] The Furby have been modified from their original state. Heaton has stripped them of their plush coverings and wired them together. She has then encased them in the wall so that only their "eyes" and "beaks" are visible to the viewer/participant. The disembodied Furby parts are arranged along

[368] Kelly Heaton. *The Pool.* (2001). Found online at: www.kellyheatonstudio.com/reflection-loop-2. *The Pool* is the major work from the series *Reflection Loop* (2001).
[369] Ibid.
[370] Ibid.
[371] Ibid. A Furby is an electronic robot marketed as a children's toy in North America. Furbys are deemed "intelligent" by the company that manufactures them (Hasbro) because they have the ability to communicate or "speak" with others, open and close their "eyes" and "beaks" and move. For more information, please visit: http://www.hasbro.com/en-us/brands/furby

the wall in such a way that they mimic a scientific diagram of the molecular structure of water.[372] (Figures 30 & 31)

Figure 30: K. Heaton, *The Pool*. (2000-2001).

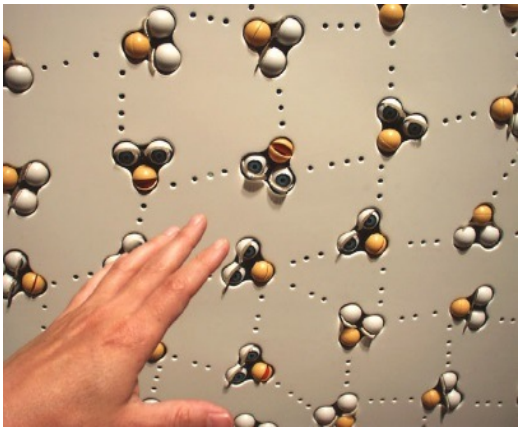

Figure 31: K. Heaton, *The Pool*. (2000-2001).

Subjected to manipulation, each Furby is chopped-up, gutted, reconfigured and they assume multiple new identities: a molecule, a specimen, a pixel, a digital interface, a subject and an object. Heaton has literally dissected both the conceptual idea of "The Furby" and the physical Furby itself, and corporeally transformed it, using its various parts to engender different artistic deployments of the digital interface. *The Pool* then explores notions about what the digital interface is, or could be, and by doing this Heaton reconfigures the digital interface as a source of uncertainty and potentiality. Although Heaton's deployment of the

[372] Kelly Heaton. *The Pool.* (2001). Found online at: www.kellyheatonstudio.com/reflection-loop-2

Furby as interface challenges us to think critically about notions like singularity (of the interface) and separation (of the object and the subject) in interactive new media art installations, her interface is a cybernetic one.[373]

Coined by Norbert Wiener in 1965, cybernetics is a term that names a "very general science of control and communication in the animal and the machine".[374] Cybernetics is a way to regulate machine-based systems by measuring their actual performance in real-time and feeding the results of this performance back into the machine, creating a continual feedback loop.[375] The purpose of this feedback loop according to Wiener, is "to control the mechanical tendency towards disorganization; in other words, to produce a temporary and local reversal of the normal direction of entropy".[376] Hayles (1999) critiques Wiener's notion of cybernetics, arguing that the premise of Wiener's cybernetic feedback loop (a way to control and manage information and interaction between the human and machine) disembodies the human subject, and creates boundaries between humans and nonhumans, thus exposing, among other things, an oppressive Cartesianism.[377] As she writes: "When the physical boundaries of the human form are secure, he [Wiener] celebrates the flow of information through the organism. All this changes, however, when the boundaries cease to define an autonomous self, either through manipulation or engulfment."[378]

These problems occur because the science of cybernetics, as Søren Brier (2008) states, "focuses not on being but on behavior: it does not ask, 'what *is* this thing?' but instead, 'what does it *do?*' Or how can we make a thing that does this?"[379] Therefore, the technologies examined and developed in first-wave cybernetics are not self-referential or autopoietic.[380] The entities studied, as Brier argues, are "all allopoietic, that is created and made by

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[373] Kelly Heaton. *The Pool.* (2001). Found online at: www.kellyheatonstudio.com/reflection-loop-2. While there are much richer and more developed approaches to cybernetics, Heaton's artwork employs first-order cybernetics. Therefore, it is analyzed using first-order cybernetic theory.
[374] Norbert Wiener. *Cybernetics: or the control and communication in the animal and the machine.* (Cambridge, MA: MIT Press, 1965), p. 11.
[375] Norbert Wiener. *The Human use of Human Beings: Cybernetics and Society,* (London: Free Association, 1950), p. 25.
[376] Ibid.
[377] N. Katherine Hayles. H*ow We Became Posthuman.* (Chicago IL: University of Chicago Press, 1999). Exposing this oppressive Cartesianism, Hayles argues, is important as she believes it undermines Wiener's notions of liberal humanism. (Hayles, 1999. p. 107)
[378] Ibid., p 107.
[379] Søren Brier. "Cybernetics" in *The Routledge Companion to Literature and Science*. ed. Bruce Clarke and Manuela Rossini. (London: Routledge, 2011), p. 89.
[380] Ibid. Autopoietic or autopoiesis refers to: "systems such as living cells, that are self-referential in that they are self-maintaining: they are themselves the product of their own operation." Autopoietic machines are studied and developed in the second wave cybernetics. (Brier, 2011)

something else, some other system".[381] Echoing Brier, Hayles and Wiener's theories and then building on them, a cybernetic interface from within the context of new media art, according to Pold (2011), is a form that is "constructed through a remediation of older representational forms… complete with their various traditions, genres and media characteristics".[382] It also incorporates cybernetic feedback and interaction, in that it allows the viewer/participant to "interact with its representations and it registers the user and his/her interactions through input devices, sensors and tracking".[383] Therefore, a cybernetic interface for Pold is a form that simultaneously builds on and incorporates "media history and aesthetic traditions of how to represent things in a way that are distinguishable and meaningful to human perception", and a computerized mechanism that contains "an action-reaction pattern which, through sensors, input devices, tracking, data-mining and surveillance, registers the recipient and incorporates his/her responses and reactions".[384] In this way, the cybernetic interface in new media art, he argues, is able to construct its own perceptional and representational feedback loop.[385]

Applying these notions to *The Pool*, the Furbys may exist as interfaces on many levels between hardware (physical motors, wires, computer chips), software (the layers of code that makes the installation and the interfaces work), human (the viewer/participant) and nonhuman (cybernetic robots). While they may demonstrate how art has the potential to critically explore and reconfigure notions of objects and subjects, and while they can be seen as a representational medium that is used for cultural production and experience, they are ultimately cybernetic toys. The digital interface (the Furby) is a cybernetic machine that, as Pold argues, treats all of the information in the installation "as sort of generalized, statistical text with no access to the ontology or semantics" of the information that it is receiving and processing (such as the viewer/participant movements or the meaning of her speech).[386] However, in the specific context of *The Pool*, the interface can also become an aesthetic form that has the ability to allow the viewer/participant to make conscious and unconscious

[381] Søren Brier. "Cybernetics" in *The Routledge Companion to Literature and Science*. ed. Bruce Clarke and Manuela Rossini. (London: Routledge, 2011), p. 90. Allopoietic or allopoiesis refers to a system that produces something outside the system itself. (Brier, 2011)
[382] Søren Bro Pold. "The Cybernetic Mentality and Its Critics: Ubermorgen.com" in *Interface Criticism: Aesthetics Beyond Buttons*. ed. Christian Ulrik Andersen and Søren Bro Pold. (Arhaus, DK: Arhaus University Press, 2011), p. 91. This definition is applied directly to the interface in net.art artist Ubermorgen.com's work.
[383] Ibid.
[384] Ibid., pp. 91, 93.
[385] Ibid., p. 92.
[386] Ibid., p. 96.

connections between machine, representation and culture. Thus, the interface in this work is simultaneously a technical tool, functional medium and an aesthetic form. While this designation as both technical tool, functional medium and aesthetic form demonstrates its cultural potential, it needs to be examined critically. This is because the Furby is a cybernetic system that statistically measures, interprets and records all the information in the environment that it is located in, and the human interacting with this device is always a part of this information.

For instance, each Furby in *The Pool*, according to Heaton, is "actuated by a motor to achieve two visible states, open (and talking) or closed (and silent)".[387] In addition, each Furby contains a microcontroller that prompts it to "speak" in response to the proximity of the viewer/participant.[388] To recap: when a viewer/participant walks into the exhibition space, she sees a large white wall covered from top to bottom with disembodied sleeping Furby faces. As she approaches the wall, a custom designed infrared detection system picks up her presence and causes the Furbys to open their eyes. If she walks right up to the wall, the Furbys respond to her by opening their beaks and "speaking".[389]

Thus, the distinction between digital interface (the object, the nonhuman) and the viewer/participant (the subject, the human) becomes blurred. Blurring occurs in this instance because the Furby is self-referential. It has the ability to "speak" and respond to speech. In this way, the Furby can be perceived by the viewer/participant as "intelligent" because it has displayed the elementary human-like ability of speech. While this self-referential "talk" may have the potential to encourage interesting types of human-to-human and human-to-computer interactions, the literal human-to-machine communication in this work can quickly become an issue. Particularly because it creates, among other things, a highly constrained looped dialogue between the viewer/participant and the interface. This dialogue, when theorized in combination with the blurring of the human-machine boundary, implies, as mentioned earlier, a generalized symmetry, rather than relationality between humans and technology. And this, of course, creates a range of problems, one of which is the personification of machines. The personification of machines tends to occur because, as Suchman (2007) argues, humans have a tendency to "ascribe full intelligence [to computerized forms] on the basis of partial

[387] Kelly Heaton. *The Pool.* (2001). Found online at: www.kellyheatonstudio.com/reflection-loop-2
[388] Ibid.
[389] Ibid.

evidence".[390] She continues by stating that as soon as these computational forms look, or act, remotely human, subjects will endow the computational form with other human-like traits and abilities. She further contends that subjects "take appearances as evidence for, or the document of, an ascribed underlying reality, while taking the reality so ascribed as a resource for the interpretation of the appearance".[391]

To put this differently, although the deployment of the digital interface in *The Pool* may highlight the uncertainty and potentiality that occur when objects and subjects are able to blur the lines between the human and the machine, the cybernetic character of the digital interface, as Pold states, "pervades both the machine and the medium".[392] Therefore, this particular deployment of the digital interface in *The Pool* could be read as problematic because the cybernetic functions of the Furby could be seen to influence the viewer/participants' interactions with the digital interface and the way the viewer/participant and the digital interface are positioned and analyzed. In this sense, the relationship between the digital interface and the viewer/participant, while active, is not co-constitutive. Rather, the aforementioned relationship in *The Pool* is presented to the viewer/participant as symmetrical. This is precisely because the blurring of the human-machine boundary (which occurs when a viewer/participant attempts to "talk" to the Furbys) incorporates the viewer/participant into it. Thus the viewer/participant becomes, to a certain extent, part of the interface's cybernetic system herself.

However*, The Pool*, with its dissected cybernetic interface, its symmetrical subjects and objects, and its self-referential dialogue, could be seen as an example of an artwork that critically questions concepts of equivalence, seamlessness and erasure, exposes their flaws and then turns them back against themselves. It does this not through outright opposition, but through replication and parody. In this way, I suggest that the digital interface in *The Pool,* and *The Pool* as an installation, is a playful cybernetic criticism of a cybernetic system. For example, rather than arguing against a system and a mode of thinking that it is an integral and active part of, *The Pool*, with its fragmented interface (the cybernetic Furby) and its underlying scientific significance (the shape of its wall, the arrangement of the Furbys and

[390] Lucy Suchman. *Human-Machine Reconfigurations: Plans and Situated Actions.* (Cambridge, UK: Cambridge University Press, 2007), p. 41.
[391] Ibid., p. 48.
[392] Søren Bro Pold. "The Cybernetic Mentality and Its Critics: Ubermorgen.com" in *Interface Criticism: Aesthetics Beyond Buttons*. ed. Christian Ulrik Andersen and Søren Bro Pold. (Arhaus, DK: Arhaus University Press, 2011), p. 97.

Heaton's dual role as artist and taxidermist), could be understood as questioning the validity of, and then poking fun at, this cybernetic system and its dubious claims of relation. Instead of expanding discussions around seamlessness or how humans retain a distinct form that is categorically different from technology, even though the two can be "interactively coupled", I argue that *The Pool* exposes the flaws in and around cybernetic systems and human-machine couplings through parodying itself. In doing this, *The Pool* provides its viewer/participants with both an alternative and a means to exploit this goal-oriented cybernetic thinking.

Galloway explores ideas surrounding cybernetics, mutual co-constitution and its associated issues discussed above and applies them to the digital interface in video games. He states that these concepts, operating in conjunction with the scientific disciplines of game theory, systems theory, information theory and behaviorism, all point to second-wave cybernetics.[393] He argues that with second-wave cybernetics, concepts such as play in video games, or other creative pursuits such as interactive new media installations, adopt "a special interest in homeostasis and systemic interaction".[394] "The worlds' entities", as Galloway posits, "are no longer contained and contextless but are forever operating within ecosystems of interplay and correspondence."[395] As such, second-wave cybernetics, he writes, is an amalgamate of socio-cultural production, romanticism and systems theory that is centered on "economic flows and balances, multilateral associations between things, a resolution of complex systemic relationships via mutual experimenting, mutual compromise, mutual engagement".[396] Thus, an interface in cybernetic terms is a place where information passes from one entity to another, from one node to the next, in a nested system.[397] This definition is important for Galloway, as it allows him to suggest that the interface is first and foremost "a control allegory".[398] By control allegory he means that the digital interface in the context of second-wave cybernetics is theorized as a networked, computer-centric mode of interaction – one that allows subjects to move and act "freely" and navigate without being confined, yet still be controlled (subjects actions are site-specific and constrained by the underlying rules of the

[393] Alexander Galloway. *The Interface Effect* (Cambridge: Polity Press, 2012), p. 28. Second-wave cybernetics differs from first-wave cybernetics, as briefly mentioned above, because the devices created and studied in the first wave, among other things are seen to be allopoietic whereas those developed and examined in the second wave are assumed to be autopoietic.
[394] Ibid.
[395] Ibid.
[396] Ibid.
[397] Ibid.
[398] Ibid.

program itself).[399] Digital interfaces, Galloway argues, can be seen as apparatuses of power and control because they regulate and confine communication and interaction between entities.[400] Thus, he writes: "despite its unsexy presence informatics of control is precisely the most important thing… if one wishes to allegorize power today."[401]

However, the interface in acting as a control allegory, Galloway states, "asks a question and, in so doing, suggests an answer".[402] If we take this to be the case, if the interface really does ask questions and suggest answers, thus indicating a way towards a specific methodological stance, then the main issue at stake when proposing an alternative theorization of the digital interface is to critically examine, and then attempt to answer, the question posed by the digital interface, whatever it may be, and in whatever context it is being studied. I argue that the question that the anthropomorphized, cybernetic Furby in *The Pool* is posing to us (as well as the question that the digital interfaces in all the interactive installations explored in this chapter are also asking), is the following: What actually counts as a viewer/participant, and what actually counts as a digital interface in interactive new media installations? This in itself, I suggest, is a question of agency and autonomy insofar as it aligns itself with what Suchman states is the "longstanding feminist concern" with the problem of who and what is recognized as an autonomous subject, and who and what is not, in discourse in the STS and humanities fields.[403] Following on from Suchman, I argue that my often repeated phrase "what exactly is a digital interface?" is not so much a question about actions (of the viewer/participant) and responses to these actions by the digital interface. I posit it is a question of who or what is recognized as a digital interface (an object), who and what is not and how and why these interfaces emerge in interactive new media installations. An investigation into this question points to some of the inadequacies in the theories of the digital interface discussed thus far, specifically to the manner in which their analysis of the interface as a socio-political after-effect or control allegory reinforces, among other things, the binary of visibility/invisibility.[404] In this regard, Galloway's interpretation of Norman

[399] Alexander Galloway. *The Interface Effect* (Cambridge: Polity Press, 2012), p. 28.
[400] Ibid.
[401] Alexander Galloway. "Playing the code: Allegories of control in *Civilization*" in *Radical Philosophy* 128 (November/December 2004), p. 33.
[402] Alexander Galloway. *The Interface Effect* (Cambridge: Polity Press, 2012), p. 30.
[403] Lucy Suchman. "Agencies in technology design: Feminist reconfigurations." *Unpublished manuscript*. (2007). Found online at: http://www.lancs.ac.uk/fass/sociology/research/publications/papers/suchman-agenciestechnodesign.pdf
[404] Very simply put, the binary of visibility/invisibility, is a process in which, as Peggy Phelan (1993) states: "the paradox of using visibility to highlight invisibility". (Phelan, 1993, p. 96)

Rockwell's iconic illustration *Triple Self-Portrait* (1960) serves as an interesting critical example to conclude this chapter with.[405] (Figure 32)

Figure 32: N. Rockwell, *Triple Self-Portrait*. (1960).

Triple Self-Portrait, according to Galloway, "presents a dazzling array of various interfaces".[406] By various interfaces, he is referring to the frame, mirror, canvas, the images of the artists contained in the illustration and to the illustration itself.[407] The images of the frame, mirror and canvas, to Galloway, are interfaces because they perform (through the acts of framing and reflecting) a mediating function.[408] The images located in the frame, mirror and the canvas, are interfaces as well because they depict information differently. For example, Galloway claims that the image located in the mirror is subjective because it is expressive, whereas the image located on the canvas is objective because it is presented to the viewer as technical or mechanic. The images on the sides of the canvas are also interfaces, he writes, because they are "a prototypical interfaces of early sketches… serving as a prehistory of malformed image production".[409] In short, these images are interfaces because they are archaeological – they provide the viewer with historical and theoretical background into the

[405] Alexander Galloway. *The Interface Effect* (Cambridge: Polity Press, 2012), pp. 34-39. *Triple Self-Portrait* consists of an image of Rockwell, seated in front of a white canvas. Located inside the canvas is a half-finished illustration of the artist. The sides of the canvas are littered with images of self-portraits of other famous artists alongside sketches of Rockwell. To the left of the canvas, there is a mirror. An image of Rockwell is reflected in this mirror.
[406] Ibid., p. 34.
[407] Ibid.
[408] Ibid., p. 35.
[409] Ibid.

art-making process. Finally, the illustration itself is an interface because, Galloway argues, it augments the interaction occurring between the viewer and the magazine.[410]

What Galloway is doing in his analysis is presenting us with four different types of objects: objects that mediate information (the frame, the canvas, the mirror), objects that interpret or translate information (the images of Rockwell), objects that act as a transparent layer between the processes that brings information into being and the information itself (the sketches of the artists on the side of the canvas) and, finally, objects that augment or supplement the viewer's interaction with information (the illustration). He then positions these objects as interfaces precisely because they frame, mediate, interpret and supplement information. Thus, Galloway's analysis engages the status of the interface (the iconic nature of certain types of interfaces: doors, windows, frames) but also the reification of it through the artistic process. The elements appearing in the illustration however do not become interfaces just because they have the ability to perform the aforementioned functions. Instead, Galloway rightly suggests that one must examine the "local relationships" and ask how these relationships work together to produce objects (the interface) and subjects (viewer/participants) in artworks.[411]

As argued at the beginning of this chapter, representationalist approaches are rooted in Cartesian modes of thinking in that they replicate notions of separation and distance. Due to the enforced fragmentation that they impose upon reality and that they then take for a supposedly objective picture of the world, they should be regarded, as Barad rightly states, with suspicion.[412] Barad continues this line of thought via a close reading of Judith Bulter's (1990) critique of representational systems. Simply put, representational systems, Barad states, form, define and reproduce subjects and objects, and they do this "in accordance with the requirements of those structures."[413] Representationalism, then (re)produces subjects and objects, and these subjects and objects reflect the underlying politics or beliefs of the systems, philosophies and philosophers they represent. If we take this to be the case, then the system that Galloway employs to theorize and designate the objects in *Triple Self-Portrait* as digital interfaces is a result of a very specific representationalist politics. In Galloway's case, this representational politics revolves around how cultural production and politics are

[410] Alexander Galloway. *The Interface Effect* (Cambridge: Polity Press, 2012), p. 35.
[411] Ibid.
[412] Karen Barad. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning.* (Durham, NC: Duke University Press, 2007), p. 47.
[413] Ibid.

interfaced together to produce a very specific socio-historical situation. The specific socio-historical situation that Galloway sees the digital interface reproducing is "the new economy".[414] The digital interfaces, and by effect the subjects viewing them, then, are products of that representational system. In this way, Galloway's claims about the interfaces found in *Triple Self-Portrait* fall short of the arguments he makes about interfaces throughout his book – specifically his suggestion that the interface is not a thing, but is an effect of the larger forces that engender them.[415] Hence, his refrain "not media but mediation".[416] Galloway engages with these processes throughout his book. He analyzes the aesthetic (artifice, the mediation of time, diegetic space), socio-cultural (via a comparison of *Triple Self-Portrait* and Richard A. Williams *Untitled (Alfred E. Neuman Self-Portrait* (2002)) and technical processes in his reading of *Triple Self-Portrait*. However, he is more concerned with designating the end products (which, ironically enough, are always images of objects or things) as interfaces than with interrogating how and why the underlying processes are significant to the creation of the artwork. Given this, the images, frames, mirrors and canvases cannot be seen as interfaces because the processes that Galloway previously claimed are an integral part in the formation of the interface are tossed aside in lieu of a more important socio-political agenda. Thus, the digital interfaces become ciphers: empty, yet pretty vessels of Galloway's unconscious disregard for the processual aspects of the interface, more than a visual articulation of the relations that bring it into being.

So, Galloway's analysis may interrogate what an interface actually is, and he may, to an extent, refigure notions of what an interface actually *does* in an artwork, but he does so through an erasure of the underlying processes that are significant to its creation. This erasure means that some subjects are considered important, thus the effects they have on the artwork they are located in are visible. Others are deemed insignificant, therefore they remain hidden in the background of the work. In this way, it could be argued that the "interfaces" in Galloway's analysis of *Triple Self-Portrait* end up becoming singular and fixed things, because they are the results of a singular and fixed process. This example then serves not only to elucidate what types of objects or subjects appear, or are visible, in artworks but also to articulate how particular theories of the digital interface themselves accept

[414] Alexander Galloway. *The Interface Effect* (Cambridge: Polity Press, 2012), p. 36.
[415] Ibid., p. vii. These forces, for Galloway, include the socio-cultural, political, *and aesthetic.*
[416] Ibid., 30, 36. Digital interfaces, for Galloway, are "nothing but mediation". Mediation, he states, is not a chronological, spatial or semiotic relation. It is primarily systemic, in the sense that interfaces are "the point of transition between different mediatic layers within any given system". (Galloway, 2012)

representationalism unquestioningly, and thus work against notions of multiplicity and difference, in the sense of simply ignoring them in order to elevate certain types of subjects at the expense of others.

While none of the above mentioned attributes (the interface's ability to mediate, to frame, to act and react) and aspects (the biological, the technical, the socio-political, the cultural, the aesthetic) definitively represents, defines or describes the digital interface, they do contribute to its constitution. In a way they also extend its scope to encompass a wider range of forms by becoming part of the digital interface in and through the viewer/participant's interactions with it in interactive new media installations. However, when the aesthetic aspects of the interface disappear from sight, critical reflection on and theorization of artworks and technologies becomes difficult – time becomes linear and, to an extent, serialized, thus exclusions are enacted. This perhaps points to the main reason why the aesthetic aspects of the interface have been overlooked or misrepresented in academic texts on the interface: aesthetics, especially the aesthetics of the interface, as demonstrated throughout this chapter, is generally treated by theorists as a secondary characteristic. However, once made visible, aesthetics, as will be seen in the next chapter, can be used to intervene and produce ruptures in linear teleological narratives of our relationship to technology.

Chapter 2: *The Body and the Interface*

In the previous chapter, I explored recent scholarly texts that attempt to rethink the digital interface in the humanities.[417] Narratives of the digital interface were presented and analyzed in relation to the previously posited theories around technology that they replicate, and the series of socio-political and cultural anxieties or concerns (automation, labor, interaction and control, inaccessibility, and incomprehensibility) that the digital interface comes to represent.[418] Re-reading these narratives, I proposed an alternative theory of the digital interface – one that positions it as an aesthetic process.

I will develop this idea further, proposing a reconsideration of the relationship between the body and technology. Issues around the body as the site of power and control, and the changes to the relationship between humans and technology that the use of the digital interface in interactive new media installations may create, as posited in the introduction and preface, are the central focus of this chapter. I will present an analysis of the relationship between the body and technology as co-constitutive – a mutually entangled and collaboratively produced experience. I will outline what is at stake in this reconsideration, suggesting that the relationship between the body and technology in interactive new media installations is unstable, uncertain and, to a certain extent, open to reconfiguration by the viewer/participant. As mentioned earlier, the body in this thesis is theorized in posthumanist terms: as an unstable, open-ended hybrid of machine and organism, one that questions previously posited notions of power, control, agency and subjectivity.[419] Technology, as discussed above, is understood in Bernard Steigler's terms: it is seen as an integral part, and extension, of our humanness.[420] The body and technology are theorized as such in order to signal the fact that the interactions that emerge out of the relationship between the viewer/participant (the body) and the digital interface (technology) are dynamic, open-ended and performed, to an extent, by the viewer/participant.

Before I expand this theory further I would like to address in more detail, the potential and the challenges that my reconceptualization of the relationship between the body and

[417] These texts include: Galloway (2010), Hookway (2011), and Andersen and Bro Pold (2011).
[418] Narratives discussed include technological determinism and instrumentalism. Binaries include the visible vs. invisible, open vs. closed, inside vs. outside, active vs. passive. The gaps include the lack of engagement with aesthetics and other cultural concerns in literature related to the interface.
[419] Donna Haraway. "The Cyborg Manifesto" in *Simians Cyborgs and Women*. (London, UK: Free Association Books, 1991)
[420] Bernard Stiegler. *Technics and Time, 1: The Fault of Epimetheus.* tr. Richard Beardsworth and George Collins. (Palo Alto, CA: Standford University Press, 1998).

technology poses to my alternative theory of the digital interface. Who or what constitutes the relationship between the body and technology in interactive new media installations? How does the artist creating the digital interface and the viewer/participant interfacing with it reconfigure this relationship? How might a more entangled reconceptualization of the relationship between the body and technology help us find alternative routes into, and different ways of thinking about, the interface in interactive new media installations?

While a detailed study of the relationship between the body and technology will not provide concrete answers to the ontological questions of the digital interface discussed thus far (i.e. "what is a digital interface?" and "why is a digital interface a digital interface?"), it is exactly these types of questions that should be asked and these types of relationships that should be explored if we are to adequately grasp the complex nature of the digital interface in interactive new media installations. For as Joost van Loon (2008) writes, when it comes to (re)theorizing media-technological agents, we must pay particular attention to the relationships that bring them into being, as well as the specific contexts that they operate in.[421] Following on, if we are to appreciate the complex nature of the digital interface in interactive new media installations, then what is needed is an in-depth study of the relationships that bring it into being and of how they manifest themselves in interactive new media installations. Specifically, I suggest, what is needed is a critical exploration and understanding of the relationship between the body and technology – one that approaches, and then analyzes this relationship as an entangled and performative experience in interactive new media installations.

In what follows, I will discuss the interest expressed in the humanities in developing different understandings of the relationship between the body and technology. In particular, I will concentrate on theories that offer, as mentioned above, a more entangled and performative approach to analyzing the relationship between the body and technology in media installations (Jones, (2000, 2006); Barad, (2003, 2006); Mondloch, (2010); Stern, (2013); Jeong (2014)). What is at stake in proposing such an alternative of the relationship between the body and technology? What is it that makes a more entangled and performative approach to this relationship more appealing than other representational, phenomenological or psychoanalytical ones? And why is it important?

[421] Joost van Loon. *Media Technology: Critical Perspectives.* (Maidenhead: McGraw Hill/Open University Press, 2008), p. 10.

Both Nathaniel Stern (2013) and Karen Barad (2003, 2006) ask and then answer similar questions. Stern, for example, argues that the relationship between the body and technology is always "performed and always emergent".[422] He positions the notion of performativity in his text as a "figure of thought", a "quality" of entities and relationships in interactive new media installations, one that, he writes, "encompasses bodily emergence not *in* the between of pre-existing entities…but *of* the relation of them together".[423] A more performative approach to theorizing these relationships, according to Stern, is significant, as he believes it allows scholars in the humanities to develop a more processual understanding of concepts of the body, embodiment and their relationship to technology in interactive new media installations, one that takes into consideration the emergent qualities of the human body, interaction and their relation to technology.[424]

Taking a different approach to these questions, Barad posits that the move towards more performative and entangled theorizations of the relationship between the body and technology is important, as it "shifts the focus from questions of correspondence between descriptions and reality… to matters of practices/doings/actions".[425] Here, Barad is arguing that a more performative understanding of discursive practices, like, HCI, presents a challenge to previously posited representationalist structures, and other similar modes of thinking.[426] It shifts the focus of scholars away from thinking about technology in terms of perceived affordances and physical constraints towards a more entangled theorization, one that positions technology as inseparable from the human.[427] In doing this, Barad argues performativity pushes against "traditional realist beliefs" that she states are linked to "the idea that beings exist as individuals with inherent attributes, anterior to their representation" or simply perpetuate an endless cycle of "unattainable options".[428] Thus, she brings important questions about key concepts of emergence, embodiment, agency and entanglement to the

[422] Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* (Canterbury, UK: Gyliphi Limited, 2013), p. 59.
[423] Ibid., pp. 59, 60.
[424] Ibid., pp. 60, 61.
[425] Karen Barad. "Posthumanist Performativity: Toward an Understanding of how Matter Comes to Matter." in *Signs: Journal of Women in Culture and Society*. vol. 28, no. 3. 2003, p. 802. Representationalism, for Barad, is the "belief in the ontological distinction between representations and that which they purport to represent; in particular that which is represented is held to be independent of all practices of representing." (Barad, 2007)
[426] Ibid.
[427] Ibid., p. 822.
[428] Ibid., p. 804.

fore.[429] I echo Barad and Stern's theorizations, suggesting that a more performative and entangled understanding of relationships (like the one between the viewer/participant and the digital interface in interactive new media installations) is significant, as it allows these relationships to come into view not as pre-coded results of pre-programmed cybernetic systems, but rather as in-process happenings or doings that emerge out of, and with, the viewer/participants' interactions with the digital interface in interactive new media installations.

Notions of entanglement and emergence in this chapter are understood in Barad's terms. Entanglement, Barad argues, is not a singular or individual occurrence, as entities such as human bodies and technological apparatuses are not ontologically separate. They do not pre-exist their relations with each other.[430] To be entangled is not simply to be intertwined with another, as in the joining of separate entities, but to lack, she writes, "an independent, self-contained existence".[431] Similar to entanglement, the concept of emergence, for Barad, is not an event that "happens once and for all".[432] What often appears as separate entities with completely different concerns to the scholar studying them, she states, "does not actually entail a relation of absolute exteriority".[433] Rather this relationship, for Barad, is processual. It is a doing, an enactment of boundaries – one that always includes exclusions.[434] In Barad's case, these exclusions include, among others, the agency of nonhuman entities. In the case of this thesis, these limitations include the aesthetic processes, the relationships between them and most importantly, the possible effects that they may have on the viewer/participant's experiences with the digital interface in interactive new media installations.

Thus, more subtle but no less significant to this chapter is the potential that more performative and entangled reconsiderations of the relationship between the body and technology might have for interactive new media art installations. In particular, I will explore

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[429] It is important to note that Barad expresses skepticism about the adoption of more performative approaches to theorizing discursive practices. These approaches, she warns us, are not an excuse "to turn everything (including material bodies) into words". Rather, they are "a contestation of the unexamined habits of mind that grant language and other forms of representation more power in determining our ontologies that they deserve." In simpler terms, discursive practices and discourses, for Barad, are not synonyms for language, but rather she views them as a set of constraints that dictate, to an extent, what can be said, who or what can say it and what counts. (Barad, 2007, p. 133)

[430] Karen Barad. *Meeting the Universe Halfway: Quantum Physics and the Entanglements of Matter and Meaning.* (Chapel Hill, NC: Duke University Press, 2007), Preface and Acknowledgements.

[431] Ibid.

[432] Ibid.

[433] Ibid., p. 135.

[434] Ibid., Preface and Acknowledgements.

the possibilities these reconsiderations have in opening up both spaces for criticism, and allowing for certain destabilizing effects to occur. These effects, include, but are not limited to: the possible creation of ruptures in traditional artistic practices and narratives, the destabilization of binary notions such as the division between the material and the informational, a rethinking of the boundaries between the artist and the viewer/participant, and a renegotiation of social and private space.

Critical explorations of the effects that a more entangled and performative theorization of the relationship between the body and technology may bring about are already underway.[435] However, these understandings, when specifically applied to the digital interface and interactive new media installations, remain, to an extent, at a superficial level. I argue that an in-depth analysis of the potential effects that the relationship between the body and technology may have on the way the viewer/participant interacts with and thinks about the digital interface in academic literature is, to an extent, lacking. The way the viewer/participant interacts with the interface should have an effect on interactive new media installations, and the majority of the theorizations around this relationship state as such. However, how these effects are analyzed in these texts brings about a rather limiting concept of the relationship between the body and technology, one that positions it as static and representational, rather than ongoing or open to reconfiguration. This limitation, I argue, is one of emphasis and focus. Specifically, it is a matter of what entity or relationship the scholar is placing emphasis on (the body or technology, the viewer/participant or the interface, the artwork, the artist or the subject's experience) and what effect(s) of the aforementioned relationships or entities the scholar is interrogating (the socio-political, the technical, the biological).

A good example of how this limitation manifests itself can be found in Galloway's text on interfaces (*The Interface Effect*, 2010) and Stern's book on interactive new media art installations (*Interactive Art and Embodiment: The Implicit Body as Performance*, 2013).[436] Interfaces, Galloway argues, are not things, but processes that "effect a result of whatever

[435] See Barad, 2003, 2006; Friedberg, 2006; Jones, 2006; Galloway, 2010; Mondloch, 2010; Jeong, 2013; Simanowski, 2013; Stern 2013.
[436] Alexander Galloway. *The Interface Effect* (Cambridge: Polity Press, 2012), Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* (Canterbury, UK: Gyliphi Limited, 2013) I use these two books as examples because Galloway's book is the most in-depth text on the use of interfaces in a cultural context. Stern's book is the most recently published text on interactive new media installations.

kind".[437] To prove this, he provides an incredibly detailed, methodological account of how the socio-political and economic effects of the interface manifest themselves in various cultural contexts. However, his theorization of the relationship between the body and technology and his explanation as to how these effects affect the relationship between the body and technology, are reductive. Therefore, his rethinking of the interface, is not about what this device can become or the potential that it holds. Rather, it is a very narrow description of what Galloway believes interfaces should be.

Stern, on the other hand, devotes two chapters to the relationship between the body and technology in interactive new media installations.[438] Drawing on Barad's concepts of performativity and entanglement and then applying them to theories of the body and embodiment, the relationship between the body and technology in interactive new media installations is, for Stern, a "performed and emerging emergence".[439] It is a process that, he writes, "is constituted in and with and through its relations".[440] To support these arguments, Stern examines how bodies (of the performer, the viewer and the artist) are staged and the potential that a restaging of these bodies (as relational to the artwork) may have for interactive new media art installations. While recognizing the importance that a more performative formulation of this relationship has for interactive new media installations, Stern does not address both the possibilities and the consequences that his approach may have on the digital interface. In other words, the body, in Stern's analysis of the relationship between the body and technology, takes precedence over the techno-material and aesthetic elements of the installations he is interrogating. The nonhuman entities and processes – particularly, the interface – exist in the periphery. Thus, the effects that his more performative theorization may or may not have on the nonhuman entities that inhabit the installations he interrogates remain, to an extent, unexplored.

In short, I believe that what is needed is a sustained and detailed engagement with, and an emphasis on, the relationship between the body and technology, coupled with a critical reflection on the important, possibly destabilizing, effects that a more entangled and performative approach to this relationship may have when addressing issues concerning the

[437] Alexander Galloway. *The Interface Effect* (Cambridge: Polity Press, 2012), Preface.
[438] Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* (Canterbury, UK: Gyliphi Limited, 2013) These chapters are Chapter 2: "The Implicit Body as Performance" and Chapter 4: "'Body-Language'."
[439] Ibid., p. 62.
[440] Ibid.

digital interface in interactive new media installations. This engagement is needed because if we fail to take into consideration all the aspects of the relationships or entities we are examining – if we do not recognize the significance that both human and nonhuman entities and their relationships have in the space they are located in – then our theories will ultimately reinforce the same binaries and object/subject, mind/body separations they argue against.

To address this, I will begin my exploration in the first half of this chapter by interrogating different ways in which the relationship between the body and technology has been presented and critiqued in the humanities. In the second part, I will explore how a more entangled and performative approach to this relationship can be articulated via the interactive new media installations of Victoria Vesna (2005-7), Tmema (2006), Rafael Lozano Hemmer (2010) and Carmin Karasic (2008). These installations are crucial to this investigation as they position the relationship between the body and technology in their artworks as emergent and processual – one that is produced by and is constantly producing, subjects, objects, meanings and, most importantly, effects. The artists creating these installations accomplish this by extending an invitation to the viewer/participant to explore and question her relationship to technology via interaction. My analysis of these works culminates at the end of the chapter in a reconfiguration of the digital interface as human body. This theorization will push us to reflect on, and then critically question, how we experience, interact and think with, and about, technology. This will ultimately open up a space for different narratives around and reconfigurations of the relationship between the body and technology in future interactive new media installations.

The Viewer/Participant or the Interface?

The relationship between the body and technology has been examined by theorists from many different disciplinary perspectives. In the humanities, analyses of this relationship revolve, to an extent, around concepts of media spectatorship and the gaze. Scholars such as Amelia Jones (2006), Vivian Sobchak (1992) and Laura Marks (2002) take a more phenomenological approach, critiquing the trajectory of what Jones terms "the complex interconnectedness" of visual representation, technology and concepts of the self in Western representational structures.[441] Others, like Anne Friedberg (2006), Kate Mondloch (2010) and Lori Emerson (2014), take a more media archaeological approach, examining how the use of

[441] Amelia Jones. *Self/Image.* (UK: Routledge, 2006) In Jones' case, these Western representational models include, among other things Kantian models of aesthetics.

different types of technological interfaces influence the ways in which contemporary viewing subjects see the world.

Friedberg, for example, investigates the literal and metaphorical concepts and functions of interfaces as well as our human experience of them.[442] Friedberg theorizes interfaces as thresholds or liminal sites that mediate the "tensions between the immobility of a spectator/viewer/user and the mobility of images" as well as the relationship between the spectator and the spectacle, the viewer and technology and the subject and representations.[443] Mediation, she argues, is an important aspect of this relationship as it relieves the aforementioned tensions by providing the "semi-immobile viewer with mobility in virtual terms".[444] In other words, the viewer's body, for Friedberg, may be "fixed" in front of a screen (an interface) but the moving images projected onto it become a virtual representation of their physical mobility.[445] The viewer, in Friedberg's theory, then, is not a passive observer, but a mobilized participant. This shift from passive observer to mobilized participant is important to Friedberg's theory, as it results in the creation of different modes of spectatorship – ones that she argues ultimately produce more spatial and temporal ways of thinking about our relationship with technology.[446] While Friedberg's text offers an incredibly important and comprehensive approach to the study of the interface, inasmuch as it highlights the significance of the interface by historicizing the interface and the relationship between the body and technology it creates, it is not without limitations.

Mondloch pinpoints these shortcomings, focusing on Friedberg's use of metaphors (the formalist model of the picture frame, the realist model of the window and Friedberg's own formulation of the virtual window).[447] While Friedberg is critical of these metaphors, the issue, as Mondloch sees it, lies in her (Friedberg's) reliance on "dualistic" thinking when applying these metaphors to the relationship between the viewer and the screen.[448] This type

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[442] Anne Friedberg. *The Virtual Window: From Alberti to Microsoft.* (Cambridge, MA: MIT Press, 2006) The literal and metaphorical concepts Friedberg looks at include the pre-cinematic and cinematic window, frame and screen.
[443] Ibid., p. 161.
[444] Ibid. For Friedberg, the word virtual: "refers only to electronically mediated or digitally produced images and experiences." (Friedberg, 2006, p. 7)
[445] Ibid.
[446] Ibid. These modes of spectatorship, Friedberg argues, rely on a virtual, mobilized gaze rather than a static, representational one. The term mobilized gaze, for Friedberg refers to how the images located on the screen and material screen itself emulate movement, multiple perspectives and imaginary space. (Friedberg, 2006. p. 6)
[447] Kate Mondloch. *Screens: Viewing Media Installation Art.* (Minneapolis, MN: University of Minnesota Press, 2010), p. 63.
[448] Ibid., p. xvi.

of thinking, Mondloch argues, is troubling as it champions "the presumed criticality of the viewer's encounter with advanced sculptural projects" while at the same time expressing a disdain for "the viewer's allegedly uncritical and passive experience" with interfaces.[449] Doing this, Mondloch argues, allows Friedberg to conclude that the relationship between the body and technology is an after-effect of "a new logic of visuality, a time-architecture, framed and virtual, on a screen".[450]

Here, Mondloch is arguing that Friedberg's analysis of the relationship between the subject and the screen is a dichotomous one. It does away with "any remaining shards of spatial locatedness" on behalf of the subject by pitting a "both here and there" spectator against a "neither here nor there" interface.[451] The relationship between the body and technology, for Mondloch, is not a binary after-effect of an interface's "remarkable capacity to reorganize time and space" and identities.[452] This relationship, she suggests, is rather an essential component of the space it is located in because viewer interaction with the interface is a phenomenal form in itself.[453] As she writes: "The viewer-screen connection is a site of radical inter-implication: it… encompasses sentient bodies and psychic desires, institutional codes and discursive constructs."[454] In other words the interface, for Mondloch, is not simply a discrete object, known by the viewer visually all at once. It is an activated space, a performative and phenomenological experience that foregrounds the relationship between the embodied viewing subject and the installation.

Mondloch's text is helpful in theorizing the relationship between the viewer/participant and the digital interface in interactive new media installations, because this relationship, she writes, "matters".[455] And the fact that it matters, she tells us, "is more than a perfunctory observation. It is a proposal for a theoretical model for assessing contemporary artistic production".[456] Yet the exact nature of this proposal remains, to an extent, unexplored, specifically how exactly the interface shapes, rather than determines or controls, the viewing subject's experience and her interactions in media installations.[457] This, I argue, hinders

[449] Kate Mondloch. *Screens: Viewing Media Installation Art.* (Minneapolis, MN: University of Minnesota Press, 2010), p. xvi.
[450] Ibid., p. 18.
[451] Ibid., p. 79.
[452] Ibid., p. 4.
[453] Ibid.
[454] Ibid., p. 3-4.
[455] Ibid., p. 4.
[456] Ibid.
[457] Ibid.

Mondloch's ability to theorize the potential that her rethinking of the body-screen relationship may have on media installations beyond simple shifts in modes of spectatorship. For example, Mondloch, on the one hand, is theorizing the interface as an aesthetic device whose "physical form shapes both its immediate space and its relationship to viewing subjects".[458] On the other hand, she is defining it as an instrumental object of power that matters, yet does nothing except constrain and control experience.[459] Therefore, the actual identity of the interface in her theory, beyond its perfunctory functions (facilitation, mediation, translation), remains obscured. This is because the emphasis in her work revolves around how the interface functions as a disciplinary tool whose job is to regulate, and thus ultimately shape, the "volatile" relationship between bodies and screens as well as the space that the interface is located in.[460]

To summarize, Mondloch's theory of the body-screen relationship is important as it reintroduces agency to the interface ("the interface matters") in media installations. However, Mondloch places too much emphasis on the interface and its ability to control and regulate interaction and experience. In this way, the other entities located in the installation, specifically the viewer, and the relationality between the viewer and the screen is, at times obscured. Thus we could argue that her theorization ultimately strips the viewer of agency.

Like the other key concepts discussed above, agency, in this chapter, is understood in Barad's terms. Agency, Barad suggests, is not: "something that someone or somebody has. Agency cannot be designated as an attribute of subjects or objects (as they do not pre-exist as such)."[461] Agency is therefore an enactment, a process; it does not encompass the human entity, the technological other and/or the relationship between them, but exceeds these entities.[462] Thus, agency is not a condition that an entity must be conceptualized as *having*, a quality that it is endowed with, or something that occurs out of the blue, and changes it, shapes it into a more important or active thing. In interactive new media installations, I argue agency is a matter of how a viewer/participant consciously or unconsciously chooses to

[458] Kate Mondloch. *Screens: Viewing Media Installation Art.* (Minneapolis, MN: University of Minnesota Press, 2010), p. 4.
[459] Ibid.
[460] Ibid., pp. 4, 35.
[461] Karen Barad. *Meeting the Universe Halfway: Quantum Physics and the Entanglements of Matter and Meaning.* (Chapel Hill, NC: Duke University Press, 2007), p. 214.
[462] Ibid.

position herself in relation to other entities (like the digital interface), the possibilities that these choices may entail and the events that these choices may bring about.[463]

Taking this statement into account, I will continue my exploration of the relationship between the body and technology, examining the possibilities that a theorization of the aforementioned relationship as co-constitutive may have for interactive new media installations. My starting point lies in the implications, such as the obfuscation of agency (of both human and nonhuman entities) that theorizations like the ones discussed above may have on the relationship between the body and technology and the important effects that this relationship may have on interactive new media installations.[464] To explore these implications and effects, I turn to Victoria Vesna's interactive installation *Mood Swings* (2005-7.) In *Mood Swings*, the relationship between the body and technology is staged (by Vesna), and consequently theorized, here as co-constitutive and emergent.[465] This is a staging that I suggest places emphasis on the relationship between the body and technology as an important agential process that not only shapes, but also is *shaped by*, the entities that surround it and the space that it is located in. Therefore, it is a staging that enables me to call attention to the processes, relations and entities this relationship enfolds and demonstrate the importance of the effects it has in interactive new media installations.

Mood Swings consists of a video projector, a computer, a closed-circuit camera, an audio system and a projection surface.[466] The camera records the viewer/participants' actions. This performance is transmitted to a computer, which is located in the same space. There it is processed, generating a pixelated image of the viewer/participant that is projected onto the

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[463] Karen Barad. *Meeting the Universe Halfway: Quantum Physics and the Entanglements of Matter and Meaning.* (Chapel Hill, NC: Duke University Press, 2007), p. 214.

[464] These effects include, but are not limited to: a critical interrogation of, and the creation of, ruptures in artistic practices and narratives, the destabilization of binary notions such as the division between the material and informational, a dissolving of the boundaries between the artist and the viewer/participant and a renegotiation of social and private space.

[465] On the surface, *Mood Swings* is aesthetically similar to installations discussed in chapter 1 – specifically Utterback's *Untitled 5* and Rozin's *Rust Mirror* – as it involves humans interacting with visual images that are projected onto a screen like surface. *Mood Swings,* however, differs from other installations discussed thus far in the sense that more attention was placed on how the relationship between the body and technology was staged (relational and co-constitutive). That is to say, the relationship between the body and technology (how we intra-act with technology) is considered by Vesna to be primary, human-computer interaction (how we act through technology), is secondary. This emphasis is evidenced in the conceptual idea behind the work. *Mood Swings,* according Vesna is a comment on the state of women's mental health in the US. It was developed, by Vesna, for the Inside Out Loud exhibit, the first significant survey of contemporary American art to explore critical issues related to health." It was informed by the artist's collaboration with a Psychiatry and Biobehavioral Sceinces research group at UCLA, specializing in the environmental effects on mental health. (Vesna, 2005-7)

[466] Victoria Vesna. *Mood Swings*, (2005-7). Found online at: http://www.victoriavesna.com/index.php?p=projects&item=8; http://vv.arts.ucla.edu/moodswings/about.html

projection surface.[467] Thus the pixelated image of the viewer/participant is the digital interface in this work. This is because the pixelated image, like those in the previous chapter, allows the viewer/participant to navigate the installation and engage with the visual information projected onto the screen. (Figures 33 & 34)

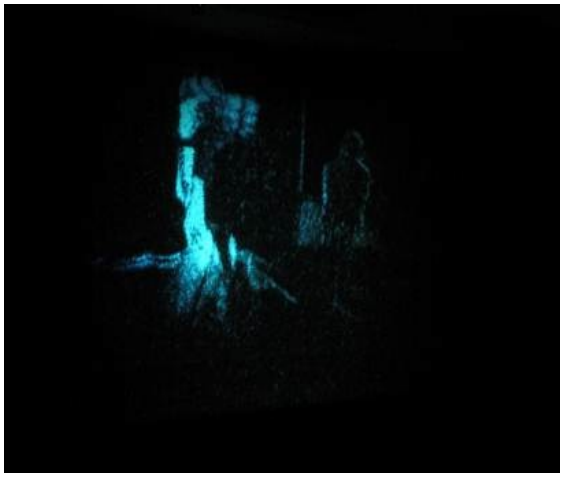

Figure 33: V. Vesna, *Mood Swings*. (2005-7).

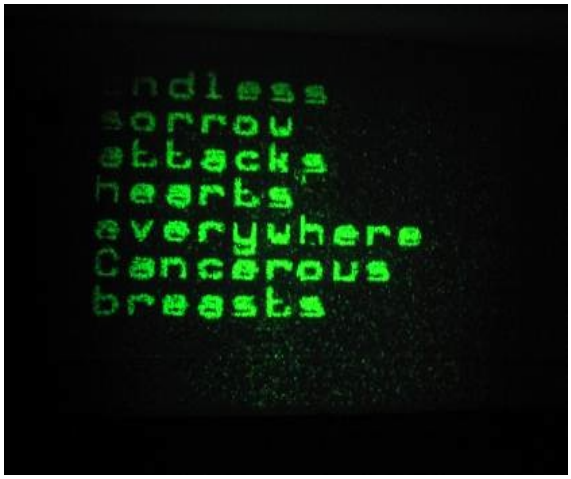

Figure 34: V. Vesna, *Mood Swings*. (2005-7).

[467] Victoria Vesna. *Mood Swings*, (2005-7). Found online at: http://www.victoriavesna.com/index.php?p=projects&item=8; http://vv.arts.ucla.edu/moodswings/about.html The pixelated image is controlled by the viewer/participant.

The pixelated image and the viewer/participant as seen in the figures above and below are visually and physically distinctive. One is a biological entity and one is a technical entity. One exists on a computer screen and one exists in the physical world. While they are physically distinctive, they do not have separate ontological existences, as these entities reproduce and are constantly reproducing each other. The pixelated image and the viewer/participant exist, as argued earlier, in relation to one another. Given this, I suggest that they can productively be read through each other for similarities and differences, thus highlighting new possibilities for understanding their relationship to each other as performative and co-constitutive.

For instance, when a viewer/participant walks across the floor, her pixelated image travels across the surface. This movement causes digital video trails to appear. These trails slowly erode the pixelated image and "poetic texts" appear in its place.[468] (Figure 35)

Figure 35: V. Vesna, *Mood Swings*. (2005-7).

If the viewer/participant moves back and forth in front of the projection surface a certain number of times, or if she stands still in front of it, the texts dissipate and her pixelated image reappears.[469] (Figure 36)

[468] Victoria Vesna. *Mood Swings*, (2005-7). Found online at: http://www.victoriavesna.com/index.php?p=projects&item=8; http://vv.arts.ucla.edu/moodswings/about.html Video trails, are special effects utilized by artists to mimic the motion blur that sometimes occurs when motion is captured by a video camera and uploaded to a computer.
[469] Ibid.

Figure 36: V. Vesna, *Mood Swings*. (2005-7).

In this way, the emphasis, in this work, via the dissipating pixelated images, is placed on co-constitution, and on how the viewer/participant via her pixelated image is able to create, separate and playfully explore the poetic texts and the relationships that they represent, only to bring them back together, to dissolve them and to rebuild them anew. The emphasis on co-constitution in *Mood Swings* is significant because it acknowledges that both human and nonhuman entities have some form of agency. Thus, it allows the viewer/participant, the digital interface, their interactions with each other and the effects they have on the installation, to matter beyond mere representation.[470] I also suggest this emphasis affords the viewer/participant the chance to begin to reconsider and possibly develop different understandings of her relationship to the digital interface in *Mood Swings*. These understandings allow both the viewer/participant and the interface to come into view as active and important agents that are deeply entangled with each other's embodied being and that form mutually productive parts of the poetic texts that they help create.

Recognizing the fact that the relationship between the body and technology is co-constitutive, as I do above, however, is not quite enough to adequately support and explain what is at stake, or why these relationships are important in interactive new media installations. It would be an oversight on my behalf to simply assume that these relationships are co-constitutive – that I know what entities consist of and what effects they may have on others. Instead, I must engage with and further develop a theory of the relationship between the body

[470] Victoria Vesna. *Mood Swings*, (2005-7). Found online at: http://www.victoriavesna.com/index.php?p=projects&item=8; http://vv.arts.ucla.edu/moodswings/about.html

and technology that takes into consideration and articulates, in clear terms, why exactly it "matters" in interactive new media installations. I suggest that a more entangled and performative theorization of the relationship between the human and technology allows us to recognize agency: both the agency of the human (the viewer/participant) and of the nonhuman (the interface) in interactive new media installations. Such an approach shifts focus from descriptive statements of entanglement and performativity as a static act, thus calling attention to the process of entanglement itself and the effects that this process produces in interactive new media installations.

The Agency of Human and Nonhuman Entities, or Why the Relationship between the Body and Technology Matters

One text that begins to make some inroads in this regard is Seung-hoon Jeong's *Cinematic Interfaces* (2013), which focuses on the use of the interface in film and expanded cinema projects.[471] For Jeong interfaces are cultural mediums whose agency emerges out of their own "flexibility" and "morphology".[472] Interfaces are not single, unified apparatuses that have separate existences from their users. Rather, he believes they are assemblages, consisting of "at least three major interfaces – camera, film and screen – which place the same image into a process of differentiation, deferral and remediation".[473]An interface, he writes: "would be found less between two entities than between two interfaces. There would be no *a priori* essence outside of interfaciality."[474]

Interfaciality, as Jeong defines it, indicates "the state or function of interfacing on a surface between two entities".[475] The concept of interfaciality, for Jeong, is highly significant to any theory of the interface because it allows us to begin to think about the interface as "a specific material surface for contact that accompanies overlapping and distancing, a contact surface of mediation through interval and interstice – however immediate it may look – in terms of space (between object, medium and subject) and time (between recording, editing and

[471] Coined by Gene Youngblood in 1970, "expanded cinema" is a term that describes multi-screen and mixed media film-making techniques that utilize new technologies (Youngblood, 1970).
[472] Seung-hoon Jeong. *Cinematic Interfaces: Film Theory After New Media.* (NY, NY; Routledge, 2013), p. 11.
[473] Ibid., p. 15.
[474] Ibid. Jeong's emphasis
[475] Ibid., p. 14. The two entities Jeong is referring to are the viewer and the screen.

projection; between perception and memory)".[476] Given this, interfaciality, he argues, implies relationality.[477]

Relationality, Jeong states, is not a synonym for intersection or interaction. Instead, it is a precondition of interfaces. Therefore, relationality is "already imminently embodied in subjectivity and objectivity which are, simply put, nothing but interfaciality".[478] Interfaciality, then, is not purely representational, but rather, it is a *quality* of relationships and things. It is, he posits, an issue of "the body-subject in physical contact with the medium interface".[479] This is because the interface, for Jeong, is an embodied agent. Therefore it has effects (on the cinematic image, the viewer's experience and the ideas and thoughts she forms around this experience) and is affected by other human and nonhuman entities.

Jeong's text is invaluable to the argument of this chapter as it recognizes the agency of the interface as well as examines the effects this agency may or may not have on the installation/cinematic space. However, I argue that Jeong's formulation of the interface is constrained due to the fact that he views the interface, as mentioned above, as consisting of two sides. This definition, combined with his alignment of notions of interfaciality and relationality with subjectivity and objectivity, quickly becomes a cause for concern. It raises questions around key concepts such as subjectivity, relationality, interfaciality and interfaces. How can interfaciality encompass such a wide range of processes and relationships if the interface that contains and mediates them is two-sided? Why, exactly, is the interface two-sided? If interfaciality and relationality are qualities, inherent attributes, of entities and relationships, and if these entities and relationships are aligned with concepts like subjectivity and objectivity (in the sense that they affect and encompass them), then what of the entities' agency?

Agency should not be understood as a quality or attribute of an entity. Rather, agency, as argued via Barad above, is an enactment.[480] Thus agency is about change, or more precisely, the possibility of change that this enactment may or may not have. Given this, entities cannot be presumed to be the site of agency, and agency cannot be presumed to be a quality of an

[476] Seung-hoon Jeong. *Cinematic Interfaces: Film Theory After New Media.* (NY, NY; Routledge, 2013), p. 14
[477] Ibid., p. 11.
[478] Ibid.
[479] Ibid., p. 77.
[480] Karen Barad. *Meeting the Universe Halfway: Quantum Physics and the Entanglements of Matter and Meaning.* (Chapel Hill, NC: Duke University Press, 2007), p. 235.

entity since entities do not have a stable existence prior to their interactions with others.[481] Barad builds on her theorization of agency, discussed earlier, via a close reading of Monica Casper's (1994) article "Humans and Others: The Concept of Agency and Its Attribution".[482] To summarize, Casper argues that when attributing agency to entities, theorists in the STS fields (and I would argue, to an extent, in the humanities as well) have "failed to consider how the very notion of human agency is premised on 'a dichotomous ontological positioning in which [nonhuman] is opposed to human'".[483] The resulting works that these theorists produce, Casper argues, are problematic because the approach utilized to analyze these entities "excludes a crucial factor from analysis since 'the attribution of human and nonhuman to heterogeneous entities' is always the consequence of particular political practices'".[484] The crux of the argument that Barad is trying to make via Casper, and the ultimate importance of it to mine, is that how agency of nonhuman entities is constructed and consequently analyzed in some texts in the STS fields renders certain human entities that they come into contact with invisible, reducing them to empty operators.[485]

Barad strongly agrees with Casper's argument. However she takes issue with Casper's conclusions.[486] The critical issue, as Barad sees it, lies not so much in the attribution of agency to the nonhuman entity in question, but in "the framing of the referent of the attribution (and ultimately in the framing of agency as a localizable attribution)".[487] Here, Barad is suggesting that it is not the attribution of agency to nonhuman entities that is the problem, but rather the alignment of agency with subjectivity and the consequent attribution of subjectivity to nonhuman agents.[488] Barad's ultimate point is that the nonhuman entity should be "understood in relation to its referent", in relation to the entities it emerges out of, rather than assuming that it is a preexisting entity with inherent properties.[489]

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[481] Karen Barad. *Meeting the Universe Halfway: Quantum Physics and the Entanglements of Matter and Meaning.* (Chapel Hill, NC: Duke University Press, 2007), p. 235.
[482] Ibid., p. 215.
[483] Ibid., p. 215
[484] Ibid.
[485] Ibid., pp. 215-216. This analysis, both Barad and Casper state, is politically motivated in the sense that agency is about who or what gets to be a subject and whom or what the theorist or scientist is accountable to. (Barad, 2007. p. 215)
[486] Ibid., p. 216. Barad calls into question the boundaries Casper draws around who or what gets to be an agent, her notions of accountability, and the exclusions that they result in. (Barad, 2007. p. 216)
[487] Ibid., p. 217.
[488] Ibid.
[489] Ibid.

Following on, while Jeong is critical of concepts such as relationality and interfaciality, which enables him to trouble assumptions about the passive nature of viewing subjects by theorizing the interface as an embodied agent, I suggest that the paradoxical nature of his concept of interfaciality ends up creating a fixed relation between the subject and the screen. This is because Jeong is aligning notions of agency, via his theorization of relationality and interfaciality, with concepts of subjectivity. In doing this, Jeong assumes that interfaciality and relationality are inherent attributes of an entity, rather than one of the many possible effects of his reconfiguration of the body/screen relation. Thus, echoing Barad's statement above about how the agency of the nonhuman entities (the interface) is constructed and consequently analyzed by Jeong renders the viewer invisible, reducing her to an empty operator. Consequently, she lacks a presence in the installation space. This is not to say that the viewer/participant is actually invisible. The viewer/participant does physically exist; however, her contributions to the installation are, to an extent, not acknowledged in Jeong's theory of the interface. Given this, the question "Why does the interface matter?" turns into the following one: What *does* it actually mean to be present *and* matter in interactive new media installations?

The Human "Me" and the Technologized "You": Agency, Subjectivity and Presence

To address the question asked above, I stage an encounter between Jean-Luc Nancy's (2000) notions of "Being" and the event as simultaneous, entangled feelings, on behalf of subjects, of perpetual presence and Tmema's interactive new media installation *Footfalls* (2006). I do this to make sense of the effects that the viewer/participant's movements and interactions have in *Footfalls* and of how the relationship between the body and technology helps bring the interface into being in interactive new media installations. In my analysis, I suggest that the specific events and effects that the relationship between the body and technology helps give the interface presence. These events and effects, I argue, bring the interface into being and allow it to actually "matter" in *Footfalls*.[490]

I will be referring to viewer/participant interaction using Barad's term "intra-action" in this section. Intra-action, according to Barad, is a concept that assumes there is no in-between or object of mediation and, as such, entities are mutually co-constitutive.[491] This relationship of

[490] By specific events, I am referring to the non-repeatable intra-actions that the viewer/participant makes with the digital interface and the images and experiences that these intra-actions bring about.
[491] Karen Barad. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning.* (Durham, NC: Duke University Press, 2007), Preface and Acknowledgements.

intra-action, in Barad's formulation, is primary and individuation is secondary.[492] That is to say, in intra-action, entities only become meaningful and present through their relationship with one another. Thus, intra-action differs from notions of interaction, because interaction, Barad argues, assumes that entities exist prior to each other.[493]

Similar to Barad's notion of intra-action, Nancy's conceptualization of "Being" relies on relationality. "Being", according to Nancy, does not exist without the "being-with".[494] The "I," he states, does not precede the "we" because there is no existence without co-existence.[495] "Being", for Nancy, is always already a process of becoming with others.[496] As he writes: "Being cannot *be* anything but being-with-one-another, circulating in the *with* and as the *with* of this singularly plural coexistence."[497] What Nancy is proposing here is that being is not a stand-alone process produced by a solitary entity. "Being" instead suggests a simultaneous, entangled feeling, on behalf of the subject, of perpetual presence.[498]

This feeling of presence, as Marie-Eve Morin (2012) tells us, is "a consequence of [being] 'singular plural': there is no single independent truth that could be immediately identified as the beginning".[499] Morin continues by stating that "Being', to Nancy, signals, "first of all that there is always by necessity more than one singularity".[500] Since "Being", as Nancy writes, means "to be-unto-the limit or to be-opened-to" then this opening, as Morin writes, "is necessarily 'with': it is impossible to open oneself to oneself without exteriority".[501] "Being" then, specifically being singular-plural, is not an attempt to position a concept or an entity as a singular, isolated or indivisible thing.[502] "Being" signifies a process of singularization, thus it suggests both an entanglement with and a differentiation from temporarily positioned

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[492] Karen Barad. *Meeting the Universe Halfway: Quantum Physics and the Entanglements of Matter and Meaning.* (Chapel Hill, NC: Duke University Press, 2007), p. 33.
[493] Ibid.
[494] Jean-Luc Nancy. *Being Singular Plural.* tr. Robert D. Richardson and Anne E. O'Byrne. (Stanford, CA: Stanford University Press, 2000), p. 3.
[495] Ibid.
[496] Ibid.
[497] Ibid.
[498] Ibid.
[499] Marie-Eve Morin. *Jean-Luc Nancy.* (Cambridge, UK: Polity Press, 2012), p. 3.
[500] Ibid., p. 36.
[501] Jean-Luc Nancy. *Being Singular Plural.* tr. Robert D. Richardson and Anne E. O'Byrne. (Stanford, CA: Stanford University Press, 2000). Marie-Eve Morin. *Jean-Luc Nancy.* (Cambridge, UK: Polity Press, 2012), p. 36.
[502] This notion is very similar, as Morin notes, to Derrida's concept of "n+one". N+one means no matter how many ones are gathered in n, there is always necessarily some other one to which n is exposed. Hence, existence is never singular. It is always the experience of the other. (Morin, 2012).

others.[503] In short, "Being" is a non-linear, ongoing process and this process always consists of more than one thing. It is, as Nancy writes, "an excess of unity; it is one-with-one where its Being in itself is co-present".[504] Plurality and co-presence, as Nancy reminds us, should not be confused with notions of the eternal or transcendental.[505] Rather, co-presence for Nancy denotes "the essential sharing of essentiality, sharing in the guise of assembling as it were".[506] So, when Nancy states that "being cannot *be* anything but being-with", "the with" is not exterior or prior to something else. It is not an addition to it, but rather "the with" for Nancy constitutes "Being".[507] The use of the interface in *Footfalls* could be interpreted to serve as an illustration of Nancy's ideas around "Being", in the sense that its interface is not simply an addition to the installation. Rather, the interface, like "the with" in Nancy's theorization of "Being", constitutes the installation itself.

On its surface *Footfalls* is an incredibly simple work. Its aesthetic is reminiscent of seminal new media art works such as Simon Penny's interactive art installation *Traces* (1998) and Myron Krueger's interactive art installation, *VideoPlace* (1974). Their interfaces are similar too: projected images of the viewer/participant. (Figures 37 & 38)

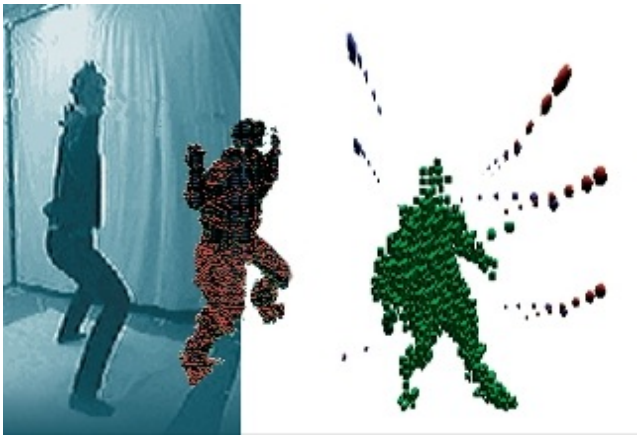

Figure 37: S. Penny, *Traces*. (1998).

[503] Jean-Luc Nancy. *Being Singular Plural.* tr. Robert D. Richardson and Anne E. O'Byrne. (Stanford, CA: Stanford University Press, 2000), p. 32.
[504] Ibid., p. 40.
[505] Ibid., p. 30.
[506] Ibid., p. 40.
[507] Ibid., p. 3.

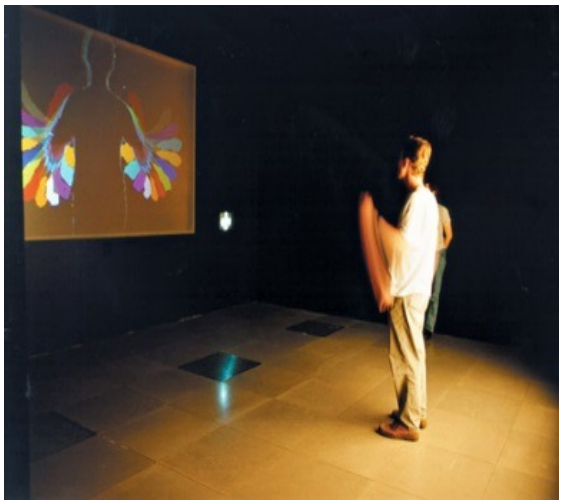

Figure 38: M. Krueger, *VideoPlace*. (1974).

Footfall's underlying idea, however, in some ways is more complex than its predecessors. *Footfalls*, according to the artists, is designed to provoke questions about the meaning of the relationship between the body and technology, and the effects that movement and interaction has on immersive environments.[508] An outgrowth of their work *Messa di Voce* (2003), *Footfalls* consists of a wall, a projector and a computer.[509] The wall is split into thirds: the top contains a series of black and white images that represent static spheres of varying size, the space in the middle is left blank and the bottom third of the screen consists of a projected shadow of the viewer/participant, which she can control by moving her body.[510] Once the piece is activated, the balls stream down from the top of the screen. The viewer/participant can then interact with the projected balls – she can pick them up and throw them around the screen via her shadow. (Figure 39)

[508] Tmema, *Footfalls.* (2006.) Found online at: http://www.flong.com/projects/footfalls/ and at http://www.tmema.org/wordpress_test/footfalls

[509] Ibid. Tmema, *Messa di Voce.* (2003). Found online at: http://www.tmema.org/messa/. Messa di Voce is a performance and installation in which sounds created by two vocalists are augmented in real-time via custom interactive visualization software. A variant of *Footfalls* appears in both the installation and performance versions of the work. (Tmema, 2003).

[510] Tmema, *Footfalls.* (2006.) Found online at: http://www.flong.com/projects/footfalls/ and at http://www.tmema.org/wordpress_test/footfalls.

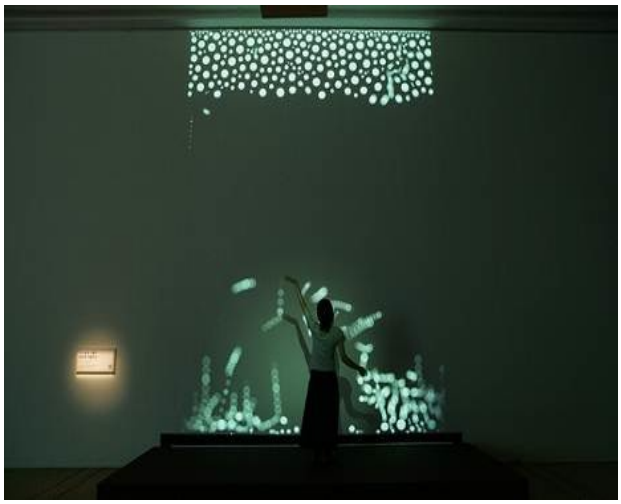

Figure 39: Tmema, *Footfalls*. (2006).

To activate *Footfalls*, the viewer/participant must step onto a platform located in front of the wall.[511] When she "stomps" her feet, a circuit board embedded in microphones located inside the platform records these vibrations and transmits them to a computer for processing.[512] This data is sent to another computer connected to a projector where it is once again processed and then projected onto the wall. The newly processed data changes the state of the projected spheres. (Figure 40)

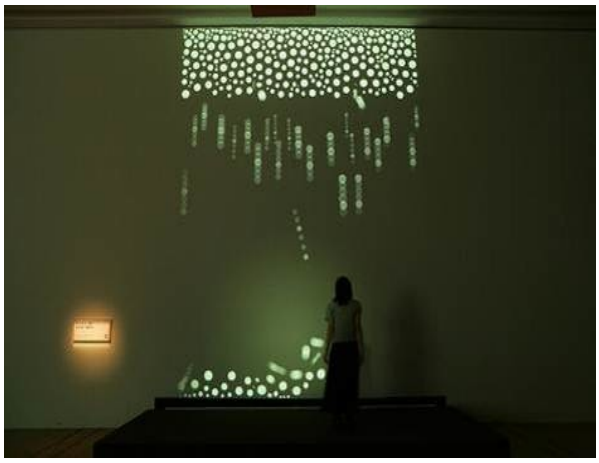

Figure 40: Tmema, *Footfalls*. (2006).

[511] Tmema, *Footfalls.* (2006.) Found online at: http://www.flong.com/projects/footfalls/ and at http://www.tmema.org/wordpress_test/footfalls.
[512] Ibid.

It sets them in motion, causing them to bounce back and forth. It also dictates the size, speed and the number of spheres appearing on the wall. Once the spheres gain enough velocity, they begin to cascade down from the top half of the wall towards the bottom, where they collect around the shadow.[513] At this point, the viewer/participant can catch the spheres and throw them around or off-screen by moving her limbs. If another viewer/participant happens to be located in the same space, an image of her physical body will be captured and projected onto the wall as well. Both viewer/participants, via their on-screen shadow, can then intra-act with the spheres and with each other. (Figure 41)

Figure 41: Tmema, *Footfalls*. (2006).

When viewing *Footfalls* either online or in a gallery, viewer/participant intra-action feels spontaneous. While it may be so, intra-action is not a happy accident. Intra-action in *Footfalls,* like "Being" in Nancy's theory of the singular-plural, is an experimental, exploratory process that happens in conjunction with, thus is influenced by, others. That there needs to be others present for intra-action to occur does not imply that there needs to be a human "me" and a technologized "you", but also that there must be, in Nancy's terms "a with", or as Morin states, "an us and a something else, and that there needs to be a plurality

[513] Tmema, *Footfalls.* (2006.) Found online at: http://www.flong.com/projects/footfalls/ and at http://www.tmema.org/wordpress_test/footfalls.

within myself".[514] Given this, Morin argues that entities intra-act "in relation/exposition to you, an 'event of me' exists in relation/exposition to other events".[515] Hence, intra-action neither affirms symmetry between two or more entities, nor does it dissolve the boundaries between them. Intra-action happens through exposition – through an exposure to, and creative exploration with, other entities. So, how does viewer/participant intra-action occur in *Footfalls?*

Viewer/participant intra-action in *Footfalls* occurs because the viewer/participant can manipulate and create information located in the installation via the presence of her shadow. She is able to, via her shadow, extend and expand her body into the installation – an act that, as suggested in the introduction, links technology to the embodied experience of the viewer/participant. The process of embodiment described above, however, is not a fully conscious one. It can be seen as primarily corporeal and affective, only later becoming theorized and reflected on by the media theorist and viewer/participant respectively. This is because the relationship between the body and technology as it manifests itself in interactive new media installations like *Footfalls* is never self-evident, never concrete. Thus, the shadow (the interface) cannot be analyzed as a direct representation of the relationship, as intra-action between the body and technology, or, in Nancy's terms, as "the with".[516] Rather, I suggest these entities and the relationship between them should be theorized as happening or emerging out of and through "the with" (the relationship between the body and technology). This is because the shadow in this work is not simply a representation of the viewer/participant, but a physical after-effect of the relationship between the body and technology.

For example, when a viewer/participant picks up a sphere via her shadow and tosses it around the screen, she could be seen as expressing a trace of this "with*"* or the relationship between the body and technology. I argue that it is precisely this expression of the "with*"* via intra-action, that enables the digital interface (the shadow) to become present and active in *Footfalls*. However, just because something resembling an interface exists in the installation

[514] Jean-Luc Nancy. *Being Singular Plural.* tr. Robert D. Richardson and Anne E. O'Byrne. (Stanford, CA: Stanford University Press, 2000), pp. 35, 62. Marie-Eve Morin. *Jean-Luc Nancy.* (Cambridge, UK: Polity Press, 2012), p. 36.
[515] Marie-Eve Morin. *Jean-Luc Nancy.* (Cambridge, UK: Polity Press, 2012), p. 36.
[516] Jean-Luc Nancy. *Being Singular Plural.* tr. Robert D. Richardson and Anne E. O'Byrne. (Stanford, CA: Stanford University Press, 2000), pp. 35, 62

does not mean it automatically *is* an interface.[517] For, as Nancy writes, the subject: "is not a 'subject' in the sense of the relation of a self to itself. It is an 'ipseity' that is not the relation of a 'me' to 'itself.'… It is being-a-part of Being itself and in Being itself, Being in each instant, which attests to the fact that Being only takes place in each instant."[518] If we take this to be the case, if, as Nancy argues, "the essence of Being only takes place in each instant" and if, as posited above, intra-action between two entities articulates a trace of "the with", then when the viewer/participant "*happens with"* the digital interface in *Footfalls*, an area for experimentation, reconsideration and possibly criticism of their relationship to, and intra-actions with, the digital interface appears.[519] Or, in Nancy's terms, a space of "betweens" is opened up.[520]

Nancy argues that: "Everything… passes *between* us. This 'between,' as its name implies, has neither a consistency nor continuity of its own. It does not lead from one to the other; it constitutes no connective tissue, no cement, no bridge."[521] So, when a link is created between the viewer/participant and the digital interface via embodiment, the movements that the viewer/participant makes in conjunction with the digital interface, while part of a larger ongoing process, are temporarily stabilized through the processes of representation.[522] For example, when the viewer/participants stomps on the platform her actions are recorded, filtered and visual representations of her actions (the spheres) are projected on screen. The very processes of emergence, embodiment and intra-action that bring these visual representations into being however involve human experimentation – experimentation that is, as suggested above, accompanied (or in some cases proceeded, interrupted or followed) by technological forces. This process, as Sarah Kember and Joanna Zylinksa (2012) write, is "a hybrid: it interweaves different entities, or, rather it stabilizes or 'fixes', entities in the process of interweaving them".[523] These temporary singular fixes, become events in the ongoing

[517] Tmema, *Footfalls*. (2006). Found online at: http://www.flong.com/projects/footfalls/ and at http://www.tmema.org/wordpress_test/footfalls. These entities in *Footfalls* include but are not limited to the spheres, the stool, and the shadow of the viewer/participant, the projectors.
[518] Jean-Luc Nancy. *Being Singular Plural.* tr. Robert D. Richardson and Anne E. O'Byrne. (Stanford, CA: Stanford University Press, 2000), p. 33.
[519] Ibid.
[520] Ibid., p. 5.
[521] Ibid.
[522] Ibid.
[523] Sarah Kember and Joanna Zylinska. *Life After New Media: Mediation as a Vital Process.* (Cambridge, MA: MIT Press, 2012), p. 22.

processes of emergence and embodiment (which Nancy refers to as "the eventness of the event" or "*the fact* that it happens").[524]

Nancy however argues that what makes an event an event "is not only that it happens, but that it surprises – and maybe that it surprises itself (diverting it from its own 'happening', not allowing it be an event, surprising the "Being" in it, allowing it to "be" only by way of surprise)".[525] An event, for Nancy, is *not* a *happening* itself, but the "*as it happens"*, thus, "it is the 'already' that leaps up, along with the 'not yet'".[526] Nancy continues, reminding us that while an event can be represented (in still or moving images or as verbal or written words), it primarily exists outside of the order of representation.[527] For instance, the event is the moment when the leap – or the relationship that emerges out of the leap – surprises itself. It surprises itself precisely because it is, to an extent, un-representable, as the event is not an expression of "itself" nor its surprise.[528] In Nancy's words: "the leap" happens in conjunction with "the surprise."[529] It is, he states: "nothing but this surprise, which still does not even 'belong' to it [the event itself]".[530] It is the interruption of this process that draws attention to the fact that the event is actually occurring. Thus, the event surprises itself through its own discontinuity, and it is this surprise that consequently allows the unrepresentable (the interface) to become present and to matter.

Nancy's notions of "Being" and the event articulate exactly why the relationship between the body and technology is important in interactive new media installations. It is important because the digital interface in *Footfalls* emerges out of the viewer/participant's multiple intra-actions and relationship with it (the event) and this emergence of the interface as an interface is the surprise of the event. It leaps out of the relationship between the body and technology. The emergence of the shadow as digital interface is the surprise that simultaneously pushes the digital interface outside of representation, and acts as the point at which it can become represented. The relationship between the body and technology constitutes the event; the fact that the shadow emerges out of and in conjunction with these intra-actions and relationships and becomes a digital interface is the surprise of its event. This

[524] Jean-Luc Nancy. *Being Singular Plural.* tr. Robert D. Richardson and Anne E. O'Byrne. (Stanford, CA: Stanford University Press, 2000), p. 161.
[525] Ibid., p. 159.
[526] Ibid., p. 171.
[527] Ibid., p. 161.
[528] Ibid., pp. 172-3.
[529] Ibid., p. 173.
[530] Ibid.

is because the movements that the viewer/participant makes with the shadow that the relationship between the body and technology brings about are precisely the events that constitute its emergence and allow it to become a digital interface.[531] The surprise of this event is significant because it is the moment when the interface is revealed to be an important, active agent – one that contributes to, thus has the ability to create change in, the installation. In other words, we can predict, to an extent, what will happen in *Footfalls* when we interact with the interface (thus predict, to an extent, how our interactions will change the installation). However, that is not what allows the interface to become present; the reason that it is present is not that it exists or that it can be represented. The overwhelming majority of interactive new media installations have interfaces. Rather, the interface in *Footfalls* has presence because it is an integral agent, an active part of a complex, open-ended, temporal aesthetic process initiated by the artists (in the past) and irrevocably shaped by the relationship between the body and technology (in the present) and those who encounter and interact with it in the future.

Enacting the Agential Cut

In what follows, I will develop my theorization of the relationship between the body and technology above through an analysis of Rafael Lozano Hemmer's interactive new media installation, *People on People* (2010). I have adopted this analysis in part from Barad's theories of the agential cut, and N. Katherine Hayles' (1999, 2003) theorization of the relationship between the body and embodiment. I draw on these texts in an attempt to advance my theorization of the relationship between the viewer/participant and the digital interface in interactive new media art installations. In my analysis, I shift focus, concentrating less on where the interface is located in the installation or on how changes to the artwork happen via viewer/participant interaction, and concentrate more on theorizing the network of multiple materialities, agents and agencies that compromise the installation.

Rosi Braidotti (1999) argues that approaching the issue of technology in "post-modernity requires a shift in perspective… the technological factor must be seen as co-extensive with and intermingled with the human".[532] This "shift in perspective" for Braidotti is more than

[531] In *Footfalls* these movements include: picking up a sphere, intra-acting with other viewer/participant(s) to change the shape of the pile of spheres on the ground.
[532] Rosi Braidotti. "Cyberfeminism with a Difference". (1996) Found online at: http://www.let.uu.nl/womens_studies/rosi/cyberfem.htm

just a "move away from a technophobic towards a more technophilic approach".[533] Rather, it must be viewed as a move on the part of media theorists towards a more "nomadic" theorization of the relationship between the body and technology – one that allows for, among other things, "shifts of location and multiplicity".[534] Unlike the binary shifts in spectatorship critiqued above, the problem, as Braidotti puts it, is no longer one in which media theorists attempt to explain how changes happen in relation to entities existing in extant positions as binary opposites.[535] Rather, the issue, she argues, lies in exploring how these shifts help us make sense of the flexible and multiple practices and identities that they help reshape.[536] Following on from Bradotti, I suggest that my reading of Hemmer's installation affords me a chance to view the viewer/participant and digital interface as productive and positive parts of the phenomena that they create. Thus, a different story is told from the one offered by the overly determined, technophobic and technophilic approaches briefly mentioned by Braidotti above.

The focus of Hayles' investigations is on the "idea of relation".[537] This idea is a way of theorizing the relationship between entities as "the dynamic flux from which both the body and embodiment [or any two entities for that matter] emerge".[538] The "idea of relation" thus suggests that the relationship between the body and embodiment (like the relationship between the body and technology) is defined by its openness to reconfiguration and uncertainty. The body, for Hayles, is the physical human form that is seen by others "from the outside, from a cultural perspective striving to make representations that can stand in for bodies in general".[539] Regardless of how it is represented or analyzed, she argues, concepts about bodies are generated "from a group of samples, and in this sense always misses someone's particular body, which necessarily departs in greater or lesser measure from the culturally constructed norm".[540] The body, then, is an abstract concept, one that is always culturally constructed by both the person inhabiting the form and the subjects that are

[533] Rosi Braidotti. "Cyberfeminism with a Difference". (1996) Found online at: http://www.let.uu.nl/womens_studies/rosi/cyberfem.htm
[534] Ibid.
[535] Ibid., Rosi Braidotti. *The Post Human.* (UK: Polilty Press, 2013)
[536] Rosi Braidotti. *The Post Human.* (UK: Polilty Press, 2013) This reshaping occurs, Braidotti writes, "by stressing heteronomy and multi-faceted relationality instead of autonomy and self-referential disciplinary purity." (Braidotti, 2013)
[537] N. Katherine Hayles. "Flesh and Metal: Reconfiguring the Mindbody in Virtual Environments" in *Data Made Flesh*. ed. Robert Mitchell, (Psychology Press: 2003), p. 298.
[538] Ibid.
[539] Ibid.
[540] Ibid., p. 297.

observing or interacting with it. Located at the other end of the spectrum, for Hayles, is embodiment.[541] Notions of embodiment, like those related to the body, are culturally constructed, but as she states: "they are not entirely so, for they emerge from the complex interactions between the conscious mind and physiological structures".[542] Embodiment, then, is experienced internally. It entails the feelings, emotions and sensations that "constitute the vibrant living textures of our lives".[543] The relationship between embodiment and the body, for Hayles, can then be seen as "emergent phenomena" that we try to interpret by separating them into individual categories or concepts (the body, embodiment, the body, technology, viewer/participants, digital interfaces).[544]

Veering between an understanding of the relationship between the body and embodiment as an emergent and fluctuating process on the one hand, and presenting the relationship between the two in terms of discrete (internal and external) entities on the other, Hayles stops short of embracing the full radicalism of her thesis. Consequently, she has been criticized for reducing the relationship between the body and embodiment to interaction between isolated things.[545] However, the analytical distinction that Hayles is making between the body and embodiment is not as binary as it appears. I do not believe that she is theorizing the relationship between the body and embodiment as a function of two separate (internalized and externalized) entities. Instead, I suggest that Hayles is breaking two entities apart in order to explore how their relationship with each other can begin to create change in the space they are located in.[546] Recognizing, but not fully articulating, the fact that theorists who analyze this relationship are usually focused on whether things are "binary or not", Hayles' text hints at the fact that relationships, like the one between the body and embodiment, are not definable unities, but always a melee of hybrid entities with multiple traits.[547]

Given this, I suggest that the separation of the elements that contribute to the relationship that Hayles is investigating is not an attempt to widen the split between the body and embodiment

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[541] N. Katherine Hayles. "Flesh and Metal: Reconfiguring the Mindbody in Virtual Environments" in *Data Made Flesh*. ed. Robert Mitchell, (Psychology Press: 2003), p. 297.
[542] Ibid.
[543] Ibid.
[544] Ibid.
[545] For more information on these criticisms, see among others, Amelia Jones's (2002) review in *Signs*, John Bonnett's (2000) review in *The Journal of the Association for History and Computing,* Jeremy Tambling's review in *The Modern Language Review* (2001).
[546] N. Katherine Hayles. "Flesh and Metal: Reconfiguring the Mindbody in Virtual Environments" in *Data Made Flesh*. ed. Robert Mitchell, (Psychology Press: 2003), p. 298.
[547] Ibid.

or a superficial reading of a complex and constantly fluctuating relationship. Rather, it is a theoretical strategy – a reclamation of the body, agency and subjectivity in contemporary discussions of posthumanism. In doing this, Hayles is positioning the relationship between the body and embodiment as emerging out of a distributed series of biological, technical, aesthetic, cultural and socio-political processes. She does so not by simply linking them together via surface level representations (words, images), but also through, among other things, a decentering of classical notions of the human and an expansion of concepts of embodiment and the body to encompass nonhuman entities and processes.[548] I argue that Hayles' study of the relationship between the body and embodiment and her attempt to return agency to this process of becoming makes a significant contribution to future theorizations of the relationship between the biological and the technical as an exchange, a network comprised of multiple materialities, processes and entities that can been pulled apart, for a certain period of time, only to be put back together again.[549] Hemmer's *People on People* (2010) offers an interesting case study in this regard. Not only because of the notions explored or the problems introduced. Rather, a critical reading of this installation provides answers to some of the more critical commentary and concerns about the relationship between the body and technology in interactive new media installations discussed above.

I first encountered *People on People* in 2011. It was included in Hemmer's solo exhibition, "Recorders", at Manchester Art Gallery. Located the back of the gallery, *People on People* consisted of two sets of projectors, high-resolution surveillance cameras and a computer.[550] When I entered the gallery, the cameras captured photographic images of me, which were projected onto a long, horizontal wall in the form of a black shadow.[551] The shadow, like the others discussed in this chapter, was the digital interface in this work, as it was the means by which I interacted with and accessed information and images. However, the designation of

[548] N. Katherine Hayles. *How we Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics*. (Chicago, IL: University of Chicago Press, 1999), p. 3. Simply put, the Posthuman, for Hayles does away with the false notion of a "natural" self and emerges when human intelligence is conceptualized as being co-produced with intelligent machines. (Hayles, 1999)

[549] One such theorization that owes a lot to Hayles study is Barad's (2007) concept of the agential cut, which is discussed in full below.

[550] Rafael Lozano Hemmer. *People on People.* (2010). Found online at: http://www.lozano-hemmer.com/people_on_people.php. *People on People* is an outgrowth of Hemmer's urban projection system: *Body Movies* (2001). *Body Movies* consists of robotically controlled projectors, light sources, a computer and thousands of photographic portraits of people, which were taken on the streets of the host city. *Body Movies* captures an image of passers-by and projects it onto the exterior wall of a public building in the shape of a silhouettes, which measure between two and twenty-five meters depending on distance. The previously photographed portraits appear in the silhouette of the passers-by. (Hemmer, 2006). Found online at: http://www.lozano-hemmer.com/body_movies.php

[551] Ibid.

the digital interface as shadow means that the digital interface is a digital image – a virtualization of me and my movements and actions. (Figures 43& 44)

Figure 43: R. Lozano Hemmer, *People on People.* (2010).

Figure 44: R. Lozano Hemmer, *People on People.* (2010).

Virtualization, or virtuality, as Hayles states, is "*the cultural perception that material objects are interpenetrated by information patterns"*.[552] She continues, writing that virtualization is normally associated with computer simulations such as the shadow in *People on People* that "put the body into a feedback-loop with a computer-generated image".[553] Drawing on Peggy Phelan's (1993) ontology of performance studies, the material (the "real") according to Hayles, implies physicality, and is characterized by presence and absence, as opposed to

[552] N. Katherine Hayles. *How we Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics*. (Chicago, IL: University of Chicago Press, 1999), pp. 13-14. Hayles's emphasis.
[553] Ibid., p. 13.

information (the virtualization), which consists of bits of digital data that are then sequenced into forms and identified by the interrelation of patterns and randomness.[554]

Similar to the way the Cartesian split used to dominate theories about the relationship between the body and the mind, Hayles believes that the dialectic of "pattern/randomness" (the basis of information) is beginning to overtake the dialect of "presence/absence" (the basis of the material) as a way to theorize the relationship between the body and technology.[555] Using the tension between the informational and the material as a starting point, Hayles develops a framework for understanding the "semiotics of virtuality", in which the concepts of "presence/absence" and "pattern/randomness" are positioned as complementary and relational.[556] She accomplishes this by positioning these two forms of dialectics as the "two axes" of a semiotic square.[557] Hayles then proceeds to connect them together, producing four synthesizing terms: materiality, mutation, information and hyper-reality.[558] Together, she argues, these terms produce the dominant characteristics of the "posthuman condition" and create a framework for the semiotics of virtuality.[559]

Kember and Zylinska build on this argument, applying it to the concept of mediation, stating that simulation "is founded on, and founders on, the collapsing of Cartesian divisions such as the one between the virtual and the real".[560] They continue, writing that mediation, like the relationship between the body and technology in interactive new media installations, "is positioned within a non-Cartesian framework (rather than an inverted or collapsed Cartesian framework in which the virtual does not absorb and negate the real)".[561] In short, the virtual does not act as a substitute for the absence of something real. Rather, as they state, the real "produces it".[562]

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[554] N. Katherine Hayles. *How we Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics.* (Chicago, IL: University of Chicago Press, 1999), p. 14. Peggy Phelan's (1993) ontology of performance studies, regards performance as a unique medium that "becomes itself through disappearance." Phelan argues that "To the degree that performance attempts to enter the economy of reproduction it betrays and lessens the promise of its own ontology. Performance is the attempt to value that which is non-reproductive, non-metaphorical." (Phelan, 1993, p. 146)
[555] Ibid.
[556] Ibid., p. 15.
[557] Ibid., p. 248.
[558] Ibid.
[559] Ibid., p. 249.
[560] Sarah Kember and Joanna Zylinska. *Life After New Media: Mediation as a Vital Process.* (Cambridge, MA: MIT Press, 2012), p. 40.
[561] Ibid.
[562] Ibid.

Following on, the digital interface (which is a digital image of my physical body) in *People on People* is not simply an on-screen representation of abstract information. Just because the digital interface is a virtualization does not mean that it is an inert object – a supplemental body that is separate from me. A change in the physical state does not denote a separation between the material and the informational. Rather, it suggests that the relationship between the material (me) and the informational (my shadow) is simultaneously a matter of being-in-the-world (the physical) and a matter of imitating and providing meaning to it (the virtual).

At this point, it is important to note that Hemmer does not aim to create a separation between the body and technology.[563] In fact, he states just the opposite in his artist statement.[564] However, just because Hemmer writes that the installation is an exploration into the creation of "a platform for embodiment and interpenetration" does not mean that the subject and the digital interface are positioned, or able to (re)position themselves, as relational, mutually co-constitutive entities in it.[565] For instance, when I entered the space containing *People on People*, a camera took a recording of me, which was sent to the projectors on the floor. The projectors on the ceiling also received this information and projected enlarged color photographic recordings of past participants who had previously interacted with the installation onto the wall. When my shadow passed over certain spaces on the wall, the color recordings revealed themselves.[566] If I stood still for a moment, these recordings sprung to life, and began to "interact" with me.[567] When I moved on, the color recordings froze and slowly faded into the background of the installation.[568] Thus the relationship between the body and technology in *People on People* was positioned by Hemmer and presented to me, as consisting of more or less self-contained objects or subjects who inhabit parallel, yet separate (physical and virtual) worlds. (Figures 45 & 46)

[563] Rafael Lozano Hemmer. *People on People.* (2010). Found online at: http://www.lozano-hemmer.com/people_on_people.php
[564] Ibid. In his artist statement, Hemmer claims that *People and People* is meant to convey "experiences of co-presence, platforms where live transmission affords entanglement and puppetry." (Hemmer, 2010)
[565] Ibid.
[566] Ibid.
[567] Ibid. By interact, I mean the recording of the previous subject could smile, look to its left or wave its hand and I could respond accordingly.
[568] Ibid.

Figure 45: R. Lozano Hemmer, *People on People.* (2010).

Figure 46: R. Lozano Hemmer, *People on People*. (2010).

In short, I was positioned in this installation, by Hemmer, as outside entity – a fixed operator, whose physical body needed to be incorporated into the interior of a machine, projected onto a surface and revealed to me in order for anything to work. Therefore, I argue that the relationship between the body and technology in *People on People*, while not necessarily conceived of, is most definitely presented to me, by Hemmer, as an exchange occurring between detached, yet communicative entities. This is precisely because *People on People* relies on the fact that I will recognize the narratives presented to me by Hemmer via the interface. These narratives include, but are not limited to, the notion that subjects and objects equally contribute to the installation, but are separate entities that occupy different worlds. This is an act of recognition on my behalf that caused me to physically enact a temporary separation, through the act of (re)positioning, between myself and the interface. Given this,

when I was interacting with *People on People* I was not a viewer/participant; I was an observer.

So, while Hemmer is careful to avoid empty instrumentalism, by ascribing agency to the digital interface, the interface in *People on People* could be criticized for, what Cramer (2011) calls, a focus on "look-and-feel".[569] By concentrating on the aesthetic appearance of the digital interface and the high-level technological aspects of the device (the fact that he can simulate a moving image of a subject in real time, project it onto a screen and make it aesthetically pleasing), Hemmer misses a fundamental aspect of HCI and digital interfaces in general: that they emerge out of and with the relationship between the body and technology. In doing this, Hemmer overemphasizes the importance of the digital interface and its technological functions, reducing it to both a synonym for simulation (the images of previous subjects as exact replicas) and a synonym of a perceptive medium or interactivity (the shadow of the current subject). The digital interface in *People on People* therefore becomes a metaphor – a vague explanation or demonstration of human perception and behavior.

Despite these limitations, the temporary analytical and physical distinctions that Hayles and the subject interacting in Hemmer's installation make between the two entities that they are exploring could be seen in terms of Barad's notion of the "agential cut".[570] The "agential cut" is a philosophical position, a material-conceptual device for knowing, seeing and understanding the world.[571] Barad argues that the entangled relationship between any two entities emerges and is "iteratively reconfigured through each intra-action, thereby making it impossible to differentiate in any absolute sense between creation and renewal, beginning and returning, continuity and discontinuity, here, there, past, present and future".[572]

The deeply connected way in which everything is entangled with everything else, according to Barad, suggests that any act of observation or intra-action (on behalf of the subject or the media theorist) requires the subject to temporarily enact "an agential cut" between themselves and the object they are studying within the larger material arrangement that they are located

[569] Florian Cramer. "What is Interface Aesthetics, or What Could it Be (Not)?" in *Interface Criticism: Aesthetics Beyond Buttons*. ed. Christian Ulrik Andersen and Søren Bro Pold. (Arhaus, DK: Arhaus University Press, 2011), p. 120.
[570] Karen Barad. *Meeting the Universe Halfway*: Quantum Physics and the Entanglements of Matter and Meaning. (Chapel Hill, NC: Duke University Press, 2007), p. 140.
[571] Ibid.
[572] Ibid.

in.[573] Agential cuts then differ from other forms of thinking because the agential cut does not take this division for granted. As she writes:

> [T]he agential cut enacts a resolution *within* the phenomenon of the inherent ontological (and semantic) indeterminacy. In other words, relata do not pre-exist relations; rather, relata-within-phenomena emerge through specific intra-actions. Crucially, then, intra-actions enact *agential separability* – the condition of *exteriority-within-phenomena.*[574]

Put simply, Barad believes that nothing located in "the world" is inherently separate from anything else.[575] However, separations are temporarily enacted, so a subject can examine an image, or explore a relationship long enough to gain some kind of knowledge about it. In the case of *People on People,* this separation occurs through subject interaction, thus determining my subject positioning in the installation (as viewer or observer, instead of viewer/participant). Thus the agential cut enacts a *temporary* separation between what is included in, and what is excluded from, the relationship or entity that the subject is observing and/or interacting with. The role of the agential cut is to untangle entities into separate objects and subjects, only to weave them back together later, as this act of unravelling is, and can only be, temporary. For, as stated above, while entities may be temporarily separated or stabilized, they *cannot* be disassociated from each other.

If, as Barad argues, nothing located in "the world" is inherently separate from anything else, and if, as Hayles argues, focusing on "the idea of relation", "changes everything"; then I can begin to argue that, despite Hemmer's focus on the aesthetic and technological aspects of the digital interface, the fact that I was able to physically enact a temporary separation (or an agential cut) between myself and the digital interface in *People on People* through the act of repositioning could be seen as an exploration, on my behalf, of how entities precede their existence with each other, and of how they emerge out of and with my relationship with the digital interface in interactive new media installations. It could also be seen as a mode of

[573] Karen Barad. *Meeting the Universe Halfway*: Quantum Physics and the Entanglements of Matter and Meaning. (Chapel Hill, NC: Duke University Press, 2007), p. 140.
[574] Ibid. Barad's emphasis.
[575] Ibid.

exploring, again on my behalf, what a body could or could not become (observer, viewer, participant, viewer/participant) in the installation space.[576]

A focus on the "idea of relation" between two entities in interactive new media installations allowed me the opportunity to (re)conceive my relationship and position to both, the digital interface and myself (as a viewer and/or viewer/participant) as in-process, thus unstable and open to reconfiguration. This openness to reconfiguration not only confused the distinction between absence and presence, as well as the material and the informational, it also afforded me the opportunity to begin to experiment with the digital interface, to question and challenge the way in which the self/other, body/technology distinctions were presented to me in *People on People*, and to explore what the digital interface may become once I repositioned myself and my relationship to technology in interactive new media installations.

In this way, I suggest that a reconsideration of the relationship between the body and technology (from separate objects and subjects to mutually entangled entities) highlights different, non-linear narratives, modes of communication and subject positionings. Thus it has the potential to open up a collective space for the exploration, criticism, reflection and reconsideration of the relationship between the body and technology in interactive new media installations.

Collective Spaces of Questioning, Reflection and Reconsideration

Amelia Jones (2000) writes that the body "is the means by which we produce ourselves as social beings, by which we produce 'social space'".[577] Referencing Michel Feher's (1987) formulation of power relations and the body, Jones argues that the body (when viewed from an art historical perspective) is not only the means by which we produce social space, but it is also the actualizer of power. The body, she claims, "functions as a kind of 'resistance to a power'… through its performance as socially determined and determining".[578] Therefore, the body, for Jones, has always been the site through which both public and private powers are

[576] Karen Barad. *Meeting the Universe Halfway*: Quantum Physics and the Entanglements of Matter and Meaning. (Chapel Hill, NC: Duke University Press, 2007), p. 140. N. Katherine Hayles. "Flesh and Metal: Reconfiguring the Mindbody in Virtual Environments" in *Data Made Flesh*. ed. Robert Mitchell, (Psychology Press: 2003)

[577] Amelia Jones. "Survey: Body, Splits" in *The Artist's Body*. ed. Tracey Warr. (London, UK: Phaidon, 2000), p. 19.

[578] Ibid., p. 22. Michel Feher's formulation states that: "the body is at once the…actualizer of power relations-and that which resists power…It resists not in the name of trans-historical needs but because of the new desires and constraints that each new regime develops. The situation therefore is one of permanent battle, with the body as the shifting field where mechanisms of power constantly meet new techniques of resistance and escape". (Feher, 1987. p. 161)

articulated; and if, as she argues, we take this to be the case, then the body can be conceived of as the site of power, and as the site of protest or resistance against those powers.[579]

Although related to 1960-1990s feminist body art performances, the crux of Jones's argument (the body is the site of power, protest and resistance) as well as her notion that radically disruptive and dislocative practices result in the intertwining of the "embodied selfhood" with social and technological spaces, therefore creating a new type of subject position – "the body/self" – can be applied to the relationship between the body and technology in interactive new media installations.[580] For example, "the body/self", for Jones, is a subject position that emerges out of the relationship between the body and social space.[581] Thus, she writes, "the body/self can be understood as the social" because it is formed through strategic corporeal acts of protest and/or resistance on behalf of both the viewer (who is observing and/or participating in the work) and the artist (who has both created and/or is performing the work).[582] The renegotiation of this relationship on behalf of the subject means that the relationship between the social and the self is no longer solely conceived of by the artist or theorized in oppositional terms (public space vs. domestic or private space, the body vs. technology.) Instead, it suggests potential for rethinking the relationship between the body and technology as being "in process" and open to reconfiguration in a way that both promotes and encourages behaviors that may deviate from the norm, and behaviors that may have the ability to cause dislocative effects in aesthetic contexts.[583]

An example of this potential can be found in Carmin Karasic's interactive new media installation *Hu^mann* (2008). *Hu^mann* consists of two components: technology (computer-generated animations, a circular screen, a camera, a computer, motion detectors) and the human (the viewer/participant).[584] (Figure 47)

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[579] Amelia Jones. "Survey: Body, Splits" in *The Artist's Body*. ed. Tracey Warr. (London, UK: Phaidon, 2000), p. 161. The fact that the body can become a site of protest or resistance against power means that the body becomes the site of power. Thus revealing what Feher refers to as the "constant tension between mechanisms of power and techniques of resistance." (Feher, 1987) This is a tension that Jones argues "lingers within the embodied subject" However, as Jones reading of Feher's work reveals, the body in its dual role as a site of resistance and a site of power means that it becomes the "ideal site of protest". (Jones, 2000)

[580] Amelia Jones. "Survey: Body, Splits" in *The Artist's Body*. ed. Tracey Warr. (London, UK: Phaidon, 2000), p. 25.

[581] Ibid.

[582] Ibid. The strategic corporeal acts of protest and resistance in Jones's case include the presence of the female body in 1960's feminist performance art, and technology. In the case of this thesis, these acts include the reconsideration of the relationship between the body and technology in interactive new media installations.

[583] Ibid., p. 42.

[584] Carmin Karasic. *Hu^mann.* (2008). Found online at: http://humann.carminka.net/index.php

Figure 47: C. Karasic, *Hu^mann*. (2008).

The animations displayed on the screen are generated randomly from the Internet in real time. They consist of both abstract and literal depictions of states, processes or events that Karasic writes: "subtly hint at the effects that our [human] actions have on the world we occupy."[585] The images located in the screen could consist of anything from a picture of the aftermath of Hurricane Katrina (a direct reference to global warming issues and civil engineering failures in the United States), to Disney World (an indirect reference to debates about fantasy and the real). They could be segments of a painting, a sculpture or an image of text that make direct or indirect reference to human actions and their effects on the world as well. When generated, multiple images are combined, distorted and then projected onto the screen in a kaleidoscope formation. (Figure 48)

Figure 48: C. Karasic, *Hu^mann*. (2008).

[585] Carmin Karasic. *Hu^mann.* (2008). Found online at: http://humann.carminka.net/index.php

This was the state of the artwork when I first encountered it in 2008 in Kunst licht kunst in Eindhoven, NL.[586] The images located inside the kaleidoscope remained static until the proximity sensors detected my movement. Once my activity was detected, the kaleidoscope began to spin based on my actions. For instance, when I moved to my left, the kaleidoscope spun left. If I walked directly up to the piece to get a closer look, *Hu^mann* would zoom in on one, or all, of the images and then project enlarged segments of them on screen.[587]

When I entered performance range, the camera took a color photograph of me. This photograph was transmitted to a computer, where it was processed, distorted and then integrated into the images in the kaleidoscope in real time.[588] While my image was distorted, I was able to recognize fragments of myself (my clothing) mixed with the other images appearing in the kaleidoscope. Since the actions that I performed (turning left, moving forward, moving backwards) caused a change in the state of the kaleidoscope, then it could be argued that my body was the means by which I produced the "social space" of the image.

Unlike the previously discussed interactive new media installations, *Hu^mann* does not contain a visible digital interface. There was no pixelated image or shadow projected on-screen for me to interact with. Instead, I was required to use my body to interact with the installation. So, if as Jones states, the body is not only the "actualizer of power" but also the "site of resistance" to these powers, then it could be argued that my physical body was not only aiding in the production of the images and narratives and social space in *Hu^mann*, as suggested above, but it was also functioning as the site of resistance to the underlying narratives, images and relationships it helps create.[589] In this way, it could be suggested that my body was the digital interface (the means of interaction and navigation) in this installation. This is precisely because in its triparte role as "creator of social-space", "actualizer of power" and "site of resistance", the body, as Jones tells us, is able to become explicitly "non-universal" and "non-transcendent". In this ability to become this way lies the potential for radically dislocative practices which include, but are not limited to, a rethinking of the digital interface, as human body, in interactive new media installations.[590]

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[586] Carmin Karasic. *Hu^mann.* (2008). Found online at: http://humann.carminka.net/index.php
[587] Ibid.
[588] Ibid.
[589] Amelia Jones. "Survey: Body, Splits" in *The Artist's Body*. ed. Tracey Warr. (London, UK: Phaidon, 2000), p. 22.
[590] Ibid.

It is important to note here that when I posit that the digital interface had become my body, I am not referencing art historians John Chandler and Lucy Lippard's (1968) notion of dematerialization.[591] I am also not attempting to argue that I could simply merge with technology to become part of the installation. Nor am I equating the visual absence of the digital interface with physical disappearance. To argue any of these things is to misinterpret the relationship between the technical and the biological and ignore the fact that digital interface has not actually been physically removed. The relationship between the body and technology in *Hu^mann* is not about assimilation or removal but about coexistence between the multiple entities that exist there. By suggesting that the digital interface has become my body in *Hu^mann*, I am signalling the fact that the digital interface (as in the abstract, multi-layered structures of code that allow two entities to communicate with each other and its consequent metaphorical significance as a mediator and translator) is no longer represented, or made tangible by, a physical object or a shadow projected onto a screen. The digital interface, the mode of interaction, communication, its metaphorical, aesthetic and cultural significance in *Hu^mann*, is now my body. Thus it is produced by and is constantly producing, subjects, objects and meanings. In this way, the designation of human body as interface can be seen as emerging out of both the reconception of the relationship between the body and technology and the ongoing process by which the artwork, cultural meanings and interactions are collectively created and questioned. In the case of *Hu^mann* the dislocative acts of cutting (of images), the integration (of my photographic image with the other images in the kaleidoscope) and artistic experimentation with different configurations of the digital interface allowed me to explore and question my relationship to technology. These acts enabled me to examine my relationship to the content of the images (of events, processes or states of human actions) and begin to rethink the actions and decisions that I made both in the gallery space and in the world.

In conclusion, whether understood as an "entangled intra-relating" by Barad, a relational construction "that participates in distributed cognition dispersed throughout the body and the environment" by Hayles or as "non-universal, "non-transcendental" and "in process" by Jones, the relationship between the body and technology in *Hu^mann* can be seen as both a

[591] Coined, by art historians John Chandler and Lucy Lippard, in 1968, dematerialism refers to an extremely diverse range of artistic practices and reflections that:"emphasize the thinking process almost exclusively" and "may result in the object becoming wholly obsolete." (Chandler and Lippard 1968, p. 46) This notion is problematic due to its Cartesian assumptions (that artwork emphasizes thinking (the mind) over acting (the body)) and notions of obsolescence.

mutually entangled and collaboratively produced experience.[592] *Hu^mann* then not only opened up a space for me to begin to reposition and reconstruct myself in relation to technology, but it also opened up both a space for criticism (of the underlying structures and theories that dictate and define my movements and positions) and an area that allowed me an opportunity to begin to reflect on, re-evaluate, rediscover and possibly even redefine my relationship to the digital interface in interactive new media installations. These conclusions lead the way towards the next topic discussed in this thesis: Instruction. The following chapter will introduce this concept and then explore the implications of the destabilizing effects (as described in this chapter) that resistance to, or the subversion of, instruction have on the way the viewer/participant both intra-acts with and thinks about the digital interface in interactive new media installations.

[592] Sarah Kember and Joanna Zylinska. *Life After New Media: Mediation as a Vital Process.* (Cambridge, MA: MIT Press, 2012), p. 7. Karen Barad. *Meeting the Universe Halfway: Quantum Physics and the Enganglements of Matter and Meaning.* (Chaptel Hill, NC: Duke University Press, 2007), Preface and Acknowledgements. N. Katherine Hayles. "Flesh and Metal: Reconfiguring the Mindbody in Virtual Environments" in *Data Made Flesh.* ed. Robert Mitchell, (Psychology Press; 2003), p. 298. Amelia Jones. "Survey: Body, Splits" in *The Artists Body.* ed. Tracey Warr. (London, UK: Phaidon, 2000), p. 22.

Chapter 3: *Instruction and the Interface*

The digital interface in interactive new media art installations is commonly defined as both the hardware and software embedded in a physical object that enables humans to use technology. Its primary functions are to mediate communication and facilitate interaction between entities. While the interface certainly enables connections to be forged, these connections are preprogrammed by the artist(s) creating the interface, and they occur, as previously argued, in spaces of predesigned experiences. In this way, the functions that the interface performs (facilitation, mediation, translation, communication) can be seen, to an extent, as problematic due to the fact that they create active vs. passive dichotomies, resulting in, as argued in Chapter 1 and 2, environments of controlled passive response. However, as Mondloch (2010) states, it is not so much the dichotomies associated with screen-based artworks that require scholarly attention, although she believes they are important and should be examined. Rather, she rightfully suggests it is the processes that bring these dichotomies into being – specifically "the disciplinary aspects of screen-based visuality" that should be of concern to any theorist examining them.[593]

The phrase "disciplinary aspects of screen-based visuality" for Mondloch refers to how the "technological structures and control mechanisms of late capitalism", such as cybernetics and new forms of visually-based media communications like the Internet, influence or effect the relationship between humans and technology.[594] Thus, she writes that while critical accounts written about interface-reliant installations in the humanities fields have developed "more nuanced theories of attentive regulation and control as potential sites of cultural contestation", the majority of these texts fail to appreciate the role that interfaces play in administrating and controlling interactions between subjects and media objects.[595] Given this, in any investigation into the use of the digital interface in interactive new media installations, it is of vital importance to develop a critical understanding of the means and mechanisms through which viewer/participant interactions are shaped via the digital interface to attain certain results. I will do just that in this chapter, focusing on the concept of instruction and instructional processes. Particularly I will examine how instruction is transmitted to the viewer/participant via the digital interface, as well as how and why it is

[593] Kate Mondloch. *Screens: Viewing Media Installation Art*. (Minneapolis, MN: University of Minnesota Press, 2010), p. 23.
[594] Ibid. pp. 23, 96.
[595] Ibid. p. 23.

employed in interactive new media installations. My exploration of instruction is structured around three questions: Why is the use of instruction important in interactive new media installations? How and why is instruction employed in them? And for what means and to what ends are the results of this instruction used?

My understanding of instruction and the instructional process is informed by a close reading of Norbert Wiener's (1989) cybernetic notion of instruction as a method of controlling biological and technical systems and Lucy Suchman's (2007) critique of instruction as a rhetorical device that reinforces problematic modes of communication between humans and machines. I draw on these texts in order to explore the implications that the use of instruction, as provided to the viewer/participant by the artist and deployed via the digital interface, has for interactive new media installations. How we learn to interact in interactive new media installations can be accomplished in multiple ways: instruction can occur through reading and following written instruction manuals, watching other viewer/participants interact with the artwork, or through direct experimentation with the installations themselves. Rather than addressing written and oral instructions (user manuals or verbal directions) provided by the artist or venue to the viewer/participant, I am concerned with instruction as it is conveyed through the use of rhetorical devices in interactive new media installations.[596]

In this way, this chapter addresses instruction, not as an order or command, but as a method of arranging and then transmitting explanatory or directional information to the viewer/participant. My ultimate aim in theorizing instruction as such is to take a step back from proliferating utilitarian accounts of instruction and interfaces that concentrate, for the most part, on the undesirable effects of instruction when transmitted via technology to the subject (Galloway, 2013; Hookway, 2012). In taking this step back, I aim to provide a different, hopefully more productive account of how instruction manifests itself and can be used in interactive new media installations.[597] While the effects that the aforementioned theorists concentrate on in their work may be undesirable, they are, for the most part, ideological in nature. That is to say, they are the effects of a normative vision – socio-political, moral or ethical beliefs or ideas around how to behave – that are transmitted to the viewer/participant via the digital interface and that structure her experience in interactive

[596] Instruction in human-machine interaction is subject to historical context, and consequently the efficacy of any given instruction set to the viewer/participants is temporally dependent with the potential of wearing thin, and ultimately it could fail altogether. For more information on how instruction fails, see Dourish, 2004.
[597] These undesirable effects include, but are not limited to the creation of spaces of controlled passive response, unworkability and incoherence as discussed in chapter 1.

installations. So, while these effects are not the focus of this chapter, they are important to any conversation around instruction and must be briefly discussed.

The Ideological Effects of Instruction

Some instruction, when transmitted through technology, is, according to Alexander Galloway (2012), always binary and always political.[598] Instruction, for Galloway, is binary in a computational sense: its dissemination hinges on the abilities of various technological and cybernetic systems to transmit a very small amount of information from one entity to another and to "operate smoothly without obstruction".[599] It is political, he writes, simply because the information being transmitted is produced by specific people for specific purposes. Thus this type of instruction, Galloway tells us, is similar to propaganda in that it is meant to be consumed by the public, taken as fact, without critically thinking about it.[600]

Galloway takes issue with this particular type of instruction (instruction as propaganda) as he believes it is used (by those designing the devices) to influence the actions of the subject via the prohibition of specific types of narratives, modes of production and moral frames.[601] In this way, instruction, especially instruction transmitted through technology, for Galloway, is problematic because it prohibits the existence of "alternate moral frames" and different ways of thinking and acting.[602] Given this, instruction, he writes, can be seen as "disingenuous informatics" because it is used, by those who create it, to transmit ideological propaganda to the public.[603]

Suchman (2008), notes that digital technologies "include relations between the sites and interests within which coordinative artifacts are generated and those of their use."[604] Such technologies, she continues: "presuppose an open horizon of socio-material practices that inevitably exceed their representational grasp. At the same time, those practices reflexively constitute themselves as implementation of actions prescribed."[605] However, she writes:"[the] frequent presence of multiple, often contradictory, agendas…on the one hand, and the work required to enact an orderliness…on the other lead to various forms of both

[598] Alexander Galloway. *The Interface Effect* (Cambridge: Polity Press, 2012), p. 102.
[599] Ibid.
[600] Ibid.
[601] Ibid., p. 104.
[602] Ibid., pp. 104, 105.
[603] Ibid., p. 103.
[604] Lucy Suchman. *Human Machine Reconfigurations: Plans and Situated Actions.* (Cambridge, UK: Cambridge University Press, 2007), p. 277.
[605] Ibid.

breakdown and creative resistance."[606] Here, Suchman, like Galloway, is arguing that people (engineers, artists), or institutions (both commercial and non-profit) produce technologies to perform very specific computerized tasks for very specific reasons. They are then sold to and used by the public for various purposes that the device's creators may or may not have originally intended.[607] Suchman continues, stating that the people who consume technologies and the institutions and people who create them, of course, hold specific, often conflicting interests or agendas. The presence of multiple, often contradictory interests, combined with the fact that these technologies are ultimately preprogrammed to perform specific task(s) can lead to both breakdown situations (the technology simply will not work) and/or resistance to the instruction given by the subject interacting with it (using it for other, unrelated purposes). Therefore, Suchman's analysis differs from Galloway's in the sense that she believes instruction, as transmitted to the subject via technology, may influence a subject's behavior. It also may suggest actions or propose strategies for the completion of a goal, but it does not, as Galloway's analysis above may suggest, determine it. That is to say, instruction for Suchman can be ideological in some cases, thus it may restrict, but it does not prohibit, as Galloway argues above, the emergence of alternative narratives, modes of production and moral frames.

Suchman's critique of instruction as a process that determines behavior assumes a particular importance in the context of this chapter, as her interpretation does not only focus on the undesirable ideological effects instruction may have, but she provides her reader with examples of the subject's subversion and resistance to it. Drawing on Suchman's work, in this chapter, I focus on the destabilizing effects that the resistance to, or the subversion of instruction on behalf of the viewer/participant has in interactive new media installations. Doing this will enable me to study a whole range of variations in behaviors and interactions that occur when the viewer/participant resists or subverts instruction, and how this resistance or subversion affects the way the viewer/participant views and interacts with the digital interface in interactive new media installations. The pertinent questions to be asked at this point then are: What are the potential consequences of subversion or resistance of instruction on behalf of the viewer/participant for the interface in interactive new media installations?

[606] Lucy Suchman. *Human Machine Reconfigurations: Plans and Situated Actions.* (Cambridge, UK: Cambridge University Press, 2007), p. 277.
[607] Ibid. An example of Suchman's argument is the telephone. The telephone's original purpose was to enable two or more users located in disparate places to conduct conversations with each other. Its use and physical appearance have changed. Telephones are not only used for communication, but they are now used to send emails, play games and browse the Internet.

And how does this instruction change when the viewer/participant resists or subverts it? My reasoning behind asking these questions is to develop a critical understanding of the power that instruction has in controlling the actions of its subjects and how the nature of this instruction may change when deployed in interactive new media installations. Subjects, as Suchman writes, have the ability to resist or subvert instruction and generate moments of rupture in the spaces they are located in.[608] Building on Suchman's argument, the contribution that my analysis of instruction adds to discussions on this topic is that it directly addresses the potential that the subject's resistance to and subversion of instruction has in allowing for different modes of thinking, doing and interacting in the specific context of interactive new media installations and in the world at large.

Discourses around the regulatory nature of instruction have recently re-emerged among scholars, in order to posit that the interface is unworkable.[609] I say, "re-emerged" because these arguments echo, to an extent, Norbert Wiener's cybernetic notions of instruction. I discuss Wiener's notions of instruction in detail below, but in brief: instruction, for Wiener, is a method of controlling biological and technical systems – one that takes information learned from past experiences and reinserts it into the system to influence similar situations encountered in the future.[610] The focus of his research, is on the control of system behaviors via instruction. Specifically Wiener focuses on how fast the system adapts to and modifies previous behaviors based on the current information it is receiving. Any moments of rupture that may occur if and/or when the subject resists instruction in his theory are dismissed, as they exist outside the cybernetic feedback loop of control.[611] By dismissing these moments, I argue that cybernetic notions of instruction, as theorized by Wiener, foreclose on any possibilities for subversion or resistance to the information or instruction being transmitted to the subject interacting with the system as this theory relies on the false premise that the systems being analyzed are a part of a closed signalling loop.[612] So, while efforts by scholars like Galloway (who theorizes the interface as unworkable) and Wiener (who theorizes instruction as an integral part of a closed feedback loop) make a considerable contribution to

[608] Lucy Suchman. *Human Machine Reconfigurations: Plans and Situated Actions.* (Cambridge, UK: Cambridge University Press, 2007), pp. 189, 198, 277.
[609] Alexander Galloway. *The Interface Effect* (Cambridge: Polity Press, 2012).
[610] Norbert Wiener. *The Human use of Human Beings: Cybernetics and Society,* (London: Free Association, 1950), p. 87.
[611] Ibid. Wiener refers to these moments as "a natural part" of a leaky instructional process. Since they are natural, they are of no concern to him, so he ignores them. (Wiener, 1950, p. 79). Wiener's theorization of these moments will be discussed in full below.
[612] Ibid.

humanistic and post-humanistic understandings of the interrelation between instruction, the viewer/participant, the artist and the interface, I argue that their theories can be seen as problematic. They are problematic because the ability (on behalf of the viewer/participant) to resist or subvert instruction is not so much ignored, but left behind by scholars like Galloway and Wiener in favor of a critique of the socio-political propaganda that instructional processes purportedly transmit or utilitarian studies of the regulation of behaviors.

With some exceptions research into the use of the digital interface in the humanities fields, has, to an extent, adopted the prevailing and dominant cybernetic views on instruction briefly described above.[613] Given this, the question should be asked of how a conceptualization of instruction would operate in interactive new media installations if we were to focus our examinations of it on other aspects of the instructional process. That is to say, to focus our investigations into instruction on the notion that the viewer/participant has the ability to resist or subvert the instruction given to her, instead of concentrating on its ability to allow the artist to control or manipulate viewer/participant interactions. By shifting focus in this manner, I do not mean to say that we should be unconcerned with developments in the computer science and humanities fields around instruction, or that artists should not critically interrogate or deploy instruction as a method of controlling viewer/participant interactions in their works. Rather, I suggest that something is needed to complement the notion of instruction as a cybernetic method of controlling the actions of biological entities in computerized systems, as well as to provide a different analytic framework for investigating how instruction is executed and inscribed in interactive new media installations. This chapter is my attempt at providing such a framework – one that places importance on, thus allows moments of experimental resistance and subversion on behalf of the viewer/participant to come into focus.

This chapter is divided into two sections. The first provides a theoretical base from which to understand instruction in interactive new media installations. It suggests that the digital interface in interactive new media installations mediates a relationship between the viewer/participant and artist. By this I mean the digital interface translates and then transmits instructional information provided by the artist about the installation to the viewer/participant. I then argue that these processes occur, in interactive new media

[613] These exceptions include, but are not limited to: Mondloch (2010), Suchman (2007), Rode (2008), Andersen and Pold (2011), Penny (2013), Rueb (2015), Sommer, Miggnonneau & King (2015).

installations, through the reappropriation and designation of common objects (bicycles, telephones, books, microphones, human bodies) as digital interfaces in order to reinforce and regulate, to an extent, viewer/participant behaviors by providing them with something familiar and recognizable. This is done to manage and sometimes to limit communication between the viewer/participant and the other entities located in the same space. The viewer/participant then interprets these objects as instruction – an action which I posit enables the viewer/participant to (re)orient themselves in the installation through the duplication and reconstruction of familiar processes, spaces and entities (reading, cycling, recording studios) that they may encounter on an everyday basis in the physical world. I build on this theorization in the second half, examining how viewer/participant resistance and subversion to instruction affects interactive installations, what it means and why it is important. In it I suggest that the viewer/participant's resistance to, or subversion of instruction begins to challenge concepts of separate, discrete, autonomous entities called humans and communicative machines by presenting the viewer/participant with an opportunity to engage with and restructure (within certain parameters) the underlying narratives that shapes her experience in interactive new media installations. I posit that this resistance and subversion begins, to an extent, to shift focus away from theorizing the subject as an outside operational entity whose actions are structured and defined as exterior to technology, towards considering her an integral part of the installation – an embodied and active viewer/participant whose interactions with the digital interface have consequences in interactive new media art installations.

This notion of an embodied viewer/participant whose interactions have repercussions in interactive new media installations is highly significant to this thesis because it enables me to theorize the encounter between the viewer/participant and the digital interface as generative – as an ongoing, open-ended process. From this perspective, the interface in interactive new media installations can be said to be unstable, uncertain and, to a certain extent, open to reconfiguration, as the designation of the viewer/participant as locus of interaction means that the illusion that the artist has complete control over the action occurring in the installation is, to an extent, broken.

Instruction, Learning Processes and the Cybernetic Feedback Loop of Interaction

Instruction, for Wiener (1989), as mentioned earlier, is: "a method of controlling a system by

reinserting into it the results of its past performance".[614] Wiener continues, positing that if this reinserted information is able to modify the patterns of the performance of the system, or the user's past actions, then we are presented with "a process which may well be called learning".[615] Instruction, then, for Wiener, is a system that influences the learning process, and the learning process is a method that relies on information learned from past experiences influencing or feeding-back on similar situations encountered in the future.

An example of how instruction and the learning process works, Wiener informs us, can be found in the way a lab rat is taught to navigate a maze.[616] The scientist places a rat in a maze, and in order to find food, or to avoid electric shock, the rat must be able to remember if its actions have been successful.[617] Did it get food? Or did it get shocked? The rat must be able to use this learned information to change its plan to avoid past mistakes (remembering which paths lead to shocks) and successfully navigate the maze (remembering which paths lead to food).[618] Wiener writes that the learning process described above is different from other instructional processes, like those that deal with simple performance-based successes or failures (the ability to grasp a straw).[619] He calls this instance a "feedback on a higher level", as the way the rat is able to navigate the maze is a reflection of disciplinary instructions used to restrict or reinforce behaviors, not of simple learned actions (again, the ability to grasp a straw).[620]

I want to concentrate, for a moment, on some of the problems in Wiener's statement on the flow and regulation of information in cybernetic systems – specifically, those found in his description of instructional and learning processes as a feedback loop. I argue that Wiener's theorization is limited because he is treating the biological and technical aspects of these processes as predetermined and constrained. In doing this, I suggest he ends up denying agency. That said, Wiener does concede, later in the same text, that if scholars treat the outcomes of the instructional and learning processes as purely quantifiable – as a detailed string of numbers that merely control action – without being critically questioned or

[614] Norbert Wiener. *The Human use of Human Beings: Cybernetics and Society,* (London: Free Association, 1950), p. 87.
[615] Ibid., p. 61.
[616] Ibid., p. 59.
[617] Ibid.
[618] Ibid.
[619] Ibid.
[620] Ibid.

contextualized, then the information received about the system being studied is flawed.[621] This is because these outcomes do not account for more subjective things like human bias or human and nonhuman error. As he writes: "If the results [of instructional processes] are merely used as numerical data for the criticism of the system and its regulation, we have the simple feedback of the control engineers."[622]

How information flowing through these feedback loops behaves, moreover, is not the same, for Wiener. Wiener does not believe that all biological processes act alike, or respond to information in the same way, if they respond at all. Rather, the transmission of information, he argues, relies on: "a complicated pattern of responses in which certain combinations of incoming [information]…will cause the message to go further, while certain other combinations will not. These combinations are not a thing fixed once for all, nor do they even depend solely on the past history of messages received. They are known to change."[623] These notions of change lead Wiener to explore the limitations of instructional and learning processes.[624] However, some of the conclusions he comes to in his study are flawed. These conclusions are, in simple terms, that the functions of biological systems (humans) are synonymous with those of technical systems (computers). Given this, humans are primarily seen, by Wiener, in the context of cybernetics, as self-regulating, information-processing things that are essentially the same as machines.

The instructional process, for Wiener, is predicated on the assumption that there is symmetry between biological and technical entities. This assumption implies that the human and nonhuman subjects participating in the instructional feedback loop lack agency.[625] Not only does instruction describe, and consequently, fix the embodied actions and perception of subjects in specific positions (spectator, observer, viewer, participant) but, by assuming that biological and technical processes are the same (thus stripping away any semblance of agency from the entities that actively contribute to them), Wiener's theorization of the instructional process is positioning the human as operational entity and technology as a passive tool. In this way, I argue that Wiener's theorization of the instructional and learning processes, in a round-about way, is reinforcing notions of the separation between the human

[621] Norbert Wiener. *The Human use of Human Beings: Cybernetics and Society,* (London: Free Association, 1950), p. 59.
[622] Ibid., p. 54
[623] Ibid., p. 64.
[624] Ibid., p. 63.
[625] This issue is elaborated on by Hayles (1999) and will be discussed in full in the next three pages.

and the machine. His theorization does this via the creation of an active vs. passive dichotomy (active, operational entity vs. passive tool.) The issues (separation of the human and the machine; active vs. passive dichotomy) found in Wiener's conceptualization are similar to those Brian Massumi (2011) sees occurring in theorizations of interactivity.

Massumi argues that despite the word inter*activity*, "the emphasis is rarely placed on the dynamic form of the [subjects'] experience".[626] Rather, the emphasis, he writes, is placed on the series of back and forth actions and reactions that interactivity provides to the subject. Massumi believes that interactivity in art should be all about this "dynamic form of the experience".[627] But instead interactivity, he tells us, "tends to get reduced to the instrumental affordance as concretized in the actual form of the technical object. It gets reified in an objective function".[628] So how do these issues around interactivity and instruction manifest themselves in interactive new media installations, if they do at all? A good place to start would be to examine media artist Luc Corchesne's installation *McLuhan's Massage Parlor* (2011-2012).

In 2011, Courchesne was commissioned by the city of Toronto to create a video installation – *McLuhan's Massage Parlor* – as part of their celebration of media theorist Marshall McLuhan's (1911-1980) 100th birthday. The Toronto-based version consisted of four large rear projection screens. The screens were arranged in a square formation and covered from top to bottom in textual, image and sound-based data taken directly from McLuhan's book *The Medium is the Massage* (1967).[629] Courchesne also created interactive versions of this work. They were installed in the Society for Arts and Technology's (SAT) interactive environments in Montreal.[630] Like their Toronto-based counterparts, the interiors of the interactive environments are covered with data taken from the same text.[631] (Figure 49)

[626] Brian Massumi. *Semblance and Event: Activist Philosophy and the Occurent Arts.* (Cambridge, MA: MIT Press, 2011), pp. 45-6.
[627] Ibid., p. 46.
[628] Ibid.
[629] Luc Courchesne. *McLuhan's Massage Parlor.* (2011). Found online at: http://courchel.net/# *The Medium is the Massage* (1967) is a 160-page collage-style book. It was intended to make McLuhan's book *Understanding Media: The Extension of Man* (1964) more accessible to a wider readership through the use of visual metaphors.
[630] Ibid.
[631] Ibid.

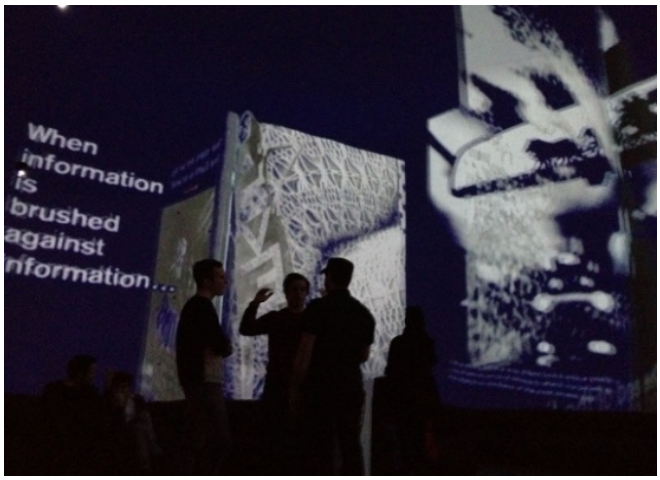

Figure 49: L. Courchesne, *McLuhan's Massage Parlor*. (2011).

The video installation does not contain a digital interface; the interactive versions, however, do. The digital interface in the interactive versions is a hand-held controller similar in shape and size to a smartphone.[632] To navigate the installation and engage with visual and textual information, the viewer/participant must hold the interface in her hands and point it up at the ceiling or down at the floor. To zoom in on a particular image or piece of text, she must press a button on the interface with her finger and move it back and forth as if she were turning a page in a book. Finally, to activate sound or video, she must tap an icon located on the interface's screen.[633] (Figure 50)

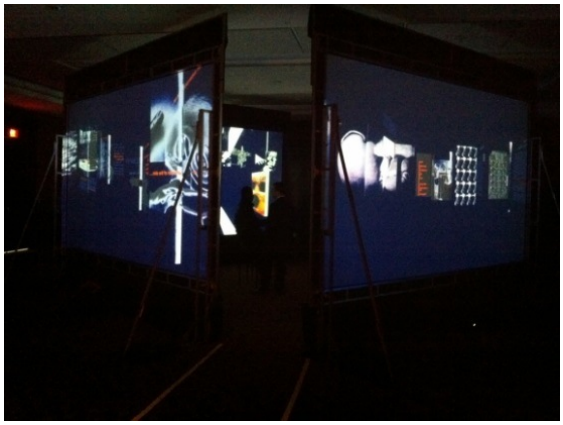

Figure 50: L. Courchesne, *McLuhan's Massage Parlor*. (2011).

[632] Luc Courchesne. *McLuhan's Massage Parlor.* (2011). Found online at: http://courchel.net/#
[633] Ibid.

How the viewer/participant uses the digital interface in *McLuhan's Massage Parlor* is based on information that she has learned from past experiences with similar items (tapping icons opens relevant applications on a smart phone). In this way, Courchesne does not have to provide a detailed list of predetermined steps for the viewer/participant to follow in order to activate the installation (and he does not.) Rather, similar to Wiener's example of rats navigating mazes above, Courchesne can assume that the viewer/participant remembers, to an extent, previous experiences with books or smartphones and will use the interface provided in a similar manner to the way she would use the aforementioned items.

Given the shape and size of the interface and the tacit instruction provided to the viewer/participant by Courchesne, it could be argued that emphasis, in *McLuhan's Massage Parlor*, is placed on the series of back and forth actions of the viewer/participant (pressing a button, swiping a finger) and responses to these actions by the installation (the revealing of the artwork). For example, the viewer/participant can do a lot with the forms and imagery located in the installation. She can make an image appear, hear sounds and read text and she can do all of this by touching the interface. Given this, the interface, and by extension the installation, feels action-packed. However, the sense of action that the viewer/participant experiences when participating in artworks that employ this type of interaction, Massumi tells us, "is constrained, subordinated to functional circuits of action-reaction that are to a large extent predetermined to respond to what are taken to be existing needs or wants [of the subject]".[634] In constraining interaction in this way, Massumi states: "What is concentrated on [by the subjects participating in the artwork and the artist programming the interface] are instrumentalized action-reaction feed-back loops and, what gets foregrounded is the element of nextness in the flow of action."[635] In this way, interactivity, he writes, "backgrounds its own artistic dimension when it concentrates on the function of the instrument to the detriment of the semblant expression".[636] Here, Massumi is arguing that when interactivity is theorized, and consequently deployed in artworks, as a series of actions and reactions, the viewer/participant's embodied experience of and creative expression with the work takes a back seat to the computerized functions of the technical devices located in the installation.

[634] Brian Massumi. *Semblance and Event: Activist Philosophy and the Occurent Arts.* (Cambridge, MA: MIT Press, 2011), p. 46.
[635] Ibid.
[636] Ibid.

Given this, the experience the participant has in artworks that employ this type of interactivity, Massumi tells us, is akin to playing a video game.[637] The viewer/participant discovers and then masters "a trick" and once she's done that, she quickly loses interest and walks away because she knows how the installation works.[638]

Following on from Massumi, I argue that the experience that the instruction affords to the viewer/participant in *McLuhan's Massage Parlor* is constrained in the sense that it describes, and consequently fixes, the actions and perception of the viewer/participant through the reinforcement of questionable and contradictory notions of interactivity (touch a button, see images, become more active). This is because the instructions given to the viewer/participant are, as mentioned above, limited to simple actions (touch this, swipe that, see an image or piece of text). Given this, interaction, in *McLuhan's Massage Parlor,* operates more on a level of instrumental function than the embodied experience of the viewer/participant or the aesthetic dimensions of the interface. By limiting interaction in this way, *McLuhan's Massage Parlor* inadvertently creates an active vs. passive dichotomy by positioning the viewer/participant as passive entity and the interface as operational tool. And it is this limitation around interactivity that I suggest ultimately reinforces, in the same roundabout way as Wiener's theorization of instructional and learning processes mentioned earlier, the separation of the human and the machine.

Suchman confirms my argument: reinforcement of the separation of the human and the machine occurs, she states, through the deployment of technologically based metaphors and models (such as the term "interactivity" or a digital interface shaped to resemble a phone, used to describe, represent and fix actions) that incorporate the subject "into the socio-material assemblage that comprises a functioning machine".[639] These metaphors and models, she tells us, ultimately instrumentalize the actions of human entities, while simultaneously celebrating the "liveliness" of the nonhuman ones. This happens, Suchman writes, because agency, when theorized using Wiener's cybernetic definition of instruction, is a singular, internal attribute. It is "something that comes from 'inside'".[640] By "something that comes from inside," Suchman is referring to the fact that agency, specifically the agency of

[637] Brian Massumi. *Semblance and Event: Activist Philosophy and the Occurent Arts.* (Cambridge, MA: MIT Press, 2011), p. 46.
[638] Ibid.
[639] Lucy A. Suchman. *Human-Machine Reconfigurations: Plans and Situated Actions,* (Cambridge: Cambridge University Press, 2007), p. 190.
[640] Ibid., p. 251.

nonhuman entities, in texts on cybernetics, is conceived of as "prespeicified" or "hard-wired" into the machine.[641] Suchman is skeptical of this particular configuration of agency as it hinges on what she sees as contradictions in Wiener's formulation of cybernetics and instruction – contradictions that she believes still exist today.[642] If we take this to be the case, if the instructional process can never fully depart from cybernetic understandings of it as a set of prescribed directions for controlling actions in closed systems, then what can be said of its use in interactive new media art installations?

Hayles, like Suchman, highlights the contradictions in the treatment of biological and technical entities that underpin Wiener's cybernetic ideas of instruction and their application in the humanities fields and fine arts. She argues that: "[f]rom Norbert Wiener on, the flow of information through feed-back loops has been associated with the deconstruction of the liberal human subject."[643] Such deconstruction of the human subject is, of course problematic; it is a process that, Hayles argues: "presumes a conception of information as a (disembodied) entity that can flow between carbon-based organic components and silicon-based electronic components to make protein and silicon operate as a single system."[644] What are the consequences of instruction when used as rhetorical device in interactive new media installations beyond the reinforcement of the separation between the human and the machine and disembodiment? To what extent can it be argued that the resistance and subversion of instruction by the viewer/participant ends up challenging notions of separation and disembodiment in interactive new media installations? How are these challenges able to reshape the way the viewer/participant interacts with the digital interface? And how effective are they?

Pre-Programmed Actions and Unexpected Experiences: Instruction as a Rhetorical Device

Critical investigations into the use of instruction as a rhetorical device that reinforces traditional modes of communication and interaction and implies separation and disembodiment are not new in the humanities and computer science fields. Suchman, for

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[641] Lucy A. Suchman. *Human-Machine Reconfigurations: Plans and Situated Actions,* (Cambridge: Cambridge University Press, 2007), p. 251. The texts that Suchman is specifically referring to are those written by Andrew Pickering (Pickering, 1995; 2002).

[642] Ibid., These contradictions will be discussed in full in the final section of this chapter. In brief, the contradictions in Wiener's theory lie in the fact that cybernetics combines "behaviorism, teleology, and control engineering" with "aspirations and a sense of contingency and interactivity worthy of 'unpredictable liveliness' and 'open-ended becomings.'" (Suchman, 2007, p. 251)

[643] N. Katherine Hayles. *How we Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics*. (Chicago, IL: University of Chicago Press, 1999), p. 2.

[644] Ibid.

example, argues that plans, like instructions, are "conceptual and rhetorical devices (often materialized in various ways, as texts, diagrams and the like) that are deeply consequential for the lived activities of those of us who organize our actions in their terms".[645]

To summarize her argument, Suchman takes issue with previously held ideas in the computer science field about the concept of planning as it relates to artificial intelligence and cybernetics. Plans, according to Suchman, are not simply scientific models of action; they also act as "resources for people's practical deliberations about action".[646] While plans are used in the aforementioned disciplines as resources for action, they do not, she writes, determine its course, as they do not fully represent the embodied practices and ever fluxuating circumstances of the user's action in concrete detail. A plan's purpose, she suggests, is to orient the user in such a way that they can "obtain the best possible position from which to use those embodied skills on which… success depends".[647] Here Suchman is arguing that a plan of action in the computer science fields is a set of movements that are utilized by the user to achieve a desired state or goal. However, this plan does not determine the exact action of the user. Rather, it recommends courses of action, which are often based on basic assumptions about the user (humans are bipedal) and/or pre-detected behaviors and basic assumptions around them (this person purchased diapers, she must have an infant). Its success relies on the user's knowledge of, and embodied response to, the conditions and entities located in their environment, not on the successful completion of the predetermined steps provided to them.

If we apply this notion to interactive new media art installations, then a plan of action is something the viewer/participant consciously forms based on instruction the artist provides to her via the digital interface. This is done in order to navigate the various images and narratives that the viewer/participant encounters in the installation. The fact that the artist is providing the viewer/participant with instruction via a navigational device (the digital interface) however complicates this process because, as argued above, a plan of action is not a series of predetermined steps executed to accomplish a goal (touch a button, activate an installation). The actions that the viewer/participant makes are reliant on her intentions or purpose in the installation. That is to say, the viewer/participant's interactions with the digital

[645] Lucy A. Suchman. *Human-Machine Reconfigurations: Plans and Situated Actions,* (Cambridge: Cambridge University Press, 2007), p. 20.
[646] Ibid.
[647] Ibid.

interface reflect and represent, but *do not replicate*, her specific purpose (press a button, activate graphics, experience artwork) in interactive new media installations. Given this, the way the viewer/participant interacts with and navigates the installation is not a direct result of the instruction provided to her. Instead, echoing Suchman, I posit that it arises from her situated actions with the forms that occupy the same space.[648] Thus the concept of interaction, when deployed in certain installations, can provide options for viewer/participant intervention, via resistance and/or subversion of this instruction.

A very good example of how intervention may occur can be found in Rafael Lozano-Hemmer's interactive new media installation *Microphones* (2008). The digital interface in *Microphones* is a series of 1939 vintage *Shure* brand microphones.[649] To activate the installation, the subject must approach a microphone and speak into it. The microphone then, to use Hemmer's words, "speaks back" to her.[650] (Figures 51 & 52)

Figure 51: R. Lozano Hemmer, *Microphones.* (2008).

[648] Lucy A. Suchman. *Human-Machine Reconfigurations: Plans and Situated Actions,* (Cambridge: Cambridge University Press, 2007), p. 72.
[649] Rafael Lozano Hemmer. *Microphones.* (2008). Found online at: http://www.lozano-hemmer.com/microphones.php
[650] Ibid.

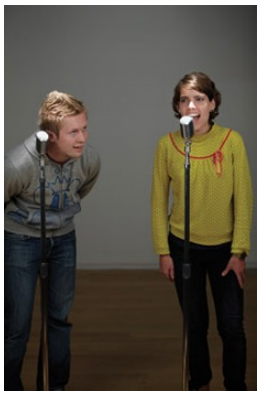

Figure 52: R. Lozano Hemmer, *Microphones.* (2008).

The types of responses the microphones give are varied – half the time they play back what was just recorded, half the time they reproduce a recording of a previous subject. This distribution of responses, according to Hemmer, serves two purposes: it allows the subject to "understand the interaction" occurring in the installation; and it "creates an experience that is outside his or her control".[651]

The way the installation is staged in the gallery may help the subject understand the interaction occurring in it on a deeper level, however, based on personal experience, *Microphones* does not create an experience outside the subject's control insomuch as it creates, to an extent, an experience outside the artist's control. I argue that it is this lack of control on behalf of the artist that ultimately provides the subject with options to subvert and resist the instruction dictated to her. For example, my interaction with the interfaces in *Microphones* and my ability to navigate the installation were not dependent on a deep understanding of external technical conditions (the ability to use a microphone in the physical world, prior knowledge of sound production) of the form that the digital interfaces represent. My actions with the digital interface were instead dependent on my intentions, or purpose (speak into the microphone, hear my amplified voice). My consequent position in relation to the digital interface (orator) was a representation of both my previous interactions in similar situations and the role Hemmer has instructed me, via metaphors and models (microphones, the word interactive), to play in the installation.

[651] Rafael Lozano Hemmer. *Microphones.* (2008). Found online at: http://www.lozano-hemmer.com/microphones.php

At this point it is important to note, as Suchman does, that plans are not located outside action.[652] They are, she states, "moments of situated activity (activities of planning, remembering, etc.), displaced in time and space from the occasion anticipated or recollected".[653] Following on from Suchman, the instruction provided to the subject in any situation should not be understood as the cause of action. It should be seen as a resource that can be employed by the subject in order to achieve action.[654] Given this, it could be assumed that when a subject interacts with the digital interface in *Microphones*, she is not necessarily following the predesigned trajectory of the installation provided to her by Hemmer. For, as argued earlier, a plan does not determine the action of the subject. It relies on her ability to recall previously learned information and apply it to the situation at hand. This then suggests, among other things, that when I approached the microphone and spoke into it, I was navigating the installation based on information (how to use a microphone, how to behave in a museum or gallery setting) located outside of Hemmer's control. In other words, Hemmer does not know who will be visiting the gallery and interacting with his work, therefore he cannot predict the behavior of every single subject in the gallery space. Thus he cannot control every aspect of the way they interact with his installation. This lack of control suggests that I could subvert the narrative or resist the instruction provided to me by Hemmer, and, to an extent, modify it.

For example, Hemmer is unaware if I had, among other things, used a microphone in a professional setting, been to a museum or seen an interactive installation before. Nor did he have any prior knowledge as to what I would do or say when I approached the microphone. I could have, for instance, screamed into a microphone from far away, instead of speaking directly into it or simply refused to speak – all actions that have the potential to modify the predetermined narrative of the installation by breaking the rigid feedback loop of human-machine interaction that it relies on. If I am not able to hear the microphone "speak back", then I am not receiving a response. Thus I am participating, but not interacting. The fact that I was engaging with and consequently applying my prior experiences with interactive artworks – experiences located outside Hemmers' control – to *Microphones* furthermore suggests that I could alter, to an extent, the outcome of the installation. For, as mentioned above, Hemmer cannot predict, therefore cannot program, all of these experiences into the installation.

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[652] Lucy A. Suchman. *Human-Machine Reconfigurations: Plans and Situated Actions,* (Cambridge: Cambridge University Press, 2007), p. 71, Footnote #4.
[653] Ibid., p. 71.
[654] Ibid.

How the subject then creates a plan through situated action is not only viewed as a way to complicate the notion that a plan is just a detailed set of instructions that is controlling the action in the computer science field – this perspective can also be seen as a way for the subject to resist or modify instruction in interactive new media installations. For example, by recalling my past experiences in similar situations and then implementing them in *Microphones*, I was able to challenge some, but not all, of the underlying concepts dictated to me by the instruction given and begin to reshape my experience in the installation. I was able to do this because, as mentioned above, my intent or purpose (which was to interact) was never completely reflected in the movements I made with the digital interface (not speaking into it, just listening thus not receiving a response). The lack of response to my actions lead me to begin to experiment and question notions surrounding the cause and effect my interactions may have in the installation.

Peripheral Actions and Unintended Consequences: Instruction and the Filtering Process

Suchman is skeptical of the instructional process and our ability to subvert or resist it due to the fact that the main goal of instruction is ultimately to bring "canonical descriptions of objects and actions to bear on the actual objects and embodied actions that the instructions describe".[655] Instruction, she writes, is a practical tool used to guide action in virtual and physical environments. It relies on the subject's ability to recognize symbolic representations and act on them. Therefore, instruction not only acts as a framework, or set of prescribed directions for controlling actions in closed systems, but it also serves, as Suchman tells us, "as resources for retrospective accounts of what has happened".[656] Hence, the success of instruction not only lies in the subject's ability to recall previously learned information and apply it to the task at hand, it is also, in her words: "a matter of constructing a particular course of action that is accountable to the general description that the instruction provides. The work of constructing that course is neither exhaustively enumerated in the description, nor completely captured by a retrospective account of what was done."[657] Here, Suchman is suggesting that instruction acts as a resource for describing what type of action happened. This description, which is formed based on previous accounts of interaction, serves as a guide for the course of action that the subject takes. Such a description however is not comprehensive because it treats the actions and decisions that the subject makes in the

[655] Lucy A. Suchman. *Human-Machine Reconfigurations: Plans and Situated Actions,* (Cambridge: Cambridge University Press, 2007), p. 101.
[656] Ibid.
[657] Ibid. p. 112.

periphery of the installation as unimportant to the completion or activation of the artwork, specifically the actions and decisions that the subject makes that the instruction views as inconsequential.

So, when the viewer/participant interacts with the digital interface – an M-16 rifle – in Lynn Hershman Leeson's interactive new media installation *America's Finest* (1993-4) the instruction that she receives from Hershman Leeson via the digital interface could be interpreted as a plan for action by both the viewer/participant and the observer.[658] (Figure 53)

Figure 53: L. Hershman Leeson, *America's Finest.* (1993-4).

This is because the instruction the viewer/participant is receiving describes the way she should act: walk up to the rifle, look into the sight and pull the trigger in order to view an image; or press the trigger down for an extended period of time to hear a sound and view an image sequence. It dictates the role(s) that the viewer/participant should play in the installation as well (aggressor before the trigger is pulled and victim afterwards). (Figure 54)

[658] Lynn Hershman Leeson. *America's Finest.* (1993-1994). Found online at: http://www.lynnhershman.com/americas-finest/

Figure 54: L. Hershman Leeson, *America's Finest.* (1993-4).

The instruction however does not take into consideration all of the actions and their consequences (both intended and unintended) of the decisions that the viewer/participant makes when she uses the rifle. These include simple shifts in movement, variations in activity, and any ethical objections she may have to the form (a weapon) that the interface represents or the positions (aggressor and/or victim) that she assumes upon interacting with it.[659] In the case of *America's Finest,* these decisions and their consequent results are explicitly intended to be seen as pointless, due to the fact that they do not follow the instruction provided to the viewer/participant by Hershman Leeson via the digital interface.

In being this way, the interface is acting as a filter, much like Hansen (2004, 2006) believes the human body in virtual environments does, selecting, subtracting, processing and then reflecting information relevant to the narrative of the installation back on to the viewer/participant, while filtering out the rest as noise.[660] Hansen's notion of the filtering process, as argued in Chapter 1, is used as a way to regulate the viewer/participant's actions and behaviors in interactive new media art installations. This regulation can be deliberate as illustrated by *America's Finest* or unintentional as illustrated in *Microphones.* Suchman

[659] Lynn Hershman Leeson. *America's Finest.* (1993-1994). Found online at: http://www.lynnhershman.com/americas-finest/ There have been lots of ethical objections to this piece. As Meredith Tromble notes: "its electrical cords were cut by a knife at the International Festival of Electronic Art in Liverpool and the gun was broken in half at the ZKM in Karlsruhe." (Tromble, 2005, p. 85)

[660] As mentioned in Chapter 1, Hansen argues that rather than simply filtering a series of composed images, the subject is able to frame and create images out of "something that has no form." Therefore, the subject has, for Hansen, become the "active source of framing" rather than being a "passive site of inscription." Thus, the viewing subject can now be considered a "viewer-participant" because perception is understood as an embodied and affective experience, albeit one that has been modified by technology prior to conscious perception. (Hansen, 2004, 2006)

confirms my argument: there is, she writes: "a determinate relationship between certain un-interpreted actions by the user, read as changes to the state of the machine, and the machine's transition to a next display. By establishing a determinate relationship between detectable user actions and machine response, the design unilaterally administers control over the interaction, but in a way that is conditional on the actions of the user."[661] Here, Suchman is stating that technology is able to filter information, and that the relationship between the human and the computer is contingent on the user's actions. If the computer is unable to process the user's actions, she writes, then the computer will take control or regulate interaction.[662] So, if, for example the interface in Hershman Leeson's installation cannot detect or interpret the viewer/participant's movements in a particular sequence, then it could exert control over interaction (and by default the installation) by predicting the viewer/participant's current action(s) based on previously detectable and interpretable ones. After that it would proceed to the next step.

Based on this predetermined information (pull the trigger of the rifle in order to view and change images, hold the trigger down for a period of time in order to view a sequence of images), the software that allows *American's Finest* to work, filters out the action(s) of the viewer/participant that are deemed unnecessary to the completion of the installation (fiddling with the sight, performing outside the video cameras' range) and move systematically to the next step, reflecting information relevant to the completion of the installation back on to the viewer/participant.[663] Thus, I argue Hershman Leeson is not only able to designate which actions will affect the installation (look into the sight, pull the trigger), but she is also able to regulate and, to an extent, fix the viewer/participant's movements (stand in a specific place, swivel the rifle) and position (aggressor and then victim) in the installation as well. (Figure 55)

[661] Lucy A. Suchman. *Human-Machine Reconfigurations: Plans and Situated Actions,* (Cambridge: Cambridge University Press, 2007), p. 75.
[662] Ibid.
[663]Lynn Hershman Leeson. *America's Finest.* (1993-1994). Found online at: http://www.lynnhershman.com/americas-finest/. America's Finest consists of a M16 rifle, custom scope, software and surveillance system. Located in the gun of the barrel is an LCD monitor and video equipment. This equipment is connected to a computer with video grabbing and mixing capabilities. There are 40 images that can be displayed on the screen. These images are held by a frame-buffer and can be overlaid on top of each other. (Hershman Leeson, 2016)

Figure 55: L. Hershman Leeson, *America's Finest.* (1993-4).

How instruction is deployed to regulate actions and behavior, however, is much more complicated than the filtering process described above. There is confusion between how the viewer/participant acts, how she interprets these actions, how the digital interface is programmed to interpret action and how these actions are viewed by others who occupy the same space. For instance, just because the viewer/participant believes an action that she makes in the installation (pulling a trigger on an automatic rifle) will mimic the way she perceives the outcome of her action in the physical world (shooting, either offensively or defensively, in order to maim or kill) does not necessarily mean it will. And in *America's Finest* it does not, as pulling the trigger of the gun causes the viewer/participant to become the victim of her own actions.[664] Nor does it mean that others located in the same space will view these actions as offensive or aggressive ones. They could easily be understood as defensive ones, by either the viewer/participant performing the action, or by those observing it. For, as stated above, there is confusion between how the viewer/participant perceives her actions, how her actions affect the underlying narrative of the installation, and how the others who occupy the same space see them.

Suchman addresses this point, raising questions about the relationship between how projected or reconstructed courses of action in situations – specifically the relationship between deliberation and reflection – are both viewed and formed. She contends, in short, that confusion occurs because directed action is always integrally yet problematically related to

[664] Lynn Hershman Leeson. *America's Finest.* (1993-1994). Found online at: http://www.lynnhershman.com/americas-finest/. *America's Finest* in Hershman Leeson's words: "transforms the aggressor/user into a victim of surveillance and capture." (Hershman Leeson, 2016) For example, when the user looks through the sight and squeezes the trigger, an image of her is pasted in the gun sight. Thus the user has become the target and she is transformed from aggressor into victim.

two types of activities: situated ad-hoc improvisation, that she defines as "the part of us, so to speak, that actually acts" and the other, which she writes is derived from these ad-hoc improvisations and includes "our representations of action in the form of future plans and retrospective accounts".[665] These descriptions, she tells us, are formed either before or after the action performed by the subject in the form of imagined projections (the plan created before the action based on the instruction given) and recollected reconstructions (descriptions of past actions).[666]

Suchman continues, stating that this method of representation relies upon "the recipient's ability to do the implicit work of anchoring descriptions to concrete objects and actions".[667] Thus, plans and retrospective accounts of plans are distinguished from action because, she argues, in order to "represent our actions we must in some way make an object of them". [668] Following on, I argue that to provide an accurate account of the abstract nature of the digital interface in interactive new media installations, we must be able to make sense of the actions we perform with it and the interactions we observe others making when using it, and in order to do so, we must be able to connect them to something tangible (often times a preexisting cultural form) and familiar.

Abstract Descriptions and Familiar Forms: The Relationship between Form and Content

The digital interface in David Small's *Illuminated Manuscript* (2002) is a hand-bound oversized book containing 26 seemingly blank pages.[669] A single projector hangs above the book, illuminating it. When a viewer/participant opens the book and moves her hand over a blank page, projected text appears on its surface.[670] The text directly corresponded to the page in the manuscript the viewer/participant turned to. As Small explains: "The book begins

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[665] Lucy A. Suchman. *Human-Machine Reconfigurations: Plans and Situated Actions,* (Cambridge: Cambridge University Press, 2007), p. 71.
[666] Ibid. These actions are the rhetorical devices such as metaphors that are employed to characterize our movements in interactive installations.
[667] Ibid.
[668] Ibid.
[669] David Small. *Illuminated Manuscript.* (2002). Found online at: http://www.davidsmall.com/portfolio/illuminated-manuscript/. *Illuminated Manuscript* is visually similar to Masaki Fujihata's interactive new media installation *Beyond Pages* (1995). In fact, Fujihata's *Beyond Pages* could be considered to be a predecessor to *Illuminated Manuscript.* The works are similar in the sense that they contain interactive books. The viewer/participant can manipulate, to an extent, the images located inside both books. *Illuminated Manuscript*, however, is purely text-based and the viewer/participant manipulates the text with their fingers. In *Beyond Pages* the viewer/participant interacts with the book using a stylus. Upon interaction she is simultaneously confronted with a written object, an image of the object as well as a virtualization of the same object. For more information on *Beyond Pages*, see http://zkm.de/en/media/video/beyond-pages
[670] Ibid.

with an essay on the four freedoms – freedom of speech, freedom of religion, freedom from fear and freedom from want. Each page explores a different text on the topic."[671]

When the viewer/participant moves her hand over the text or touches a word, full sentences break away from the paragraphs they are embedded in and run from one side of the page to the other. Text also overwrites itself and circles around the page in a tube-like formation. Given this, the digital interface not only resembles a book in form (it has a spine and pages) but its content (readable narrative text) mimics one as well. (Figures 56 & 57)

Figure 56: D. Small, *Illuminated Manuscript* (2002).

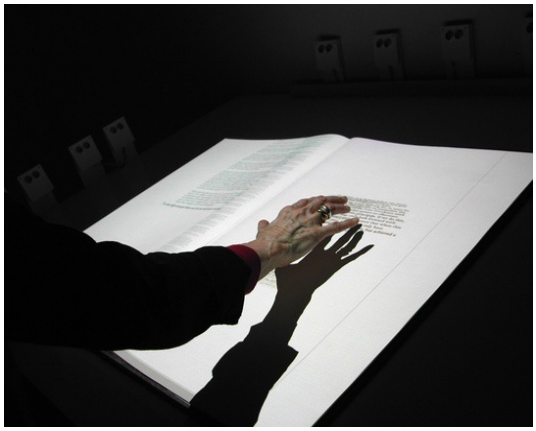

Figure 57: D. Small, *Illuminated Manuscript*. (2002).

[671] David Small. *Illuminated Manuscript.* (2002). Found online at: http://www.davidsmall.com/portfolio/illuminated-manuscript/.

Despite its visual appearance, the manuscript is a digital interface. It is a technical device, shaped to mimic a cultural form. It has been fitted with electronic measurement devices and has been preprogrammed to perform specific functions. Specifically it mediates the conversation between the viewer/participant and the artist, makes text-based information appear on its surface and allows interaction to occur.[672] Since the instructional method relies on the ability to anchor abstract descriptions to concrete forms and actions, it could be argued that the relationship between form (the way something looks) and content (the message something transmits) in *Illuminated Manuscript* allows the viewer/participant to make the actions of abstract technological systems (the projector, algorithms and sonar sensors that control the movement of the text and make it appear on the page) tangible and relatable. This is because the digital interface is acting as a metaphor for a book through the relationship between form and content that it provides, the connection it creates to similar objects in the physical world and the viewer/participant interaction that it facilitates.

The fact that the shape the digital interface in Small's installation takes is a familiar one does not necessarily mean that the viewer/participant can predict the type of response that her actions will elicit, although in some cases she can. For example, we can predict, to an extent, what will happen when we flip a page of a book (readable text will appear.) However, a book has multiple functions and its content, like its technical counterpart in *Illuminated Manuscript*, is open to interpretation. This openness, combined with the fact that the viewer/participant can manipulate and reconfigure the structure and meaning of the text in *Illuminated Manuscript*, means that the ability on behalf of the viewer/participant to navigate the installation is not a precondition of the digital interface or the form it takes. Rather, it is the product of the viewer/participant's embodied experience with it. And, it is this embodied experience, I posit, that allows the viewer/participant to begin to rethink her relationship to the interface and interact with it in different ways. For, it is through the act of creative manipulation that the viewer/participant can begin to modify the underlying narratives of the texts embedded in the book and create different structures, forms and meanings with them. In this way, the viewer/participant's relationship to, and interactions with, the interface constitutes her experience in *Illuminated Manuscript*. Thus, it affects the way she reorients and consequently repositions herself in the installation as well.

[672] David Small. *Illuminated Manuscript.* (2002). Found online at: http://www.davidsmall.com/portfolio/illuminated-manuscript/

Paul Dourish (2001) echoes my sentiments, stating that instructional processes act as metaphors, allowing the subject to visualize and interact with computational systems. The ability to anchor abstract descriptions to concrete forms, he writes, also involves: "being able to reorient ourselves towards the technology turning it from an object of inquiry and examination, into a tool that can be used". [673] Dourish continues, stating that while computational systems incorporate elements from the physical world such as shared ontological systems, intentionality and intersubjectivity, "computation is fundamentally about representation". [674] Here, Dourish is arguing that the elements that make up technological systems are both virtual and physical. They are abstract phenomena, a series of programmed numbers and visual signs or representations that refer back to, and consequently feedback on, the form that the software designer or artist has chosen to model.

If the key feature of a technological system is that it symbolically refers back to, as Dourish states, "elements in the world of human experience", then it could be argued that when a viewer/participant uses a digital interface, she is not simply interacting with a replica of the form that the technology represents, she is also interacting with all of its underlying socio-political, cultural and aesthetic connotations as well.[675] The fact that the viewer/participant is able to connect the interface in *Illuminated Manuscript* to previous encounters with similar forms (books) in the physical world suggests that her experience in the installation is both constructed by the physical appearance of the interface, as well as shaped through previous and current interactions with it. Furthermore, I posit that the way the viewer/participant orientates herself in relation to the digital interface is shaped by the underlying cultural significance that these forms carry as well. For, as Dourish states, the key feature of interaction with technological systems does not solely lie in the operational capabilities of the system, but rather it is an issue of transparency – that is, how easy the technological system and its computerized processes are to use and understand.[676] Importance, he argues, is not about what technology does, or can do but rather "how we *act through* it to achieve effects in the world". [677] So, when a viewer/participant flips a page of Small's book, the fact that the sensor embedded in the page is sending a signal and activating algorithms located in a computer is not of paramount importance to her experience (although it does matter, as these

[673] Paul Dourish. *Where the Action is*. (Cambridge, MA: MIT Press, 2001), p. 154.
[674] Ibid., p. 143.
[675] Ibid.
[676] Ibid.,
[677] Ibid. Dourish's emphasis.

algorithms do dictate and control, certain key actions.) What is significant is that her actions allow her to see images and, to a certain extent, manipulate them.

Dourish is right when he calls for transparency. Designers, artists and engineers should focus on transparency, as a "good" interface should be easy to use. It should let us concentrate on the task at hand, rather than its technical functions. Furthermore, the metaphors and models deployed to describe action in technological systems, as Dourish rightfully points out, do affect the way we reorient ourselves in relation to technology because they provide us with instruction, as argued above. However, Dourish and I differ in regards to his statement that it is the way we act "*through technology*", that allows this reorientation to occur. The trouble with his analogy is that it prioritizes an abstract notion of transparency, or ease of use, over the subject's embodied actions and her access to the inner workings of the computer, thereby simplifying, to an extent, a very complex, multifunctional and consciously negotiated process and turning the technology used into an instrumental thing. More importantly though, I posit Dourish's statement suggests a certain kind of finality to a relationship that is generative in the sense that it is constantly reproducing subjects, objects and processes. Contrary to Dourish, I argue it is the way we act *in conjunction with technology*, as in what we, as embodied beings, are able to do *with* technology that allows this repositioning to happen. The difference between these two statements lies in the fact that the digital interface is more than a metaphor for human vision, or a tool used to easily navigate an interactive installation, and the human body is more than just an operational vessel for consciousness, identity and technological innovation. The digital interface and the subject's interactions with it constitute, or aids in, the articulation and construction of the way in which the subject conceptualizes and classifies entities and experiences in space.

The distinction between acting *through* and acting *in conjunction with* technology and the consequent metaphors, models and positions that are a result of these frameworks, as slight as they may be, I suggest are not so much binary, but rather a matter of significance. For instance, by stating that it is how we act *through* technology that matters, Dourish is prioritizing the technological operations and constraints of the interface. Therefore, its instrumental uses (the technical ability to transmit information and the subject's capacity to easily act within the predetermined confines of the technological system) become significant. Whereas, emphasizing how the subject acts *in conjunction with* technology means that importance is placed on the intelligent interplay, or the relationship between the human and the machine. By placing importance on intelligent interplay and the relationship with

technology, the subject's situated and embodied actions with, and future reactions to, other entities that occupy the same space become significant. Furthermore, it allows our relationship to technology to become significant in that it begins to shift focus away from the capabilities of the technological form onto what the viewer/participant can do in conjunction with it in interactive new media installations. I posit that this particular way of theorizing the relationship between the body and technology as an engagement with, and an integral part of, interactive new media art installations, has the potential to begin to reshape the way technologies are used and theorized in interactive new media installations. Thus, by emphasizing what the subject can do *in conjunction with* technology rather than *through* it I can begin to theorize the viewer/participant and the digital interface in interactive new media installations as relational and co-constitutive, rather than separate objects and subjects that are working through, or against, each other to accomplish a mutual goal.

Acting in Conjunction with the Computer

In order to develop a more critical understanding of what it means to act in conjunction with technology in interactive new media installations, I turn to Martin Heidegger's (1927) theory of technology. Here, my notion of acting in conjunction with technology rests alongside Heidegger's notions of "ready-to-hand" and "present-to-hand", which for him are some of the preconditions of technology and our relationship to it.[678] I say preconditions because the concepts of "ready-to-hand" and "present-to-hand", for Heidegger, in simple terms, refer to the fact that technology has, to an extent, agency or "Being-in-itself". Thus it affects the space or place that it is located in.

The phrase ready-to-hand, for Heiddeger, means using a piece of technology and concentrating on the task at hand (writing text, exploring an interactive new media installation), rather than the actual technology.[679] As he writes: "[W]hat is proximally to hand is that, in its readiness-to-hand, it must…withdraw in order to be ready-to-hand quite authentically. That with which our everyday dealings proximally dwell is not the tools' themselves. On the contrary, that with which we concern ourselves primarily is the work."[680]

The concept of present-to-hand is more complex than the concept of ready-to-hand. According to Heidegger, technology becomes present-to-hand when the subject discovers its

[678] Martin Heidegger. *Being and Time: A Translation of Sein und Zeit*. tr: Joan Stambaugh. (State University of New York Press, 1996), p. 19.
[679] Ibid.
[680] Ibid., p. 64.

"unusability".[681] This discovery usually occurs during some sort of breakdown situation: the interface will not turn on, Microsoft Word crashes mid-edit, or something less drastic like a mouse hitting the edge of a mouse pad. Technology, specifically the functions of the technology used (navigation in the case of interfaces, writing in the case of Microsoft Word), then, becomes apparent or "conspicuous" to the subject using it.[682] Thus, the subject's focus is on the technology itself, rather than on the task at hand. This "conspicuousness" on behalf of the ready-to-hand technology, as Heidegger argues foregrounds its present-to-hand qualities.[683] As he writes: "This conspicuousness presents the ready-to-hand equipment as in a certain un-readiness-to-hand. But this implies that what cannot be used just lies there; it shows itself as an equipmental Thing which…. in its readiness-to-hand has constantly been present-in-hand."[684]

In this way, present-to-hand is not a notion that is in contrast to ready-to-hand, but an integral part of technology, something that has been there all along. The distinction between present-to-hand and ready-to-hand, like the distinction between acting through technology and acting in conjunction with it, then is not binary. The difference, instead, lies in the fact that when technology has broken down, the present-to-hand aspects of technology become readily apparent or significant to the subject. This is because the existence of entities – be it a subject, an object, a digital interface or a viewer/participant – according to Heidegger lies precisely in the way those moments make technology apparent.[685] Let me explain this concept by way of the following example of Bernie Lubell's interactive new media installation *A Theory of Entanglement* (2009).

A Theory of Entanglement consists of an oversized loom.[686] The loom is fragmented, divided into individual, yet interconnected sections (harnesses, beams, spindles) and spread across the gallery space. In addition to the loom, a large tube of knitted black fabric descends from the ceiling into the area directly below it. To activate the installation to knit, the

[681] Martin Heidegger. *Being and Time : A Translation of Sein und Zeit*. tr: Joan Stambaugh. (State University of New York Press, 1996), p. 64.
[682] Ibid.
[683] Ibid., 102
[684] Ibid.
[685] Ibid. p. 103.
[686] Bernie Lubell. *A Theory of Entanglement.* (2009). Found online at: http://bernielubell.com/03entangleinstall.htm

viewer/participant must sit on one of the two stools shaped to resemble bicycles (the bikes) and push their pedals.[687] (Figure 58)

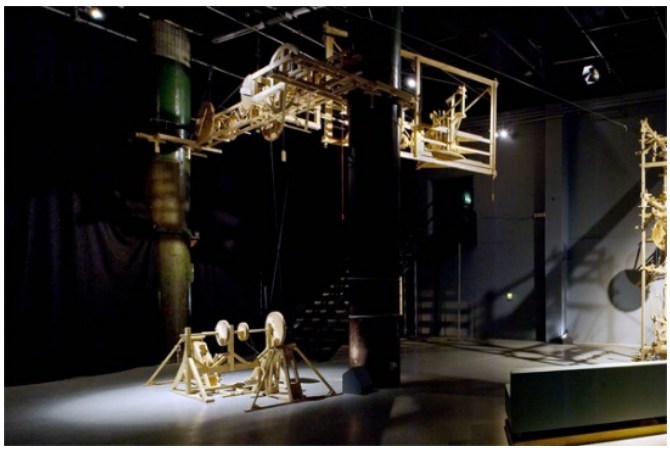

Figure 58: B. Lubell, *A Theory of Entanglement*. (2009).

Since the viewer/participant must push the pedals of the bikes to activate the piece, thus make things appear, one might assume that the digital interface in this work is the bikes. However, as Lubell states: "Only the right combination of actions by participants pedalling bikes (Labor) and sitting on a couch in the Café (Capital) will produce the knitting (Craft)."[688] (Figure 59)

Figure 59: B. Lubell, *A Theory of Entanglement*. (2009).

[687] Bernie Lubell. *A Theory of Entanglement.* (2009). Found online at: http://bernielubell.com/03entangleinstall.htm
[688] Ibid.

Given the fact that multiple elements (the bikes, the loom the viewer/participants) must be present to produce the artwork (the tube of fabric), then what is the digital interface in this work? Is it the bikes, as the viewer/participant needs to use them in order to activate the mechanical gears of loom? The viewer/participants sitting in the café, because without them, the tube of fabric would not be knitted, thus the 'art' would not be made? Or is it the viewer/participants sitting in the café, the viewer/participants using the bikes, the bikes and the loom working in conjunction with each other? What are the consequences of each of these designations? In order to explore these consequences and the distinction between working through and working in conjunction with technology further, I will set up a dialogue between *A Theory of Entanglement* and Heidegger's notions of present-to-hand and ready-at-hand.

To recap, *A Theory of Entanglement* consists of an oversized loom, a tube of knitted black fabric, two bikes, and three or more viewer/participants, two of which use the bikes and one who sits in the gallery's café. If there are two viewer/participants pedalling bikes, and one sitting in the café, the tube of fabric is being knitted. Thus the technology being used (the bikes, the loom) could be seen as ready-at-hand in the Heideggarian sense. For, as mentioned above, the viewer/participants are using technology (the bikes, the loom) and concentrating on the task at hand (knitting the tube of fabric) rather than their actions with them (pedalling, knitting.) If there is no viewer/participant sitting in the café, then there is no change in the tube of fabric despite the fact that there are multiple viewer/participants on bikes, pedalling away. Thus technology in this specific instance could be called present-at-hand. This is because the multiple viewer/participants on the bikes are concentrating on technology and the actions they are making through them, rather than the underlying goal of the piece – knitting the knot. Given this, the digital interface(s) could be considered to be the bikes, as the emphasis in this particular instance is placed on the bikes and their ability to mediate, translate and facilitate communication, interaction and information and, most importantly, allow the viewer/participants to contribute to the creation of the artwork (knit the tube of fabric).

However, when the bikes become present-at-hand, they are not suddenly revealing themselves as, or becoming digital interfaces, nor is the viewer/participant simply walking up to the bikes and using them to activate the piece as if the bikes were waiting there to be discovered as interfaces. Rather, the uncovering or revealing of an aspect of an entity (in this

case the interface) is also a covering of another aspect of that same entity. As Heidegger writes:

> Equipment can genuinely show itself only in dealings cut to its own measure; but in such dealings an entity of this kind is not *grasped* thematically as an occurring Thing, nor is the equipment-structure known as such an event in the using…. In dealings such as this, where something is put to use, our concern subordinates itself to the 'in-order-to' which is constitutive for the equipment we are employing at the time; the less we just stare at the…Thing, and the more we seize hold of it and use it, the more primordial does our relationship to it become, and the more unveiledly is it encountered as that which it is – as equipment.[689]

Following on, when the viewer/participant interacts with one of the bikes, she is using it in a particular way (pedalling), for a particular reason (in order to knit the tube of fabric). This understanding is further embedded in the installation through the instruction provided to the viewer/participant by Lubell: the viewer/participant must pedal the bike to activate the loom to contribute to the knitting of the tube of fabric. Included in this instruction are other rules: to knit the tube of fabric a third person must sit on a couch in the gallery's café. (Figures 60 & 61)

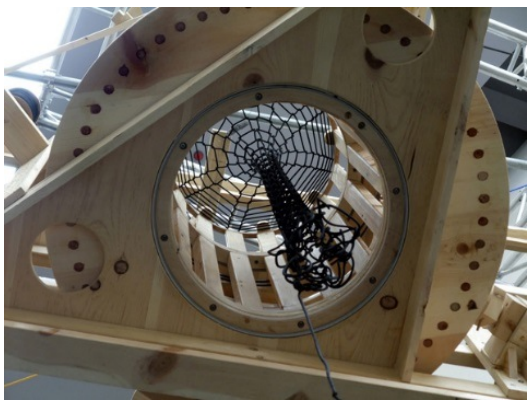

Figure 60: B. Lubell, A *Theory of Entanglement*. (2009).

[689] Martin Heidegger. *Being and Time: A Translation of Sein und Zeit*. tr: Joan Stambaugh. (State University of New York Press, 1996), p. 98.

Figure 61: B. Lubell, *A Theory of Entanglement*. (2009).

A Theory of Entanglement's narrative – a comment on capitalism and its links to industrialization – appears in this context: because of the underlying instruction given, the bikes are presented as a metaphor for labor and the viewer/participant pedaling it positioned as laborer. Additionally, the café in this context is presented as a metaphor for capital, because it belongs to the gallery that controls access to the artwork. The viewer/participant sitting in the café is therefore positioned as consumer.[690] In this way, the digital interface(s) could be considered to be the viewer/participants (both on the bikes and in the café), as the emphasis above is placed on the human and their ability to communicate and interact with each other and with the artist (via the instruction he provides) to understand the conceptual meaning of the piece.

In understanding the digital interface from within the context of *A Theory of Entanglement* however, certain labor-based aspects of the technology employed come to foreground, while other aspects (the use of bikes as exercise devices, the use of a loom for enjoyment rather than commercial profit) are obscured, as they are not important to the completion of the installation. Therefore, when the digital interface reveals itself and becomes present-at-hand, it is doing more than simply sitting there waiting to be found. And the viewer/participant is not blindly following the instructions provided by the artist or aimlessly communicating and interacting with people sitting in the café. Rather, as Heidegger argues: "When we deal with them [technology] by using them and manipulating them, this activity is not a blind one; it

[690] Bernie Lubell. *A Theory of Entanglement.* (2009). Found online at: http://bernielubell.com/03entangleinstall.htm

has its own kind of sight, by which our manipulation is guided and from which it acquires its specific Thingly character."[691]

Inherent within the above analysis, then, is what Heidegger terms "Umsicht", looking around or *circumspection – a careful observation of their surroundings on behalf of the viewer/participant.*[692] *Circumspection for Heidegger is not a purely mental activity*; it is also a phenomenological process. As Michael Wheeler (2005) states, Heidegger's analysis of technology includes both "the appropriate uses to which an item of equipment can be put, and the normatively constrained public practices that shape the human agent's acts of projection".[693] Given this, Wheeler argues that circumspection emerges "not only as a form of awareness, but as an action-oriented form of knowledge ('sight')".[694] In this way, I argue that circumspection, like the tube of fabric in Lubell's installation and the process that creates it, becomes an entangled, interwoven, embodied process that includes the viewer/participant's knowledge of how to use technology as a form of embodied and perceptual awareness. Theorizing the viewer/participant's relationship to the digital interface as an ongoing process then prioritizes, thus it allows the actions that the viewer/participant makes *in conjunction with*, rather than *through* technology to always remain at the center of activity.

Accordingly, it is in this moment of becoming present-at-hand, and through the embodied circumspection that accompanies it, that the multiple viewer/participants, the bikes and the loom reveal themselves as the digital interface. I suggest this because the viewer/participant and technology must work in conjunction with each other to reveal the full nature of the artwork (the underlying concept) and to complete the artwork (knit the knot). In revealing itself as both biological (viewer/participant) and technological (bikes and loom) the interface takes on an existence as an active entity that has agency – that affects the outcome of the installation – thus is profoundly significant to the installation and the viewer/participant's experience of it.

Representational Systems and Instruction

In what follows I turn to four interactive new media installations that integrate found objects

[691] Martin Heidegger. *Being and Time: A Translation of Sein und Zeit*. tr: Joan Stambaugh. (State University of New York Press, 1996), p. 98.
[692] Ibid.
[693] Michael Wheeler. *Reconstructing the Cognitive World: The Next Step*. (Cambridge, MA: MIT Press, 2005), p. 132.
[694] Ibid.

that resemble representations of the human form: Ken Feingold's *Interior* (1997), Jeffrey Shaw's *conFIGURING the CAVE* (1996) Alan Dunning and Paul Woodrow's *The Einstein's Brain Project: The Madhouse* (1995-2001) and Henry Kaufman's *The Lightness of Your Touch* (2004). The aforementioned installations were chosen because they critically question, via artistic experimentation, cybernetic notions of instruction and the relationship between the human and machine that this type of instruction promotes. They then provide the viewer/participant with the means to resist and subvert this instruction, via the deployment of an interface shaped to mimic a human form. Given the underlying purpose of the installations, the following questions are asked: If instruction presents the viewer/participant with a blueprint for interaction in interactive new media installations, then what happens to the artwork, and the underlying narratives and meanings that it promotes, when the viewer/participant subverts or resists it? Furthermore, does viewer/participant subversion and resistance of instruction equal viewer/participant intervention? Or does this process simply reinforce the same cybernetic notions of instruction that the artist is asking the viewer/participant to resist and/or subvert? Each installation examined addresses these questions in a different way: Kaufman's work sheds light on concepts of immediacy and how the use of instruction exacerbates the confusion between the "real" and the representation through the reproduction and presentation of an enlarged copy of a human torso positioned as digital interface. In *The Einstein's Brain: The Madhouse*, the artists explore how the subversion of normative representational systems and representations of the body affect the viewer/participant's perceptual and physical expectations in interactive new media installations. Feingold's use of the digital interface (a medical doll, combined with the graphic images) found in his work examines notions of the body as a site of potentiality through the resistance to instructions that both promote and project normative positions and representations of the human body in relation to technology. I will conclude this chapter with a short analysis of Shaw's *conFIGURING the CAVE* illustrating the limitations of a digital interface shaped to mimic the human body. Specifically, I will highlight the problems that arise when shared, singular ontological systems are in play.

"The Real" and the Representational

In *Gender Trouble* (1990), Judith Butler develops a theory of corporeality as performativity, in which she provides a critique of concepts around heteronormativity and the function of gender in the modern world. Butler views the body as fluid, performative and open to

reconstruction and reconfiguration.[695] The fact that the body is performative, she states, suggests that it "has no ontological status apart from the various acts which constitute its reality".[696] The various acts that the body performs, for Butler, not only constitute and articulate its reality, but they also suggest "an openness to re-signification and re-contextualization".[697] Put simply, the body, to Butler, is a repetitive act of identification and imitation of both public and social norms, and these actions imply, among other things, that gender and sexuality are open to reconstruction and reconfiguration.

Although related to notions around gender and sexuality, I believe the crux of Butler's argument (corporeality as performativity) can be applied to the way the viewer/participant relates to reappropriated representations of the human body in interactive new media installations. For example, Butler states: "The body *is* a historical situation…a manner of doing, dramatizing and *reproducing* a historic situation."[698] This is because she believes that identities are formed through strategic corporeal acts that are deeply social and continuously reiterated.[699] Thus, she writes: "the body is always an embodying *of* possibilities", the site where subversive acts carry not only personal effects but also carry public and social effects as well.[700] The fact that Butler believes that the human body is a historically constructed site of possibilities suggests that the viewer/participant has the ability to subvert and reconstruct dominant narratives and positionings of the body, and instantiate a change in the way she positions herself in relation to the digital interface in interactive new media installations through the performative medium of her physical body.

Peggy Phelan (1993) echoes, to an extent, Butler's sentiments about the body as a site of possibilities and expands on them through an investigation into the distinction between the representation and "the real" as it relates to visual power and visibility in photography.[701] There is, as Phelan states, confusion between the representation and the "real" on behalf of the subject who is viewing the photographs. In Phelan's theory, the "real" is the subject and

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[695] Judith Butler. *Gender Trouble: Feminism and the Subversion of Identity*. (NYC, NY: Routlege, 1999), p 74.
[696] Ibid.
[697] Ibid., p. 75.
[698] Judith Butler. "Performative Acts and Gender Constitution." in *The Feminism and Visual Culture Reader,* ed. Amelia Jones (London: Routledge. 2006), p. 394.
[699] Ibid.
[700] Ibid., Butler's Emphasis.
[701] Peggy Phelan. "Broken Symmetries: Memory, Sight, Love." in *The Feminism and Visual Culture Reader*, ed. Amelia Jones; (London: Routledge. 2006), p. 106.

the representation is a photograph of the subject. In the case of my thesis, the "real" is the viewer/participant and the representation is the interface shaped to represent a human form. Confusion between the "real" and the representational occurs, Phelan writes, because there is an insufficient understanding of the relationships between "visibility, power, identity and liberation" among other things, and this misconception leads the subject to mistake the "real" for the representational and vice versa.[702] Phelan's analysis is similar to that of Suchman's theorization of plans and action. Phelan, like Suchman, believes that the confusion between "the real" (the subject or in Suchman's case, the action) and the representational (the photograph or in Suchman's case, the plan) happens precisely because: "The real is read through representation and representation is read through the real... Each representation relies on and reproduces a specific logic of the real; this logical real promotes its own representation."[703] With this in mind, I can explore how confusion between the "real" and the representational manifests itself in interactive new media installations as well as begin to examine some of the issues around, and possibilities for, resistance and subversion on behalf of the viewer/participant that follow it. A good place to start this exploration is Henry Kaufman's interactive new media installation *The Lightness of Your Touch*.

In 2006 I exhibited *The Lightness of Your Touch* as part of the group show "Capturing Time and Space" at Axiom Gallery. The only part of *The Lightness of Your Touch* visible to the viewer/participant was a large-scale custom-made curved projection screen. The screen doubled as the digital interface. Projected on to the screen was an image of an oversized human torso.[704] To interact with the work, I had to place my hand on the torso. When I did this, the "skin" of the torso shook. If I placed my hand on the screen for an extended period of time an "impression" of a hand appeared on the torso. The brightness and clarity of the "impressions" directly correlated to the forcefulness and duration of my touch. After a certain period of time had passed, the handprints lifted off the screen, faded away and the torso returned to its original, unmarked state. (Figures 62 & 63)

[702] Peggy Phelan. "Broken Symmetries: Memory, Sight, Love." in *The Feminism and Visual Culture Reader*, ed. Amelia Jones; (London: Routledge. 2006), p. 106.
[703] Ibid., p. 107.
[704] Henry Kaufman. "The Lightness of Your Touch" in *Leonardo* Volume 43, Number 4, August 2010, pp. 398-9.

Figure 62: H. Kaufman, *The Lightness of Your Touch*. (2004).

Figure 63: H. Kaufman, *The Lightness of Your Touch*. (2004).

The designation of the digital interface as human torso caused confusion, for some visitors, between "the real" (the visitor's body) and the representation (the on-screen torso). This confusion occurred, because the appearance of the digital interface (the representation), its movements, actions and the consequences of these actions (the "skin" moves when touched, a forceful and prolonged touch leaves a colorful mark) resembled, to an extent, the visitor's body (the real).

For example, on the night of the opening at Axiom Gallery, I encountered a visitor who was repeatedly touching her arm, touching her colleagues arm and then touching the screen. She was doing this to show her colleagues how the piece worked. If she touched her arms or her colleague's arms with a lot of force for a prolonged period of time, she said, a red mark

would appear on their arm, just like it would on the screen. The comparison between her physical body (the "real") and the on-screen imagery (the representational) the visitor was making, worked. Soon everybody was touching the screen and their arms and exploring the similarities and differences between the two. The shaking of the skin and the marks, combined with the fact that the interface is designated as the locus of interaction, which mimics the visitor's position (the locus of interaction and sensation) in the physical world, only exacerbated the confusion between the two.

In her discussion of photography, Phelan argues that: "[r]epresentation follows two laws: it always conveys more than it intends; and it is never totalizing. The 'excess' meaning conveyed by representation creates a supplement that makes multiple and resistant readings possible."[705] In other words, representations, be it a photograph or a moving image projected on a screen may mimic the "real" thing they are representing but these representations are flawed due to the fact that they do not provide an exact replica of "the real". And it is through this failure to represent things perfectly that representations can create resistance, on behalf of the subject, and possibly produce change.

So, if as Phelan states "each representation relies on and reproduces a specific logic of the real" and "this logical real promotes its own representation" then it could be argued that the reappropriation and use of representations of the body as digital interfaces, like the one deployed in *The Lightness of Your Touch,* not only means that the subject in the installation is doubled (i.e. the subject is the viewer/participant and the computerized representation of it, the interface), but that these representations filter information, reproduce it and then reflect it back onto the subject.[706] Thus, the interface (the representation) is not only providing instructions for how the viewer/participant (the real) should interact in *The Lightness of Your Touch*, it is dictating how her body should look (flawless, unless touched), what her body should be (male, white and powerful) and how her body should behave (like a machine in all instances) in these environments as well.

However, if as Butler argues, the body is fluid, performative, and has the ability to subvert and reconstruct dominant narratives and positionings, and, following Phelan's argument, reproductions have the ability to generate ruptures and gaps in dominant narratives, produce

[705] Peggy Phelan. "Broken Symmetries: Memory, Sight, Love" in *The Feminism and Visual Culture Reader*, ed. Amelia Jones; (London: Routledge, 2006), p. 107.
[706] Ibid.

resistant readings and create change, then it follows that the viewer/participant has the potential to subvert the instruction provided to her via the digital interface (the representation), and alter the dominant metaphors and models used to describe actions and fix identities in interactive new media installations in a similarly profound way.

While the potential to subvert or resist the instruction on behalf of the viewer/participant exists, it is not without limitations. I turn to Alan Dunning and Paul Woodrow's interactive new media installation *The Einstein's Brain Project: The Madhouse* (2001) as a means to help develop an understanding of these limitations – specifically notions around the liveliness of nonhuman objects and problems like the personification of machines and anthropomorphism that follow them.

Liveliness, Anthropomorphism and Symmetry

The digital interface in *The Einstein's Brain Project: The Madhouse* is an anatomically correct life size model of a male human body. The artists call it ALIBI (Anatomically Lifelike Interactive Biological Interface).[707] ALIBI is placed horizontally on top of a white table and is located in a darkened gallery space. (Figure 64)

Figure 64: A. Dunning & P. Woodrow, *The Einstein's Brain Project: The Madhouse*. (1995-2001).

There are two different sets of subjects participating in the installation: one set (the viewer/participant) that interacts directly with ALIBI via a heads-up display (HUD) and another set (the audience) that observes the interaction from another part of the gallery or via online video documentation. (Figure 65)

[707] Alan Dunning and Paul Woodrow. *The Einstein's Brain Project: The Madhouse.* (2001). Found online at: http://people.ucalgary.ca/~einbrain/new/main.html

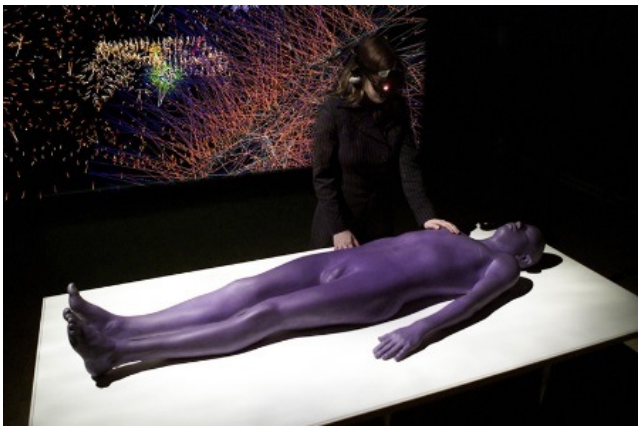

Figure 65: A. Dunning & P. Woodrow, *The Einstein's Brain Project: The Madhouse*. (1995-2001).

The aesthetics of the installation (the sterile room, the shape and position of the interface, the type of interaction the viewer/participants perform, the type of subjects present) resembles, to an extent, the medical operating theaters of the late 19th and early 20th centuries and their slightly less performative and more sterile modern-day counterparts – medical operating rooms. The aesthetic comparison is confirmed by the artists in a statement about ALIBI. ALIBI, they tell us, was "never conceived of as an interface *per se* but rather as a sensory blister".[708] This "blister", they state, calls attention to our immediate technological past (operating theaters in which bodies and technologies are at odds) and our immediate technological present and future (operating rooms, in which humans and machines are inextricably enmeshed, yet separated by space, skill/profession or technology from each other).[709]

Unlike their medical counterparts ("the real"), *The Einstein's Brain Project* is an interactive new media installation and ALIBI is an interface. That is to say, the installation and the interface are artistic imaginings of physical environments, objects, entities and things. They are representations. This notion of representation is reflected in ALIBI's appearance. ALIBI is covered in a layer of translucent thermochromatic blue paint, which the artists refer to as "skin". ALIBI's skin changes color, fluctuating from dark to light when touched by the viewer/participant.[710] The "skin" serves two purposes: it allows the viewer/participant and the audience to visually see the effects interaction has (via the change interaction makes to

[708] Alan Dunning and Paul Woodrow. *The Einstein's Brain Project: The Madhouse.* (2001). Found online at: http://people.ucalgary.ca/~einbrain/new/main.html
[709] Ibid.
[710] Ibid.

ALIBI's "skin" and the images it produces); and it allows the viewer/participant visual access to the organs, muscles and tendons located inside it.[711] To interact with ALIBI, the viewer/participant must touch ALIBI with her hands. Touching ALIBI not only causes a change in the color of its "skin", it causes sounds and images to appear as well. These images appear directly in the viewer/participant's line of vision and are projected onto the walls of the theater for the audience to see. Sometimes, as the artists write, the images directly correspond to the organ or body part touched, other times "they are related to metaphor and simile".[712] For instance, if the viewer/participant touches an area located over ALIBI's circulatory system, an abstracted image of the human circulatory system, or a sequence of metaphorical images representing the circulatory system (waterfalls, electrical circuits) appear.[713] (Figures 66 & 67)

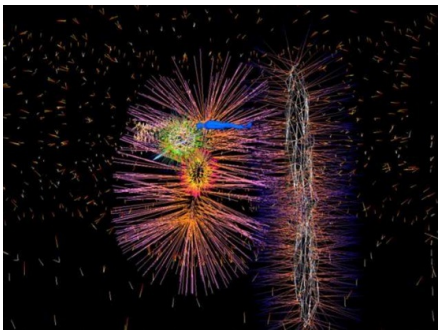

Figure 66: A. Dunning & P. Woodrow, *The Einstein's Brain Project: The Madhouse*. (1995-2001).

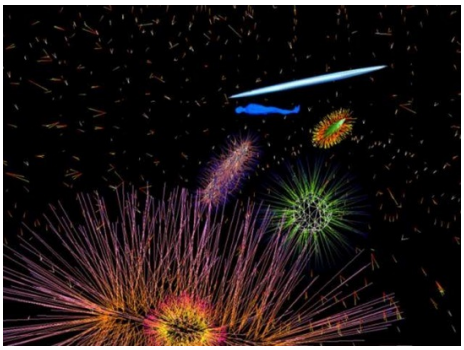

Figure 67: A. Dunning & P. Woodrow, *The Einstein's Brain Project: The Madhouse*. (1995-2001).

[711] Alan Dunning and Paul Woodrow. *The Einstein's Brain Project: The Madhouse.* (2001). Found online at: http://people.ucalgary.ca/~einbrain/new/main.html
[712] Ibid.
[713] Ibid.

The viewer/participant can then interact with the images and sequences as if they were physical objects or occurrences and the audience can watch her do so from afar. In this way, the digital interface takes on a dual significance, and in doing this it serves a dual purpose: It is a representation of a human body, therefore it is acting as an example of how a subject should look and/or think of herself as an embodied human being; and it is a teaching tool, therefore it is instructing the subject, showing her how to interact with other human-like entities in similar settings.

I argue that the instructional aspects of the digital interface combined with both the separation between participants the installation creates and the metaphors that the images allude to allows for something quite interesting to happen: it causes the audience observing the action to confuse "the real" (the operating theater/room, the surgeon/nurse, the patient) with the representational (the gallery space, the viewer/participant, ALIBI/the interface). This confusion leads the audience, and to an extent the viewer/participant, to believe that the digital interface is a "live" agent – a deceased, yet human character – who contributes to the installation just as much, if not more than the human interacting with it. Just as one set of subjects must be designated passive observers for the other set to become active participants, as argued in previous chapters, the representation (the digital interface), in *The Einstein's Brain Project* must be deemed lifeless (and to an extent it is as it is colored blue), by the artists so that the subjects participating in the installation can reanimate it (via interaction experienced first-hand or observed second hand) for it to become "the real". The reanimation of inanimate technologized entities that the confusion between the real and the representational begets of course creates a range of issues, one of which, as Suchman tells us, is the "personification of machines".[714]

Suchman argues that humans have a tendency to "ascribe full intelligence [to computerized entities] on the basis of partial evidence".[715] She continues, stating that as soon as computational forms look, or act, remotely human, the subject will endow it with other human like traits and abilities.[716] She further contends that subjects "take appearances as evidence for, or the document of, an ascribed underlying reality, while taking the reality so

[714] Lucy A. Suchman. *Human-Machine Reconfigurations: Plans and Situated Actions,* (Cambridge: Cambridge University Press, 2007), pp. 207, 213.
[715] Ibid., p. 15.
[716] Ibid.

ascribed as a resource for the interpretation of the appearance".[717] In short, Suchman believes that humans have a tendency to anthropomorphize certain types of technological forms; we assume that a computerized system has sophisticated human-like abilities (speech, emotions, intelligence) after it has displayed elementary ones (shape, size, presence of internal organs).[718]

Wiener provides an interesting counterpoint to Suchman's analysis in his writings on cybernetics. Less skeptical of the concept than Suchman is, Wiener argues that anthropomorphism is a tool used to describe and/or emphasize the importance of affective instructional processes, situations or experiences.[719] He suggests that anthropomorphism is purposefully employed by those creating technology to illicit strong preconditioned reflexes or learned responses on behalf of the subject interacting with it.[720] These reflexes are formed in response to what he terms "trigger situations", which are actions that initiate a reaction or series of reactions.[721] A trigger situation can be summed up as such: if I touch the flame of a candle (the trigger situation or action) I will burn my finger and feel pain (the reaction or response). Trigger situations, for Wiener, do not have to have physical consequences; they can have mental or psychological ones as well. Given this, trigger situations could encompass interaction in interactive new media installations in that the images that a viewer/participant receives is a reaction or response to her touching a digital interface (the trigger situation, or action). Wiener contends that a subject should, to an extent, know how trigger situations work, not because she has a deep understanding of the underlying processes that allow them to operate, but because she has developed a "conditioned reflex" through previous interactions in similar settings with similar entities, both physical and virtual.[722]

Mondloch combines Wiener and Suchman's views on this topic, focusing on how trigger situations influence the viewing habits and experiences of subjects in museum and gallery settings.[723] Mondloch posits that artists tacitly instruct subjects on how to interact with screen-based visual artworks and purposely structure their physical and psychological

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[717] Lucy A. Suchman. *Human-Machine Reconfigurations: Plans and Situated Actions,* (Cambridge: Cambridge University Press, 2007), p. 23.
[718] Ibid., p. 14.
[719] Norbert Wiener. *The Human use of Human Beings: Cybernetics and Society.* (London: Free Association, 1950), p. 69.
[720] Ibid.
[721] Ibid.,
[722] Ibid.
[723] Kate Mondloch. *Screens: Viewing Media Installation Art*. (Minneapolis, MN: University of Minnesota Press, 2010), p. 26.

experience with them "by playing on the learned conventions of screen-mediated communication".[724] Instruction, she states, occurs because artists rely on and incorporate "the generalized tendency of viewers to turn their attention toward video monitors, their desire to see comprehensible screen-mediated representations (or, perhaps more accurately, 'conformations') of themselves" into their works.[725] Mondloch contends that the effectiveness of instruction in moving image-based installations is a direct result of a presumption made on behalf of a subject surrounding the "liveness" of moving images. The phrase, "liveness of moving images", for Mondloch, refers to the fact that some subjects assume that some moving images projected on screens are of "live events" happening in real-time. This assumption, she argues, is conditioned by, among other things, subjects' continuous access to mass media.[726] Mondloch postulates that misunderstandings around the liveness of images lead the subject to believe that she is involved in an open-ended participatory experience, as this expectation of liveness, Mondloch writes, confirms, to an extent, the subject's presence in the space or geographic area they are located in. However, the subject's participation in the installation is, she states, actually a combination of conditioned habits, underlying expectations for and predetermined assumptions around technology.[727]

While Mondloch's conceptualization of screen-based instruction can lead to the aforementioned misconceptions, evidenced by the installations she applies it to, I suggest that some digital interfaces can present a challenge to some of the conditioned habits, underlying expectations and predetermined assumptions around technology that Mondloch discusses – specifically the separation between the body and technology. These interfaces do this, I argue, by playing on conceptions of liveness of images and turning them on their head. For example, the audience in *The Einstein's Brain Project* assumes, to an extent, that interaction is occurring between two humans, even though one (the viewer/participant) is "real" and one is a representation (ALIBI). This assumption occurs because ALIBI is shaped to resemble a human being, thus the audience is anthropomorphising ALIBI. They are assuming that the ALIBI is live – that it has sophisticated human-like abilities because it has displayed elementary ones. In assuming liveness, I suggest that the audience is unconsciously ascribing

[724] Kate Mondloch. *Screens: Viewing Media Installation Art*. (Minneapolis, MN: University of Minnesota Press, 2010), p. 26.
[725] Ibid. p. 31.
[726] Ibid.
[727] Ibid.

agency to technology. This ascription of agency made on behalf of the audience is of critical importance to the instructional process in this installation. Not because it widens or narrows the boundary between the human and the machine, like it did in *McLuhan's Massage Parlor,* but because it affords the subject a chance to critically examine and then compare the behavior of the digital interface to her own behaviors, allowing her to understand whether the images presented to her in the installation are accurate or real.

It is important to note that the interface in *The Einstein's Brain Project* is an inert male body covered in bright blue paint, located on a table in the center of a gallery space shaped to look like an operating room. So while the audience may be able to ascribe agency to the interface, the representation of the human body that it reflects back onto them could be seen by some viewer/participants as disorienting. While disorientating for some, I do not think the shape and size of the interface is detrimental to the instructional process. I argue that whatever disorientation experienced on behalf of the participant aids in the reversal of liveness described above, as it reveals the differences between the representation (the digital interface) and the "real" (their physical body.) This revelation, in turn, undermines the audience's perceptual and physical expectations of the representations of the human body that the digital interface presents, allowing them to begin to critically question and resist, to an extent, the underlying notions of separation and sameness that the instructional and representational processes in this installation relies on.

The Reuse of Cultural Forms: Practice, Potentiality and Instructional Processes

Nicolas Bourriaud (2004) reiterates some of my points, in a conversation about the use of reappropriated cultural forms in contemporary artworks. Bourriaud argues that cultural forms carry a set of visual and cultural expectations and experiences (the shape of a head, the placement of hands, the way legs move) that we are intimately familiar with.[728] The use of these forms, he states, makes it easier for a subject to connect to artwork. It also leads, he writes, to the "eradication of traditional distinctions between production and consumption, creation and copy, readymade and original work".[729] Eradication of traditional distinctions occurs because the reappropriated form, for Bourriaud, is "no longer *primary*".[730] That is to say, the reappropriated form is not original. Instead it is an object that is, in his words, "working with objects that are already in circulation…which is to say objects already

[728] Nicolas Bourriaud. *Postproduction*. (New York, NY: Lukas & Sternberg, 2004), p. 6.
[729] Ibid.
[730] Ibid. Bourriaud's emphasis.

informed by other objects".[731] The reuse of these forms should, as Bourriaud argues, complicate the conventional notions of artistic production through the eradication of the traditional distinctions between original and copy.

Yet Suchman contends that this need to eradicate distinctions between the human and the computer or the original and the copy, on behalf of some scholars, is part of a need to naturalize: "to disappear and put in one's place something transcendent, existing independently of one's actions".[732] And this need to naturalize, Suchman states, is troublesome, as it is directly related to the notions of separation and symmetry.[733] As she writes: "[h]aving systematically established the division of humans and machines, technological imaginaries now evidence worry that once separated from us, machines are rendered lifeless and, by implication, less. They need to be revitalized, restored to humanness – in other words, to be made like us – in order that we can be reunited with them."[734] However, how does this naturalization process Suchman discusses manifest itself in interactive new media installations? How does it relate to the reappropriation of human forms used as digital interfaces? And what possibilities for subversion or resistance on behalf of subjects and artists exist, if they do at all?

An example can be found in Ken Feingold's installation, *Interior*. *Interior* consists of a projection screen, a digital interface and a table. The digital interface is a plastic medical model of a truncated human torso, whose organs, spine and brain are exposed.[735] The torso rests on top of the table, which is located in front of the projection screen. Although the organs are exposed both in the front (facing the screen) and rear (facing the viewer/participant) of the torso, only those situated in the rear are fitted with touch sensors. When the viewer/participant touches the interface, animated graphic representations of human body parts and red-lipped doll heads appear on the screen.[736] These images slowly emerge, drifting from side to side until they disappear against the changing background of the pictorial scenes projected onto the screen.[737] (Figures 68 & 69)

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[731] Nicolas Bourriaud. *Postproduction*. (New York, NY: Lukas & Sternberg, 2004), p. 6. Bourriaud's emphasis.
[732] Lucy A. Suchman. *Human-Machine Reconfigurations: Plans and Situated Actions,* (Cambridge: Cambridge University Press, 2007), p. 214.
[733] Ibid.
[734] Ibid.
[735] Ken Feingold. *Interior*. (1997). Found online at: http://www.kenfeingold.com/artworks90s.html
[736] Ibid.
[737] Ibid.

Figure 68: K. Feingold, *Interior*. (1997).

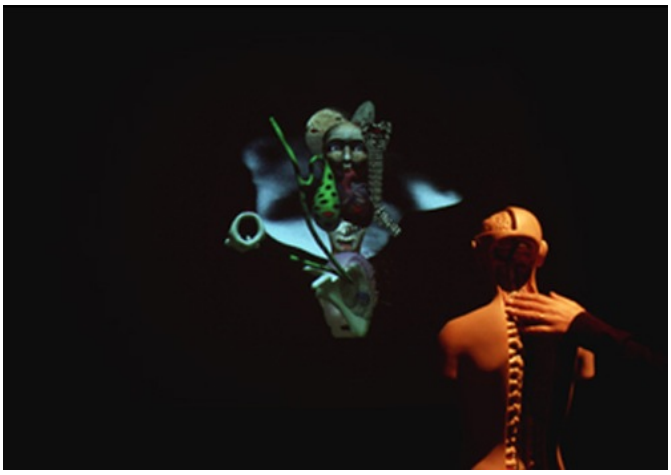

Figure 69: K. Feingold, *Interior*. (1997)

Each body part appears according to what area of the torso is touched, and operates differently according to physical function (what its real life equivalent does) and bodily language (how and where it is touched). For instance, if the viewer/participant touches the torso's liver, a representation of a liver appears on-screen.[738] If the viewer/participant touches the torso's liver and brain at once, then two representations, one of a liver, one of a brain, appear on-screen. (Figure 70) In order to transition between pictorial scenes, the viewer/participant must keep her hands on one organ for an extended period of time. If she

[738] Ken Feingold. *Interior*. (1997). Found online at: http://www.kenfeingold.com/artworks90s.html

places her hands on two or more parts of the torso for a prolonged period of time, dozens of organs and heads float forward and arrange themselves into monstrous human-like forms that sometimes babble incoherently.[739] (Figure 71)

Figure 70: K. Feingold, *Interior*. (1997)

Figure 71: K. Feingold, *Interior*. (1997)

Thus, the physical human body, as represented by the digital interface and the abstracted human-like on-screen images, is cut up, dispersed and then repositioned by the

[739] Ken Feingold. *Interior*. (1997). Found online at: http://www.kenfeingold.com/artworks90s.html

viewer/participant in the process of artistic creation.[740] But what is this dispersal suggestive of? What kind of assumptions do the representations of the body in this installation embody? What is the relevance, or importance, of these representations? What type of instruction do they provide to the viewer/participant interacting with them? And, finally, what types of possibilities or alternative readings do they open or close?

Interior is an installation that is infused with images of bodies that are medical and technological in nature. The interface is a plastic medical model of a truncated human torso that is plugged directly into a machine. In being this way, the aesthetics of the interface gives the impression of neutrality and objectivity (of behalf of the artist) and a certain standardization or wholeness (of the human body and the human experience) yet the interface is carefully crafted and put into play by Feingold. For example, the digital interface visually traces concepts of the human body (technology) as symmetrical to the physical body (the human). However, the representations of the body that appear on-screen when the interface is touched by the viewer/participant are not naturalized. They do not look like, nor do they attempt to mimic, the behaviors of the viewer/participant's physical body in the way the interface does. In stark contrast to the interface, the on-screen representations of the body are abstracted, unsettling, uncanny and always in excess.

For instance, the on-screen representations – the red-lipped dolls heads, the disembodied livers and spleens – are not exact reproductions of the body. Nor are they presented as stable or unitary. They are mutated, fragmented and dispersed across a variety of digital spaces and temporalities. By doing this, Feingold creates a tension between the embodied "realness" of the viewer/participant's physical body and the artificiality of the representations (the organs and body parts located on-screen and the digital interface). I posit that the tension between the real and the representation in *Interior* presents a significant challenge to notions of separation or eradication (of the boundary between the body and technology) and naturalization (of the human body) discussed above.

They create, in Deleuzian terms, "bodies without organs" (BwO) in the sense that the representations and the viewer/participant's consequent reconfigurations of them acknowledge the existence of many different versions of the self yet these images cannot be

[740] Ken Feingold. *Interior*. (1997). Found online at: http://www.kenfeingold.com/artworks90s.html These images also speak to the viewer/participant. The dialogue is not pre-recorded. It is generated in real time and corresponds to the organ touched. (Feingold, 1997)

reduced to either a technological or a biological thing.[741] No configuration of the body in *Interior* can be claimed as the original, as "the real" or as the representational. For, as Rosalind Krauss (1999) states, the BwO "produces nothing; it reproduces. It is the domain of simulation, of series crossing one another, of the possible occupation of every place in the series by a subject forever decentered."[742]

Since the BwO, as Krauss argues, lies in the domain of simulation, it becomes the place of textual and semiological inscription.[743] The BwO, for Krauss, then, is an entity with no underlying organization or instruction. It is a series of processes, multiplicities or "crossings" that are constantly interrupting, intersecting and reproducing each other, and that are always both original and in excess.[744] In this way the "logic" of the BwO is not that of representation, in the sense that it is a reproduction of an autonomous original object. Instead, Krauss suggests that it is "the logic" of open-ended, variegated "flows of information".[745] Thus, she concludes, the content of the product (the representation) is the expressive medium of the producer (the artist, the viewer/participant).[746] As she writes: "[the BwO's] logic is not that of the signifier, that of representation. Rather it is the logic of 'flows of information' in which the content of the first flow (its product) is the expressive medium of the second (its producer)."[747]

I posit that the same logic, or chaotic processes of consumption, reproduction, remediation and reconstruction of the relationship between the body and the machine and the real and the representation via the digital interface and the on-screen images are at work in *Interior* via

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[741] The term BwO originates in Antonin Artaud's (1947) radio play: *To Have Done with the Judgement of God.* Deleuze and Guattari build on it in arguing that the BwO is: "not an empty body stripped of organs, but a body upon which that which serves as organs…the body without organs is opposed less to organs as such than to the organization of the organs insofar as it composes an organism. The body without organs is not a dead body but a living body all the more alive and teeming once it has blown apart the organism and its organization." (Deleuze & Guattari, 1987, p. 33-4). The BwO is similar to the post-humanist conceptions of the body discussed throughout this thesis in the sense that both concepts are considered to be post-enlightenment constructions of bodies, attempting as they do to decenter the body. For example, both the BwO, Donna Haraway's concept of the cyborg and Stelarc's notion of obsolescence, as discussed in the introduction, chapter 1 and chapter 2, question notions of naturalism and attempt to reconfigure them. In doing this, the BwO and posthumanist concepts of the body, like the cyborg, ask us to think harder about the status of the human and in doing this, they provide us with the opportunity to pursue different schemes of knowledge, representation and thought. Feingold has an explicit interest in the work of Artaud, as stated in a lecture titled "The Interactive Art Gambit (Do not run! We are your friends!")" at the Museum of Modern Art (MoMA), NYC, USA. A transcript of Feingold's talk can be found online at http://www.kenfeingold.com/feingold-moma4.97.html

[742] Rosalind Krauss. *Bachelors.* (Cambridge, MA: MIT Press, 1999), p. 181.

[743] Ibid.

[744] Ibid.

[745] Ibid.

[746] Ibid.

[747] Ibid.

the appearance of the monstrous human-like forms. Embedded into *Interior*, then, is a narrative surrounding notions of the body as changeable and the representation as always being in excess – one that explores the way technological representations of the body reflect and then reinforce fixed positions onto the viewer/participant, as well as one that suggests that there is room for resistance to, and subversion of, this instruction by offering the viewer/participant a chance to destabilize, reconstruct and reposition the on-screen representations via the digital interface.

Shared Ontological Systems and the Emergence of Different Dialogues

In conclusion, I would like to critically interrogate some of the limitations surrounding the designation of familiar forms as digital interfaces in interactive new media installations – specifically those around the transmission and interpretation of instruction that these forms may bring about. Of particular concern is the loss of information that occurs through this process and the effects that this may have on how the viewer/participant translates the instruction that the artist is trying to convey via the digital interface. As argued above, instruction relies on the viewer/participant's ability to connect intangible descriptions of actions and movements to tangible signs and forms. In order to then accomplish a task, the viewer/participant first must be able to interpret the information she is presented with. As Wiener writes: "The amount of information carried with actual terminal equipment depends on the ability of the [subject] to transmit or to employ the information received."[748] Put simply, the amount, and type of information transmitted by the digital interface (and by extension the artist) is reliant on the ability of the subject to process present information and then act upon previous instructions provided to her.[749]

On this point, Dourish argues that the loss of information is a direct result of the use of certain types of ontological systems of representation. Dourish is specifically concerned with how these systems are used as a basis for designing interactive systems in the computer science field.[750] Ontological systems, in the computer science field, he tells us, are structures of meanings, which programmers use to assess their relationship to physical forms and conceptual theories in order to digitally reproduce them in machines. These systems, he

[748] Norbert Wiener. *The Human use of Human Beings: Cybernetics and Society,* (London: Free Association, 1950), p. 104.
[749] Ibid.
[750] Paul Dourish. *Where the Action is*. (Cambridge, MA: MIT Press, 2001), p. 129. Ontology is a system of meaning concerned with philosophical questions regarding entities, in particular, which entities exist or can be said to exist and how they are grouped. An ontological system groups these entities in order to provide us with a structure from which meaning can be constructed. (Dourish, 2001, p. 129)

writes, are used to address questions like: "how we can individuate the world, or distinguish between one entity and another; how we can understand the relationships between different entities or classes of entity."[751] Echoing Suchman's argument surrounding intelligent and embodied action, Dourish states that the use of ontological systems of representation as the basis of design for interactive systems are detrimental to the instructional process due to the fact that there is "imbalance between the situated organization of practical action and the regimented models that systems embody".[752] He continues, arguing that when designing complex computerized systems, like digital interfaces, major issues, such as the loss or miscommunication of information, manifest themselves quite quickly as they are "consequences of assuming that ontological structures are shared and static".[753] Here Dourish is arguing that while a design element may reflect the programmers' specific ontological system, it does not necessarily provide meaning for the subject. Not only does the use of an ontological system assume shared meaning, but it also promotes, he writes, "the idea that there is only one ontology in play".[754] In short, the concept of a single, shared ontology presents issues because it implies that systems of meaning are stable. Furthermore, it suggests that the subject and the programmer share the same model of both the physical and virtual world despite the fact that they have very different experiences of it. So how does this limitation manifest itself in, and what does it mean for, interactive new media installations?

A good place to begin this investigation is Jeffrey Shaw's *conFIGURING the CAVE* (1996). The digital interface in this installation is a near life-sized replica of a wooden artist mannequin located in the center of a CAVE environment.[755] The mannequin is shaped to resemble a human body and has a head, a torso and movable appendages. The mannequin is outwardly genderless and is fitted with electronic measurement devices, which are embedded in its moveable joints.[756] (Figure 72)

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[751] Paul Dourish. *Where the Action is*. (Cambridge, MA: MIT Press, 2001), p. 129
[752] Ibid., p. 122.
[753] Ibid., p. 129.
[754] Ibid., p. 130.
[755] Jeffrey Shaw. *conFIGURING the CAVE*. (1996). Found online at: http://www.jeffrey-shaw.net/html_main/frameset-works.php A CAVE is a multi-person, room-sized, high-resolution, 3D video and audio environment. In its most recent configuration, graphics are rear projected in stereo onto the three walls and the floor, and viewed with stereo glasses. Viewers wearing position sensors move within the display areas, the correct perspective and stereo projections of the environment are updated by a supercomputer, and the images move with and surround the viewer. Stereo projections create 3D images that seem to exist both inside and out of the environment. (Shaw, 1996)
[756] While outwardly genderless, the interface in this work is definitively female. The designation of interface as female is exacerbated in the *UNION* domain (domain 5) of the installation. *UNION*, divides the space of the

Figure 72: J. Shaw, *conFIGURING the CAVE*. (1996).

A single viewer/participant outfitted with a HMD controls its motions.[757] In addition to the interface, *conFIGURING the CAVE* consists of seven differentiated pictorial and audio domains that display, in Shaw's words, an "emergent complexity of mutable forms and organic abstractions which are conjoined with representative and symbolic images".[758] These domains are generated through custom algorithms, and each one is distinctive. To access them, the viewer/participant must interact with the digital interface. (Figure 73)

Figure 73: J. Shaw, *conFIGURING the CAVE*. (1996).

CAVE into two overlapping planes, with images projected on top of each of them. The images are a three-dimensional satellite photograph of the geographical area around Hiroshima, Japan and a Daguerreotype of two nude women. (Shaw, 2016). Viewer/participant interaction with the interface – specifically tilting it vertically and horizontally – causes the images of the women to move up and down in an erotic manner. So, while wooden and technological, the interface in this work is not neutral: it is a representation of a responsive, yet submissive woman. For more information on how technology becomes gendered, see Rode, 2011; van Oost, 2003; Berg and Lie, 1995.

[757] Jeffrey Shaw. *conFIGURING the CAVE.* (1996). Found online at: http://www.jeffrey-shaw.net/html_main/frameset-works.php There is only one viewer/participant interacting with the work at a time. Thus, the very fact that this apparatus is needed in order to interact with the work could be viewed as a limitation of the digital interface, and of the piece in general, as it limits the amount of subjects who have access to the work.

[758] Jeffrey Shaw. "Movies after Film – The Digitally Expanded Cinema." in *New Screen Media Cinema/Art/Narrative* ed. Martin Rieser/Andrea Zapp. (London: British Film Institute, 2002), p. 271.

However, if the viewer/participant is unable to identify the mannequin as interface, then she simply will not be able to interact with it as such, which means she is unable to activate the piece. Similarly, if she misinterprets or does not understand the metaphors (touching equals activity, a head denotes vision) that Shaw has deployed to supply her with navigational information in the installation, or if she is unable to connect the movements of the limbs of the interface to the movement of the images in the CAVE, she will be unable to transition between domains or scenes. Thus she will be unable to navigate the installation.

The inability to process instruction on behalf of the viewer/participant due to the deployment of unsatisfactory metaphors by the artist can result in miscommunication – an act that Wiener argues, means "information may be lost which can never be regained".[759] Wiener continues by stating that process of transmitting information in technological systems may involve "several consecutive stages of transmission following one another in addition to the final or effective stage; and between any two of these there will be an act of translation, capable of dissipating information".[760] In short, Wiener is arguing that the transmission of instruction is a multifaceted and sequential, but not necessarily linear, process that relies on, among other things, the act of translation, and because of this, the loss of information can occur.

Loss of information is of course detrimental to *conFIGURING the CAVE*. It can lead to confusion surrounding the operations of the installation, disorientation of the viewer/participant or, as exampled above, the viewer/participant, unable to navigate the work, may give up and leave – an action that results in the complete failure of the installation. The fact that information may leak out of the system, never to be seen again, however, is not an issue for Wiener. As he states: "That information may be dissipated but not gained is as we have seen the cybernetic form of the second law of thermodynamics."[761] Here Wiener is arguing that the loss of information is not detrimental, but a natural part of the instructional process. Thus he does not consider it to be a major problem. Building on Wiener's assertion, I argue that it is possible for this loss of information to yield more interesting results in interactive new media installations. For example, if the viewer/participant is unable to process instructions, or operate the digital interface properly, she may begin to explore the artwork from a different vantage point, or experiment in different ways with the tools

[759] Norbert Wiener. *The Human use of Human Beings: Cybernetics and Society,* (London: Free Association, 1950), p. 104.
[760] Ibid., p. 78.
[761] Ibid., p. 79

provided. Take, for instance, the second domain of *conFIGURING the CAVE*. When the viewer/participant enters this domain, layered images of text, characters and hieroglyphs appear.[762] (Figure 74)

Figure 74: J. Shaw, *conFIGURING the CAVE*. (1996).

When she moves the mannequin's limbs, the graphic and text change.[763] If she is unable to connect the movement of the mannequin's limbs to the movement of the text and images, these images remain static. Failure to process instruction and activate the images in the installation however may prompt the viewer/participant to begin to experiment with the mannequin in different ways. (Figure 75)

Figure 75: J. Shaw, *conFIGURING the CAVE*. (1996).

[762] Jeffrey Shaw. *conFIGURING the CAVE*. (1996). Found online at: http://www.jeffrey-shaw.net/html_main/frameset-works.php
[763] Ibid.

Instead of lifting the legs of the digital interface up and down (an action that imitates walking in the physical world), she may begin to experiment and tilt the artist doll completely upside down, or move its head around – actions which cause a circular three-dimensional representation of an ancient Chinese rubbing-stone carved with text to appear on the floor.[764]

I argue that experimentation with, and a critical interrogation of, actions of the digital interface allows the viewer/participant to concentrate on the creation or alteration of forms that differ from those that would have appeared if there was no loss of information. By selecting a familiar cultural form and designating it, a digital interface, Shaw is tacitly acknowledging his relationship to a set of publicly available and organized series of signs, forms and actions. However, this relationship is fraught due to the fact that it presumes and then promotes the idea that systems of meaning and representation are both stable and shared, when in fact they are flexible, they fluctuate and are open to interpretation.

Despite this, the digital interface in Shaw's installation is a representation of a human form – a representation, that Phelan and Butler argue has the ability to generate ruptures and gaps in dominant narratives and to produce resistant readings. Given this, by interacting with this form, I argue that the viewer/participant is able to begin to subvert the instruction provided to her via the digital interface and begin to modify the underlying narrative of the work (originality, being at the origin of and creation or constructing something out of nothing). Thus she is able to begin to reposition herself as creator, or co-creator, and by extension the locus of interaction in *conFIGURING the CAVE*. In this way, the subversion of instruction by the viewer/participant allows a different dialogue between the human and the machine to appear – one that points towards the emergence of multiple perspectives and different theorizations of the relationships and narratives that Shaw is presenting her with.

The emergence of a different type of dialogue between the viewer/participant and the digital interface does not occur because the actions that the viewer/participant makes with the digital interface have changed (as those are, albeit within very narrow limits, predetermined by the algorithms that the artist employs, as well as the environment that the viewer/participant is acting in). Instead, as Amelia Jones (2001) suggests, this dialogue has appeared because the way we think about and discuss the relationship between the body and technology has, to an

[764] Jeffrey Shaw. *conFIGURING the CAVE*. (1996). Found online at: http://www.jeffrey-shaw.net/html_main/frameset-works.php

extent, changed.[765] This change in thinking, Jones states, has occurred, in part, because of the proliferation of digital technologies in the early 20th Century, which allow different types of thinking and "technologically mediated modes of being" to emerge.[766]

Jones argues that the concept of translation (reading and writing) was the principal technique used by artists at the height of the industrial revolution to connect the body with the new industrialized technology, thus translation was, the "primary mode of interface between body and technologized world".[767] Jones continues stating that due to the proliferation of concepts like cybernetics and commodity culture that occurred after World War II, the view of the relationship between the body and technology described above, alongside the primary techniques used to articulate this relationship, collapsed.[768] This collapse, Jones tells us, combined with the "growing awareness of the brutal potential of technology in its military forms" lead to enactments of the human body as performance of the work of art.[769] And, artists employing this practice, "insisted on the coextensivity of body/machine and vision/machine, of artist and interpreter".[770] This focus on the body, embodiment and coextensivity of the human and the machine, Jones states, meant "enactment, or performance replaced translation as modes for articulating the hinge between body and technology".[771] In this way, representation, Jones argues, is no longer theorized as static, thus it is no longer articulated through images or words, but rather it is seen as processual. It is articulated through the embodied performance of the viewer/participant.[772]

Jones's rethinking of performance as the primary mode of communication between the body and technology allows me to argue that the digital interface as an individual computerized device – a visible technological thing – that provides instruction and mediates a relationship between the viewer/participant and artist, that while important and physically there, is no longer necessary in interactive new media art installations as it is, and has always to an extent been, the viewer/participant themselves that performs these acts. The reconstitution of the interface as the human body in interactive new media installations points towards the next thematic discussed in this thesis: ubiquitous computing (ubicomp).

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[765] Amelia Jones. "The Body and Technology" in *Art Journal,* Vol. 60, No. 1 (Spring, 2001), p. 20.
[766] Ibid.
[767] Ibid.
[768] Ibid.
[769] Ibid.
[770] Ibid.
[771] Ibid.
[772] Ibid.

Coined by computer scientist Mark Weiser in 1991, ubicomp refers to the seamless integration of technology into every place, building and body.[773] Taking Jones's notion of enactment as replacing translation as the primary mode for articulating the hinge between body and technology to the extreme, theories of ubicomp position the interface as an invisible object – something that has disappeared so far into the background that it no longer exists. Ubiquitous interfaces, Emerson (2014) writes: "share a common goal underlying their designs: to efface the interface altogether and so also to efface our ability to read, let alone write…definitively turning us into consumers rather than producers of content."[774] Chapter 4 interrogates the claims surrounding the erasure of the interface, through an examination of the use of ubicomp systems as interfaces. It provides a critique of how these devices are theorized and understood in the media studies and humanities fields and the utopian and dystopian stories these theories promote. After interrogating these claims, I explore the potential that artistic and collaborative experimentation with ubiquitous interfaces in interactive new media installations has for destabilizing and reconfiguring theories of ubicomp and the interface.

[773] Mark Weiser. "The Computer for the 21st Century". *Scientific American*, September 1991. Found online at: http://www.ubiq.com/hypertext/weiser/ACMInteractions2.html.
[774] Lori Emerson. *Reading Writing Interfaces: From the Digital to the Bookbound.* (Minneapolis, MN: University of Minnesota Press, 2014), p. xvii.

Chapter 4: *Ubiquitous Computing and the Interface*

The aesthetic of Scott Snibbe's interactive new media installation, *Boundary Functions* (1998) is a minimalistic one. The gallery was dark when I entered, the walls bare and other than a blank projection surface covering the floor, the space was empty. When I walked onto the surface, it remained blank. When another viewer/participant joined me, a closed-circuit camera began to record our action, ultimately activating the piece. Our captured performance was transmitted to a computer, where it was processed, generating a white line, which was projected onto the surface. The line produced a real-time Voronoi diagram that temporarily divided the surface into autonomous regions, based on our physical location in the installation.[775] (Figure 76)

Figure 76: S. Snibbe, *Boundary Functions*. (1998).

For example, when I walked onto the surface with another viewer/participant, the line bisected it. If three of us walked onto the surface the line divided it into thirds. The line was not static; it was animated and mobile. If I stepped directly on, or attempted to jump over the line, it moved out of the way or followed me. No matter what I did (jump, step, move left), the line responded dynamically, keeping an even distance between me and other viewer/participants. (Figure 77)

[775] Scott Snibbe. *Boundary Functions.* (1998). Found online at: http://www.snibbe.com/projects/interactive/boundaryfunctions/ A Voronoi diagram is a partitioning of a surface into regions based on distance to points in a specific subset of the surface. (Snibbe, 1998)

Figure 77: S. Snibbe, *Boundary Functions*. (1998).

The line not only visually divided the surface of the piece, but it acted, as the name of the artwork suggests, as a boundary. Its purpose was to obstruct me, to stop me from gaining access to other viewer/participants. In this way, the line was regulatory – it was used to control my actions in the installation. It did this by reinforcing specific notions of what a subject was (me), what an object was (the line, others interacting with the piece) and what our relationship to each other was or could be (one of opposites). However, just because this boundary existed and was visible did not mean I could not subvert it.

I did just this. I worked together with other viewer/participants and eliminated the line. All I had to do to accomplish this was hold hands with another viewer/participant and the boundary between us disappeared. The principle interaction in *Boundary Functions,* was not of repetition or reproduction of previously posited theoretical frameworks or behaviors as discussed in earlier chapters. Instead, it was about rethinking and rebuilding spaces and the human and nonhuman relationships that exist within them. *Boundary Functions* did this by allowing me to think seriously about the restrictions, constraints and potential possibilities of the representational and technical systems I was interacting with. I could then intervene in these systems and the underlying meanings and stories they promote, destabilize, to an extent, and rewrite them through creative and experimental collaboration with others.

This chapter builds on my experience with *Boundary Functions*. It examines the use of new interface technologies in interactive new media installations, the utopian and dystopian stories told about these technologies and the consequent meanings attributed to them. I specifically look at installations that intervene in these stories, critically examining the claims

about technology they make, the human and nonhuman relationships that these claims promote and the potential that artistic and collaborative experimentation has for destabilizing and reconfiguring them. I turn to a recent story being told around our human relationship to technology: ubiquitous computing (ubicomp) and its flourishing, yet fragmented and contradictory image of the "invisible" digital interface and HCI.

Ubicomp, as briefly discussed earlier, is a "post-desktop" paradigm for HCI.[776] It refers to the seamless integration of technology into every place, object, building and body. These technologies are deemed "invisible" by the scholars writing about them and the engineers or artists creating them, because their inner workings, as well as junctures and communications with other entities are concealed, hidden away and thus become imperceptible to the user. I argue that the invisibility of the interface, as it is presented in some texts on ubicomp, is problematic because the word invisible is used to position the interface as a natural, neutral or value-free boundary between humans and machines. The interface, as mentioned in previous chapters, mediates, frames, constrains and thus determines, to an extent, our experience in the space we are located in. Given this, there is nothing neutral or natural about the interface, even if we have become naturalized to it. Rather, I posit the word invisible, when applied to the interface in ubicomp contexts, is used to mask closed and regulatory computational systems that control users' access to content and their creative experimentation with the interface. I will outline what is at stake in this argument, suggesting that the so-called invisibility of the interface standardizes and sanitizes viewer/participant experience with technology in interactive new media installations. In doing this, I posit that viewer/participant behavior and experience in interactive new media installations is, among other things, reduced to an algorithmic commodity, ultimately creating a single, stable, unified perspective of what the interface, and interaction with it, are rather than what they could become.[777]

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[776] Mark Weiser. "The Computer for the 21st Century." *Scientific American,* September 1991. Found online at: http://www.ubiq.com/hypertext/weiser/ACMInteractions2.html

[777] My critique of Weiser's concept of invisibility is similar to critiques presented in the HCI and design fields around Weiser's notion of disappearance and Paul Dourish's notion of "embodied interaction" – specifically those offered by scholars such as Chalmers (2004) and Chalmers and Galani (2004) For example, Chalmers, argues that Weiser's notions of transparency and invisibility are "unachievable or incomplete ideal[s]" (Chalmers, 2004). They are unachievable and incomplete, because they "underemphasize the interdependence of 'invisible' non-rationalizing interaction and focused rationalizing interaction within ongoing activity." (Chalmers and Galani, 2004). Instead Chalmers advocates seamful design. Seamful design, according to Chalmers, "involves understanding and accepting 'seams' such as gaps and breaks in functionality, and the limits of sensing, communication and representation" (Chalmers, 2004).

What is Ubiquitous Computing?

Ubiquitous computing, as mentioned above, is a term describing the seamless integration of computers into everyday objects, bodies, artworks and spaces, thereby creating environments, objects, bodies and installations that are completely saturated with technology. It is a concept that details, as Adam Greenfield (2006) succinctly puts it, "computing without computers".[778] Ubicomp takes many different forms across cultural, aesthetic, socio-political and technical landscapes. It encompasses everything from the mundane (subway passes), to the aesthetic (technology in artwork like *Boundary Functions*), to the outrageous (talking doors and toilets found in science fiction books and movies) to commercial products (video game consoles like the Kinect). These devices, as Lori Emerson (2014) writes are sometimes referred to as ubiquitous interfaces, as they are the point of interaction between two or more entities of a ubiquitous computing system.[779] Ubiquitous interfaces, as mentioned above, are deemed "invisible" by the scholars writing about them and the engineers or artists creating them because they are imperceptible to the person using them.

The invisibility of the interface will be understood in this chapter with reference to texts on ubicomp, particularly those written by computer scientist Mark Weiser (1988-1996). I draw on Weiser's definition of invisibility in order to explore the implications that the invisibility of the interface has on viewer/participant interaction, and for interactive new media installations in general. Furthermore, I use Weiser's definition of invisibility because, as Emerson rightly points out, Weiser's theories are responsible for introducing it into the lexicon of interface design, defining this term "as a device's ability to be simultaneously everywhere yet also unexceptional in how it ideally lacks an identity".[780]

Invisibility, according to Weiser, is the main characteristic that differentiates ubicomp from the personal computer (PC) and other modes of HCI.[781] Invisibility is such a significant characteristic for Weiser that he returns to this point repeatedly throughout his essays on the

[778] Adam Greenfield. *Everyware: The Dawning Age of Ubiquitous Computing.* (Berkely: New Riders, 2006), p. 11.
[779] Lori Emerson. *Reading Writing Interfaces: From the Digital to the Bookbound.* (Minneapolis, MN: University of Minnesota Press, 2014), p. x.
[780] Ibid., p. 5.
[781] Mark Weiser. "The Computer for the 21st Century." *Scientific American*, September 1991. Found online at: http://www.ubiq.com/hypertext/weiser/ACMInteractions2.html

topic.[782] It is imperative, Weiser argues, to "conceive of a new way of thinking about computers in the world…that takes into account the natural human environment and allows the computers themselves to vanish into the background".[783] In doing this, he suggests that interfaces in ubicomp contexts will become "so unobtrusive we will not even notice our increased ability for informed action".[784] Weiser continues his theorization, stating that interfaces should be analogous to the written word; they should be "an integral, invisible part of the way people live their lives".[785] In this way ubiquitous interfaces provide a more "natural" type of interaction because they "get out of the way", allowing the user to focus on other, more important, things.[786]

Given the importance Weiser places on invisibility in his essays, the majority of my questions in this chapter will revolve around this concept. They are as follows: Why make technology like interfaces invisible? What exactly is the word "invisibility," when used in a ubicomp context, trying to hide? What relationships, processes and structures is it suggestive of? What relationships, processes and information does it conceal or reveal? And how does ubicomp, and the claims it makes, change via artistic experimentation in interactive new media installations, if it does at all?

In order to fully understand the concept of invisibility as well as the possible change in thinking artistic experimentation with ubiquitous interfaces may or may not enable, it is necessary to explore both what the ubiquitous interface is positioned as *becoming*, as referenced in texts on ubicomp, and how we experience these positionings in interactive new media installations. I use the word becoming here not merely in the sense of a set of linear changes culminating in the realization of semi-realistic potentialities or commercial products, but more in the sense of what these future positionings may or may not signify (helpfulness, user-friendliness, inaccessibility, erasure) and how they connect to past imaginings of ubicomp. In this chapter, I will focus on three interconnected concepts that Weiser and other scholars use to describe ubiquitous interfaces: invisibility, calm and attractiveness, and the

[782]These essays include, but are not limited to: The Computer for the 21st Century (1991), Some Computing Problems in Ubiquitous Computing (1993), The World is not a Desktop (1994), Designing Calm Technology (1996), Open House (1996).
[783] Mark Weiser. "The Computer for the 21st Century." *Scientific American*, September 1991. Found online at: http://www.ubiq.com/hypertext/weiser/ACMInteractions2.html
[784] Mark Weiser. "Open House." *ITP Review 2.* March 1996. Found online at: https://makingfurnitureinteractive.files.wordpress.com/2007/09/wholehouse.pdf
[785] Mark Weiser. "The Computer for the 21st Century." *Scientific American*, September 1991. Found online at: http://www.ubiq.com/hypertext/weiser/ACMInteractions2.html
[786] Ibid.

claims they perpetuate.[787] I say these concepts are interconnected because they are used in texts on ubicomp to describe the same thing – the disappearance of the interface.

Concepts of calm and attractiveness, will be understood in the first instance in Weiser's terms, because like the notion of invisibility discussed above, Weiser is responsible for introducing these concepts into the lexicon of interface design. Attractiveness, for Weiser, as briefly mentioned in the introduction, refers to technology that makes itself the center of human attention. Technology should not be, he argues, something "I need to talk to, give commands to, or have a relationship with." [788] Rather, technology should disappear into the background. In this way attractiveness, for Weiser, is an undesirable trait because attractiveness "is the opposite of invisible".[789] The notion of calm, Weiser tells us, refers to technology that is free from excitement and that does not require the full attention of the person using it. Calm technology does this, he states, by engaging both the center and the periphery of the user's attention, moving back and forth between the two depending on the context, thus leaving the user, not the computer, "serene and in control" of the situation or task at hand.[790] I will treat the three concepts mentioned above as necessary conditions of ubiquitous interfaces only in that these concepts are the foundations on which the theory of ubicomp is built – they are necessary, but not sufficient or definitive. I do not suggest that ubiquitous interfaces can be reduced to these concepts. I do however believe that these concepts and the claims that they generate are significant enough to merit a critical investigation into what their nature is and how they manifest themselves in interactive new media installations.

This investigation is important because, like most popular computer science-based concepts proposed in the past decade (virtual reality, artificial reality, artificial life), ubicomp, as Christiane Paul (2013) observes, is "surrounded by a certain amount of hype and invites a set

[787] The claims that these concepts perpetuate, I argue include, but are not limited to: the eradication of the boundary between the human and information; separation between content and the user; the artist and technology; Aristotelian notions of the relationship between the body and technology; the disembodiment of the subject.
[788] Mark Weiser. "The Computer for the 21st Century." *Scientific American*, September 1991. Found online at: http://www.ubiq.com/hypertext/weiser/ACMInteractions2.html
[789] Mark Wesier. "Some Computer Science Issues in Ubiquitous Computing." *Commun. ACM* 36, 7 (July 1993). Found online at: http://www.ubiq.com/hypertext/weiser/UbiCACM.htm
[790] Ibid.

of critical questions".[791] In other words, ubicomp, or more precisely, the scientists, engineers and artists who produce ubiquitous interfaces and the theories around them, make claims and promises that these devices do not, cannot, or in certain cases will never be able to, deliver. These include, but are not limited to, evoking a state of calm, improving our lives or simply making them easier. Thus, as Ulrik Ekman (2011) argues: "ubiquity and ubiquitous computing remain potentialities of whose actualization we are not yet sure."[792]

In the past decade, considerable effort has gone into realizing Weiser's vision of ubicomp including, but not limited to, the development of ubiquitous frameworks, interfaces and infrastructures. As advanced and impressive as these endeavors have been, there remains, as Yvonne Rodgers (2006) states, "an enormous gap between the dream of comfortable, informed and effortless living [as proposed in Weiser's papers] and the accomplishments of Ubicomp research".[793] This gap exists, Rodgers argues, because ubicomp involves, among other things, "solving very hard artificial intelligence problems" such as harnessing the huge variability around human motivation and intention as discussed in chapter 3.[794] So while it has been possible to develop a range of simple ubicomp systems that can remind us of events or recommend products, it is, she writes "proving to be much more difficult to build truly smart systems that can understand or accurately model people's behaviors, moods and intentions".[795] Following Rodgers, I argue the importance of a critical engagement with ubicomp, the theories that surround it and the interfaces that it generates, not because of its concreteness (the objects that it produces) but because of the stories around technology that it tells.

My inquiry into the stories above raises interesting questions around the foundations on which ubicomp is based. In doing this, my inquiry will require an in-depth discussion of the foundational papers of ubicomp – one that highlights the (dis)continuities between discourses found in the foundational papers to the current institutions, texts and theories that promote it. It will focus specifically on how these newer texts echo, as Emerson writes, the techno-

[791] Christiane Paul. "Contexts as Moving Targets: Locative Media Art and the Shifting Ground of Context Awareness." in *Throughout: Art and Culture Emerging with Ubiquitous Computing.* ed. Ulrik Ekman. (Cambridge, MA: MIT Press, 2013), p. 399.
[792] Ulrik Ekman. "Ubiquity Editorial – Interaction Designs for Ubicomp Cultures." *The Fibreculture Journal*. ed. Ulrik Ekman. Issue 19, 2011: Ubiquity. Found online at: http://nineteen.fibreculturejournal.org/
[793] Yvonne Rodgers. 'Moving on from Weiser's Vision of Calm Computing: engaging UbiComp experiences.' in *Ubicomp 2006:* Ubiquitous Computing: 8th International Conference. September 2006, Orange County, California.
[794] Ibid.
[795] Ibid.

determinist assumptions embedded in the foundational papers "about how ubicomp-related devices *will* be deployed everywhere in the future" and how this imagined deployment implies, to an extent, the inadequacy of traditional interfaces.[796]

I draw heavily on Emerson's theorization of ubicomp throughout this chapter, but offer an approach and framework that extends beyond a critique of techno-deterministic imaginings of disappearing technology and marketing rhetoric (although I do critically examine them). I argue that the word invisible, when applied to the interface in interactive new media installations not only represents the commodification of bodies and things; it also represents erasure. In particular I refer to the erasure of the multiple agencies that contribute to and help shape the interface and the relationships between them – relationships between human individuals (viewer/participants, artists, theorists, engineers and scientists) and relationships between nonhuman actors, like the ubiquitous interface and the aesthetic, algorithmic and technical processes that allow it to work. The question then becomes: How can I call attention to the multiple agencies, entities and relationships that bring the interface into being when the ultimate goal of the system being used is "invisibility" or disappearance?

Taking this question into account, I will suggest that the relationship between computation, aesthetics and the interface should be understood as an interwoven and multifaceted process that questions the ways in which ubicomp systems are theorized and deployed. It is a process that looks towards interactive new media installations not as a mode of opposition, but as a mode of intervention, a way to critically question commonly held assumptions about the interface and call attention to, and then dispel, myths and claims of ubicomp such as invisibility, neutrality and naturalness.

Ubiquitous technologies are, of course, present well beyond new media art, but I contend that interactive installations can become a good entry point to look at such systems as they construct situations and then ask us to participate – to physically perform – in and with technology, and thus they afford us a chance to critically experience and re-examine our relationship to technology. As mentioned earlier, interactive new media installations draw on and remediate cinematic and other art historical practices, processes and traditions – specifically those of technological experimentation, creative collaboration and audience participation. Therefore interactive art provides us with strategies – with a means to

[796] Lori Emerson. *Reading Writing Interfaces: From the Digital to the Bookbound.* (Minneapolis, MN: University of Minnesota Press, 2014), p. 8. Emerson's emphasis.

undermine the claims of invisibility and neutrality that ubicomp promotes. In direct relation to ubicomp, interactive art does this, I suggest, by intervening in, via mimicry, resistance, opposition and/or rejection, the same regulatory principles and claims that engineers and scientists producing and marketing ubiquitous interfaces employ for commercial gain.

For example, Brian Massumi (2011) states: "the regulatory principles of the technical process in the narrow sense are utility and salability, profit-generating ability. Art claims the right to have no manifest utility, no use-value, and in many cases even no exchange value. At its best, it has *event-value.*"[797] By event-value, Massumi is referring to the fact that interactive art is experiential and exploratory, unbound and unsubordinated by and to external finalities.[798] It is precisely this "event-value", or open-endedness, Massumi argues, that allows interactive art to intervene in previously posited modes of thinking and begin to reframe them.[799] Interactive art, he writes, "can push further to the indeterminate but relationally potentialized fringes of existing situations, beyond the limits of current framings or regulatory principles".[800] Following on from Massumi, the notions of experimentation, collaboration, and audience participation embedded in new media art's history become important to any study of ubiquitous technology, because the aesthetic practices that underpin it have the potential to create encounters between entities and facilitate creative action on behalf of the viewer/participant. In doing this, I argue interactive new media installations can reposition the instrumental and invisible ubiquitous interface into a creative and visible technology, bringing the role of the artistic and the aesthetic to the fore. In short, to think about the use of the ubiquitous interface in interactive new media art installations is to acknowledge the role, both positive and negative, that artistic experimentation has played, and still is playing, in the development of new technologies.

Intervention, of course, has its limitations. One of these limitations is that it can inadvertently reinforce that which it seeks to intervene in.[801] In the case of this thesis, intervention is seen as creative experimentation, by new media artists, with ubiquitous technology in interactive new media installations. The "thing" that artists are trying to intervene in is, among other

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[797] Brian Massumi. *Semblance and Event: Activist Philosophy and the Occurrent Arts.* (Cambridge, MA: MIT Press, 2011), p. 53. Massumi's emphasis.
[798] Ibid.
[799] Ibid.
[800] Ibid.
[801] Another limitation of intervention is that it can be exploited by corporations. It can be co-opted, re-packaged and leveraged for profit. This notion of intervention being co-opted and leveraged for profit is discussed, in full, in my analysis of David Rokeby's interactive new media installation *Hand-held* (2012).

things, the commodification of aesthetic content and innovation by the technology industries. The notion of intervention, via artistic experimentation in interactive new media installations and the limitations that surround it, will be discussed in full in the second half of this chapter, but to summarize: according to Simon Penny (2013), media arts practitioners working in the 1990s played (and are still playing) a key and vigorous role in the development of new technologies – specifically, ubiquitous interfaces.[802] Driven by "the traditions of open intellectual inquiry and interdisciplinarity in the arts and by the previous thirty years of 'art and technology' practice" the underlying goal of some artists developing these technologies, Penny writes, was to critically question and intervene in the popular rhetoric of the time (Cyberculture, Virtuality).[803]

Nurtured in environments that rewarded aesthetic experimentation, creative risk taking and radical intervention the ubiquitous interfaces created for interactive new media installations in the 1990s have been repurposed and turned into commercial devices that now dominate the 21st Century (iPads, the Kinect, VR Headsets).[804] Stripped of their aesthetic functions, some of these technologies have been co-opted by large conglomerates (Microsoft, Apple, Google). They have been sanitized and instrumentalized, sold back to us as serialized products that will "expand your creativity" and/or "change the way you use technology forever".[805] The commodification of aesthetic content raises questions around artistic experimentation by new media artists in interactive new media installations. I will address these questions by critically examining the use of ubiquitous interfaces in interactive new media installations, positioning them as mediums through which notions of creativity and aesthetic content become commodified, asking whether artistic experimentation with ubicomp technology is actually the instrument of intervention that artists developing ubiquitous interfaces, like Penny, see it as, or more of a continuity of the same.

I begin my exploration of ubiquitous interfaces in the first section of this chapter, critically examining how ubicomp is framed and presented to us in the foundational papers. In the second and third part, I draw on more recent theories of ubicomp directly related to the

[802] Simon Penny. "Trying to Be Calm: Ubiquity, Cogntivism, and Embodiment." in *Throughout: Art and Culture Emerging with Ubiquitous Computing.* ed. Ulrik Ekman. (Cambridge, MA: MIT Press, 2013), p. 263. Penny is specifically talking about experimentation.
[803] Ibid. Cyberculture and Virtuality, Penny argues framed new technologies as "abstract immaterial" manipulators of information." (Penny, 2013)
[804] Ibid.,
[805] These claims are specifically made by Microsoft and Apple in regards to their products (the Kinect, the iPad/iPhone). I critique these claims in full later in this chapter.

humanities fields as offered by Greenfield (2008), Hayles (2011), Sarah Kember (2013) and Emerson (2014) and apply them to the use of the ubiquitous interface in interactive new media installations of David Rokeby (2012) Scott Snibbe (2002) and Brian Knep (2006-8). In these sections, I argue that an investigation into aesthetic experimentations with ubiquitous systems is important because these experimentations not only affect the interfaces used in art but they influence those developed elsewhere. These aforementioned humanities-based texts, and the consequent interactive new media installations that I apply them to, are invaluable to my research as they critically evaluate the principal claims and question the foundations on which the concept of ubicomp is based. Thus I posit they offer an important and much-needed critical perspective on ubiquitous technologies – one that seeks to challenge the hegemony of ubicomp theories by intervening in normative assumptions concerning the interface. Specifically, I will call attention to how the ubiquitous interface is being marketed as a natural, intuitive feature by corporations that will transform the way we interact with each other forever. These interventions happen, via critique (Hayles, Kember, Greenfield, Emerson), presence or visibility (Rokeby, Knep), disruption (Snibbe), resistance (Rokeby), critical reflection (Knep) and creative play (Snibbe, Knep). I argue that it is precisely the aforementioned scholars' and artists' awareness of the fact that the claims require critical attention and intervention, rather than tacit acceptance, that differentiates the more recent, humanities-based discourses on ubicomp and artworks from both the foundational texts and those written and created by scholars working in other fields.

My analysis of ubicomp culminates in an alternative theorization of the relationship between aesthetics, computation and the interface in interactive new media installations via a re-reading of Natalie Jeremijenko's *Live Wire* (1995). My re-reading of *Live Wire* is important because I believe it pushes us to reflect on, and then critically question, how we encounter, experience and think about technology, ultimately opening up a space for different narratives around, and reconfigurations of, the ubiquitous interface and ubicomp to emerge. Approaching ubicomp from this perspective will situate my theory of the digital interface at the boundary of the STS and humanities fields as well as apply it to issues of invisibility, aesthetics, interactivity, agency and autonomy. The issue of invisibility is embedded in the notion of the interface as a calming, unattractive technology, as theorized by Weiser in the foundational papers and consequently adopted by some artists, engineers and scholars in the humanities and STS fields. Questions around agency and autonomy arise in regards to the reappropriation and commodification of experimental ubiquitous interfaces created for

interactive new media installations by corporations and the normalization of bodies and behaviors that follow. Finally the concepts of aesthetics and interactivity will be developed in relation to notions of viewer/participant creativity and choice.

A 'Shift' in Computing

In his 1988 article "The Computer for the 21st Century", Mark Weiser defined ubicomp as "the method of enhancing computer use by making many computers available throughout the physical environment".[806] The availability and integration of technology into the physical environment is significant for Weiser as he believes it will result in a space in which "each person is continually interacting with hundreds of nearby wirelessly interconnected computers".[807] However, there exists, as Paul Dourish and Genevieve Bell (2011) argue, a multitude of complex interactions "between space, technology, culture and experience".[808] The spaces in which ubiquitous technologies are being deployed and the interactions that they enable "are neither stable, uniform, nor given".[809] Ubiquitous technology, they continue, "can destabilize and transform" these interactions and mediate space, but they "will only ever be one part of the mix".[810] This is because ubicomp, Dourish and Bell state, was "from the outset, a proposal not for how technology should *be* but instead how it should be *experienced*".[811]

Dourish and Bell's conceptualization of ubiquitous technology – specifically, their statement that ubicomp was, from the outset, a proposal for *how* technology should be experienced – is helpful to this chapter as it exposes a major contradiction in the foundational papers.[812] For example, the main characteristic of ubiquitous technology, as described above, is invisibility. As Weiser states, "a good tool is an invisible tool" and "the most profound technologies are those that disappear".[813] However, if, as Weiser claims, the best technology is invisible, then

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[806] Mark Wesier. "Some Computer Science Issues in Ubiquitous Computing." *Commun. ACM* 36, 7 (July 1993). Found online at: http://www.ubiq.com/hypertext/weiser/UbiCACM.html
[807] Ibid.
[808] Paul Dourish and Genevieve Bell. *Divining a Digital Future: Mess and Mythology in Ubiquitous Computing.* (Cambridge, MA: MIT Press. 2011), p. 116.
[809] Ibid., pp. 11-12.
[810] Ibid., p. 116.
[811] Ibid. Dourish and Bell's emphasis.
[812] Ibid.
[813] Mark Weiser. "The World is not a Desktop." November, 1993. Found online at: http://www.ubiq.com/hypertext/weiser/ACMInteractions2.html Mark Weiser. "The Computer for the 21st Century." *Scientific American*, September 1991. Found online at: http://www.ubiq.com/hypertext/weiser/SciAmDraft3.html

how is ubicomp "an experience?" How do we experience invisibility? How can we experience something that we cannot see?

In order to address this contradiction and these questions, I must return to the foundational papers of ubicomp. This return is necessary because these papers, as Dourish and Bell state, begin "to shape an argument for the future of ubicomp as inevitable; it is already on its way, delivered by the people who brought you the personal computer".[814] The foundational papers of ubicomp helped create both the possibility of ubiquitous interfaces and their limits. To understand the potential that ubiquitous interfaces may hold, I must explore what made the emergence of ubicomp possible and the motives behind it. By examining the foundational papers, I do not seek to offer a judgment on the "effects" that the use of ubiquitous interfaces and their proposed invisibility have in interactive new media installations. I return to them to explore how the aesthetic and cultural aspects of ubiquitous interfaces are situated in, and respond to, the aforementioned claims, like invisibility, that surround them.[815] In attempting to critically examine these claims, I gesture towards discourses in the STS and humanities fields that are larger than and encompass more, yet still feedback on, and are important to, interactive new media installations and new media art.

The ultimate point of creating ubiquitous environments, for Weiser, is twofold. I say twofold because ubicomp, as it is presented to us by Weiser in the foundational papers, has two seemingly interrelated, yet contradictory goals: one humanist and one technicist. The first goal is humanist as ubicomp is centered on users and their interactions with technology. For example, the point of ubicomp, in Weiser's words, is to: "create a new kind of relationship of people to computers, one in which the computer would have to take the lead in becoming vastly better at getting out of the way so people could just go about their lives."[816] Here Weiser is advocating for what he believes is a better way of interacting with technology, one that shifts attention away from technology (via the integration of multiple small, unobtrusive, or "invisible" interfaces into environments) onto the user and their interactions with other humans.[817] Given Weiser's emphasis on the human here, it is easy to see how Dourish and

[814] Paul Dourish and Genevieve Bell. *Divining a Digital Future: Mess and Mythology in Ubiquitous Computing.* (Cambridge, MA: MIT Press. 2011), pp. 11-12.
[815] These claims revolve around statements made by some scientists, engineers and artists about the invisibility, seamlessness, calmness and attractiveness of ubicomp technologies.
[816] Mark Weiser. "Some Computer Science Issues in Ubiquitous Computing." *Commun. ACM* 36, 7 (July 1993). Found online at: http://www.ubiq.com/hypertext/weiser/UbiCACM.html
[817] Ibid.

Bell would suggest that the foundational papers were proposals that detailed how users should experience ubiquitous technology mentioned above.

The other goal of ubicomp is technicist. It is technicist in that it is technologically driven and focused on technical knowledge. The point of ubicomp is, as Weiser writes, "to achieve the most effective kind of technology, that which is essentially invisible to the user".[818] In order for ubiquitous systems to become invisible, and thus effective, those designing them need to find, Weiser states, "the right balance of features".[819] This balance must meet the specific "niche" for which the device is being designed. For example, if the device is being designed for a sound system in an interactive new media installation, then it would have to meet the technical requirements (power amplification, signal processing, other additional aural requirements) aesthetic needs of the installation (adapt to the gallery space and the installation, complement on-screen visuals) and the needs of the user (be easy to activate and audible).

However, the only features that ubicomp devices must include, according to Weiser, are "display size, bandwidth, processing and memory".[820] Given this, an artist designing an interface for a sound system would not have to consider the aesthetic aspects of the device (what it looked like, how it fit in the gallery space and the installation, how it complements the on-screen visuals). They only have to take into consideration the technical requirements: its size (can it fit into a speaker or a microphone?) bandwidth (what frequency is it operating on? what is its data transfer rate?) and its processing and memory capabilities (how much information can it store and how fast can it process?).

So, ubicomp, as described in the foundational papers by Weiser, is seemingly focused on our relationship to and interaction with technology. Yet, the features and relationships Weiser discusses throughout his texts are mostly instrumental ones. As he writes: "The balance for us emphasizes communication, ram, multi-media, and expansion ports."[821] Furthermore, in order to be effective, these features (ram, multimedia, expansion ports) must be inexpensive and easy to acquire, or "off the shelf".[822] Central to ubicomp then is the development of affordable, embedded and invisible technology (sensors, motors, processing units) and the

[818] Mark Weiser. "Some Computer Science Issues in Ubiquitous Computing." *Commun. ACM* 36, 7 (July 1993). Found online at: http://www.ubiq.com/hypertext/weiser/UbiCACM.html
[819] Ibid.
[820] Ibid.
[821] Ibid.
[822] Ibid.

different types of interaction and relationships between machines and machines that these devices may bring about. In short, what appears to be humanist, in Weiser's writings, is actually technicist. I say technicist because the focus of ubicomp is not on what it can do for us, but on the technology itself, and what it can do in the space it is located in. I suggest this because Weiser's emphasis is on the size, speed, power, performance and affordability of the technology developed, not on the relationships that people have with their machines.

While Weiser acknowledges that this balance of features includes communication, the type of communication he promotes is not human-to-computer or human-to-human. Rather, it is communication between computers and computers (pens, boards, tabs, pads) and the underlying software and hardware (ram, expansion ports) that enable them to function. In this way, I posit that the goals that Weiser's theory of ubicomp is based on, are predicated on false divisions between the biological, the technological, and the economic(al). Or, to put it more simply: capital, computers and consumers.[823]

Kember (2013) confirms my suggestions: ubiquitous technologies, she writes, are based on false divisions in the sense that they "articulate and disarticulate, avow and disavow" the entanglement of life, technology and capital.[824] Significantly for Kember, the entanglement "of technologies and users" in ubicomp discourses "belies the false divisions that persist through new, social and what is sometimes referred to as cross media".[825] While directly related to ambient intelligence, photography and face recognition technology, the point, for Kember, and the importance of her argument to mine, is that technoscience industries "are taking on the media industries, incorporating them in ways that are utterly asymmetric and exploiting our agential intra-actions or dynamic relations with technology in order to derive value from them".[826] They do this, she writes, in multiple ways: by reviving and repackaging e-commerce strategies (the replacement of venture capitalists and bankers with "prosumers"), reviving and repackaging previous scientific research into the intersection between life,

[823] These divisions are false, as discussed in chapter 2, because they presume a prior separation between entities – that entities are individual things that come together to interact, rather than entangled entities that intra-act in conjunction with each other.
[824] Sarah Kember. "Ambient Intelligent Photography." in *The Photographic Image in Digital Culture.* ed. Martin Lister. (New York, New York: Routledge), p. 60.
[825] Ibid., p. 58. The term "cross media", for Kember: "designates a primarily technologically-driven phenomenon whereby content is delivered across a range of different platforms." These platforms, she writes, are social media based (Facebook, Twitter, Flickr). Additionally, these platforms, she states, are associated with Web 2.0 and "somewhat over-emphasize the autonomy of media use and users." (Kember, 2013)
[826] Ibid., p. 59. Ambient Intelligence refers to electronic environments that are sensitive and responsive to the presence of people. It is a discourse, which Kember refers to in her text as a "hybrid of ubiquitous computing and artificial intelligence." (Kember, 2013)

technology and media (artificial life, artificial intelligence), and by "making direct claims on the everyday and on social environments constituted by users and intelligent artifacts alike."[827]

The direct claims that the technoscience industries are making on the everyday, Kember explains, are often contradictory.[828] They cross already unstable boundaries between the public, the personal and the private, as well as the professional and the amateur, and the human and the nonhuman. They come in different forms, depending on the particular type of discourse, technology and environment they are associated with and the scholars or corporations writing about, designing or promoting them. Some, like discourses around Ambient Intelligence, as Kember discusses in her article, are created for specific sectors or audiences and deemed ordinary or helpful, whereas other more interfacial products, like Google Glass or the Apple Watch, are called extraordinary and life changing. While these discourses and devices have their own unique vision and version of media, technology and computing, they all have, Kember tells us, one thing in common: they all emerge out of research conducted in the realm of ubicomp.[829] Thus, they are "incorporated within the claims and innovations associated with the wider discourse of ubiquitous computing".[830] As she writes: "Such claims have come from research in ubiquitous computing and they materialized through new discourses and innovations that, by means of the media and technologies of (everyday) life, seek to change the very meaning of it."[831] So, how should we understand the relationship between the future of ubicomp that Weiser predicted and its present state as detailed by theorists like Kember? Well a good first step in developing this understanding would be to examine the underlying goals of ubicomp. A second good step would be to explore how these goals have changed since Weiser wrote the foundational papers.

One of the main goals of ubicomp is to bring about a "shift" in computing – one that Weiser believes will allow human-to-human interactions to become dominant over individual users' interactions with personal computers. Thus it is a shift that I argue suggests a very subtle move, on Weiser's behalf, from analyzing the relationship between the biological and the

[827] Sarah Kember. "Ambient Intelligent Photography." in *The Photographic Image in Digital Culture.* ed. Martin Lister. (New York, New York: Routledge), p. 59.
[828] Ibid.
[829] Ibid., p. 58.
[830] Ibid.
[831] Ibid., p. 59.

technical as separate (one isolated human and one isolated computer that sometimes talk to each other) towards theorizing the human and technology as entangled entities (entities that do not pre-exist each other's existence).[832]

For example, the idea of ubicomp, Weiser writes, first came about via personal research into "the place of today's computer in actual activities of everyday life".[833] Citing academic studies into situated learning in classroom- and office-based settings – specifically those conducted by Lucy Suchman (1985) and Jean Lave (1991) – people, Weiser states "primarily work in a world of shared situations and unexamined technological skills. However the computer today is isolated and isolating from the overall situation and fails to get out of the way of the work".[834] The goal of ubicomp, for Weiser, is to rectify these problems: to make the computer less isolating and to get it out of the way.[835] Accomplishing this goal, he states, is not an easy task. It is not a multimedia, GUI or interface problem. Nor is it a matter of symmetry – that is making computers more human like or turning them into "autonomous agents that take on our goals."[836] Hence his question: "Why should a computer be anything like a human being."[837] Rather, the challenge, for Weiser, is to "draw computers out of their shells" and to better integrate them "into human activities, since humans are of and in the everyday world".[838] In other words, computers are not isolated things, singular or individual entities that pre-exist their relations with humans, or autonomous agents that act alone. Instead computers, for Weiser, are made by humans and exist in the physical world. Therefore they should invisibly enhance, rather than simulate, or isolate us from the world.[839]

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[832] The concept of entanglement was discussed in full in chapter 2 of this thesis, via Barad (2007). To summarize, entanglement, Barad argues, is not a singular or individual occurrence, as entities are not ontologically separate. (Barad, 2007). Emerson (2014) echoes my argument, focusing on the notion of symmetry in the foundational papers. As she writes: "…neither did he [Weiser] advocate using 'magic' as a way to trick the user into thinking the computer was behaving like a human by doing something it was not, usually via attractive packaging that called attention to the computer even more." (Emerson, 2014, pp. 9-10)

[833] Mark Weiser. "Some Computer Science Issues in Ubiquitous Computing." *Commun. ACM* 36, 7 (July 1993). Found online at: http://www.ubiq.com/hypertext/weiser/UbiCACM.html

[834] Ibid.

[835] Ibid.

[836] Ibid.

[837] Mark Weiser. "The Computer for the 21st Century." *Scientific American*, September 1991. Found online at: http://www.ubiq.com/hypertext/weiser/SciAmDraft3.html

[838] Mark Weiser. "Some Computer Science Issues in Ubiquitous Computing." *Commun. ACM* 36, 7 (July 1993). Found online at: http://www.ubiq.com/hypertext/weiser/UbiCACM.html Mark Weiser. "The Computer for the 21st Century." *Scientific American*, September 1991. Found online at: http://www.ubiq.com/hypertext/weiser/SciAmDraft3.html

[839] Mark Weiser. "The Computer for the 21st Century." *Scientific American*, September 1991. Found online at: http://www.ubiq.com/hypertext/weiser/SciAmDraft3.html

In this way, the computer, albeit invisible, is positioned, by Weiser, as entangled with its human user in the foundational papers of ubicomp.

While advocating for what he truly believed was a better form of HCI, the relationship between the human and the machine that Weiser's shift in computing subtly hints at, is false. Despite his best efforts, I suggest that Weiser is positioning the relationship between the human and technology, via notions of invisibility, as fixed and static rather than entangled, and as such the user, in his theory, becomes pliable rather than open to change. In doing this, I argue that Weiser's theory of ubicomp creates boundaries and separations between the user, ubiquitous technology and other subjects and objects. Like the computer itself, any notion of relation between the human and the machine, in Weiser's shift in computing, fades into the background and disappears, only to be replaced, in more recent texts on ubicomp, with the same notions he was advocating against: simulation (of the users movements by the machine) and symmetry (between the human and the machine).[840]

Weiser's proposed shift in computing and its problems raise questions specifically pertaining to ubiquitous interfaces and interactive new media installations. How does the relationship between the human and the machine detailed above manifest itself in interactive new media installations? What version or vision of ubicomp and the interface do these positionings of the relationship between the human and the machine present and promote? Do interactive installations provide the viewer/participant with any means of intervention into these positionings?

To begin to answer these questions, we might consider David Rokeby's interactive new media installation *Hand-held* (2012).[841] *Hand-held* consists of two projectors and a Kinect depth sensor. When the viewer/participant walks into the installation and holds out her hands, the piece is activated. Once activated, the space is filled with 80 layers of three-dimensional images of everyday objects.[842] (Figure 78)

[840] The more recent scholars who have adopted Weiser's shift in computing and advocate for the things listed above include, but are not limited to Johnson (1997), Abowd and Mynatt (2000), Saffer (2010), Dourish and Bell (2011), Hansen (2013).
[841] David Rokeby. *Hand-Held.* (2012). Found online at: http://www.davidrokeby.com/handheld.html
[842] Ibid.

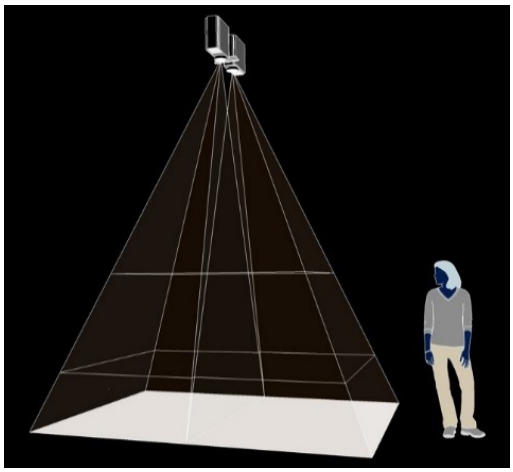

Figure 78: D. Rokeby, *Hand-held*. (2012).

Not all of the images contained in these layers are perceptible – some float, suspended in space, unseen until the viewer/participant interacts with them. The exact images the viewer/participant receives upon interaction, according to Rokeby, are dependent on the height of her hands.[843] (Figure 79)

Figure 79: D. Rokeby, *Hand-held*. (2012).

For example, if the viewer/participant holds her hands at waist level, a field of images containing objects like coins or paper money emerges. If she holds her hands at eye level, a field of images containing objects like apples or mobile phones appear. The quality of the

[843] David Rokeby. *Hand-Held.* (2012). Found online at: http://www.davidrokeby.com/handheld.html

images received is dependent on the viewer/participant's location. The closer she is to the center of the installation, the more in focus the images are, the farther away, the blurrier they are.[844] If the viewer/participant moves her hands directly through an object, cross-sections of the interior of that object materialize. The objects are held in a set of disembodied virtual hands and they appear, upon interaction, in the viewer/participant's physical hands. (Figure 80)

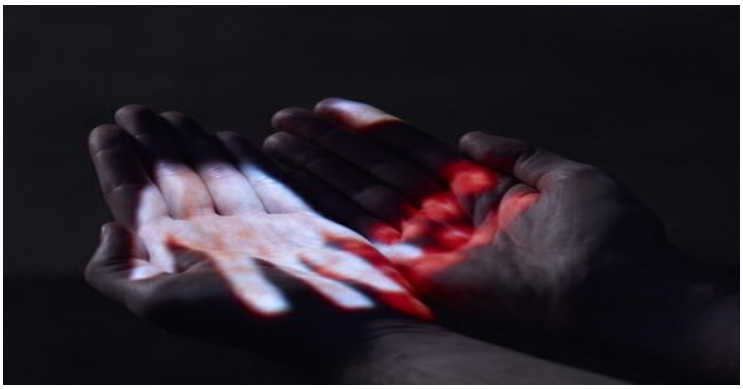

Figure 80: D. Rokeby, *Hand-held*. (2012).

As the viewer/participant moves her hands through the various layers of the installation, the disembodied hands "touch" her. They pass objects between and interact with her, thus making, as Rokeby argues "the invisible communications through which we increasingly convey information, conduct transactions and relate to each other" visible.[845] Since the viewer/participant must move her hands in order to view the images and since the virtual hands must "pass" the viewer/participant objects for the underlying meaning of the piece to be revealed, the hands (both virtual and physical) become the interface in this installation. The virtual and physical hands have an interfacial significance because they help create and form relationships and facilitate communication between entities. Instead of depicting these relationships in full, however, Rokeby has visually reduced them to a series of iconographic symbols. (Figure 81)

[844] David Rokeby. *Hand-Held.* (2012). Found online at: http://www.davidrokeby.com/handheld.html
[845] Ibid.

Figure 81: D. Rokeby, *Hand-held*. (2012).

Here Rokeby is reappropriating the imagery, and, to an extent, the language of digital capitalism – the images look like apps located on mobile devices and the viewer/participant must "touch" the objects with her fingers in a similar manner to the way she would touch apps on a phone, to open and view them. In doing this, Rokeby provides the viewer/participant with a specific context to interact in (digital capitalism), and thus he offers specific possibilities for viewer/participant intervention into thinking about ubiquitous technologies (disruption, resistance, disturbance, destabilization). [846]

Stern discusses how viewer/participant intervention into the rhetoric of "digitally-enhanced capitalism" occurs and the opportunities for re-evaluation and resistance (of and to narratives or objects) that it affords.[847] Drawing on Milla Tiainen and Jussi Parikka's (2012) theorization of choreographer Tero Sararinen's dance piece, *Hunt* (2002), Stern argues that living bodies, like that of the viewer/participant, "continuously connect, perceive and act with a difference".[848] Given this, he states: "we must recognize their variability as a political existence for both exploitation [by corporations] and resistance [to this exploitation]."[849] Stern continues, stating that when corporations advertise technology they "no longer need to recognize 'particular target groups' in that they can tap into the 'sensation of an excess of possible meanings with respect to a given image/product.'"[850] So, rather than selling an actual

[846] David Rokeby. *Hand-Held.* (2012). Found online at: http://www.davidrokeby.com/handheld.html Put simply, digital capitalism is the global political economy of cyberspace, where economically productive activities are connected to and shaped by a networked, global and digital marketplace. For more information, see: Schiller, 2000; Deuze, 2007; Terranova, 2003, 2004; Ross, 2009.
[847] Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* (Canterbury, UK: Gyliphi Limited, 2013), p. 47.
[848] Ibid.
[849] Ibid.
[850] Ibid.

product or marketing it towards a specific demographic, advertisers can sell an "abstract idea of fulfilled desire through their product".[851] Couple this power (the supposed fulfillment of our every desire that advertisers purport their product will bring about), he writes, "with the supposed infinite choice of interactivity, and credit card details will be very forthcoming".[852] Interactive new media installations, Stern goes on to state, can "speak back to such exploitation" because they remind us of the human body's power and resistance to the dominant market's regime.[853]

Following on from Stern, I argue that while the images located in *Hand-held* may be representative of digital capitalism (in the sense that they look like apps on mobile devices) the experience the viewer/participant has with them signifies something different: resistance, on behalf of the viewer/participant, via her physical presence in the installation, to the invisible and sometimes inaccessible relationships between entities (bodies, technologies, spaces, images and more) that ubicomp promotes. In this way, my designation of the virtual and physical hands as interface, takes on a dual significance: the hands perform interfacial functions (they facilitate communication and interaction) but they also act as an intervention into the dominant discourses of ubicomp – specifically notions of invisibility and inaccessibility mentioned above.

We are surrounded by ubiquitous interfaces (closed-circuit cameras, biometric and video-surveillance technologies, geolocation devices) that constantly monitor, collect and share information about us, and our interactions with each other. Like the images in *Hand-held,* this information is invisible or unreadable to us without the right device or digital access code. In the case of *Hand-held,* the right device is the viewer/participant's hands; in the case of commercial ubiquitous devices, it is a key code that only the manufacturer has access to.[854] Unlike commercial ubiquitous devices, however, the objects in *Hand-held* contain a degree of ambiguity – they move in and out of focus, their relationship to each other is confusing and often contradictory. Rather than minimizing the complexity of these relationships, stabilizing and then standardizing their meanings (as biometric technologies, geolocational and mobile devices often do), the objects revealed to the viewer/participant (as well as their underlying

[851] Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* (Canterbury, UK: Gyliphi Limited, 2013), p. 47.
[852] Ibid.
[853] Ibid.
[854] Unless, of course, you "jailbreak" the device.

meanings and connections to each other) are left undetermined – open to reinterpretation by the viewer/participant.

The amount of agency and ambiguity that the images and interfaces may hold, and the exact type of intervention that the viewer/participant can make in *Hand-held* is limited by the cultural and institutional agency that hosts it, the viewer/participant who experiences the work, the artists, theories and theorists that create, frame and interpret these experiences, and the technical capabilities of the artwork. Moreover, viewer/participant intervention in *Hand-held* may have multiple targets (a company, an individual, a slogan, a philosophy) therefore it may not offer a solution, let alone resistance to anything. What viewer/participant intervention does, I argue, is begin to provide us with a vocabulary for critically re-evaluating discourses about ubiquitous interfaces – one that I believe starts with a rethinking of Weiser's proposed "shift" in computing and the notions of invisibility and inaccessibility that accompany it.

A Restructuring of Interfaces

In this chapter, I will refer to the shift in computing that Weiser outlines as a restructuring of interfaces. I refer to this shift as such, in order to highlight what I see as an unresolved difficulty in the aforementioned texts on ubicomp that conflate linear and progressive notions of technological evolution (the movement, in a straight line from a, to b, to c) with the open-ended and hybrid nature of the relationship between the human and technology. Furthermore, I believe the phrase "restructuring of interfaces" is important to use when referring to the digital interface in ubicomp contexts, simply because it allows me to begin to counteract claims made in texts on ubicomp around the invisibility and disappearance of interfaces and the notions of inaccessibility that accompany it. The phrase "restructuring of interfaces" counteracts these claims by drawing attention to the interface and the processes and entities that contribute to its being instead of allowing them to disappear behind, or become black-boxed into, some mythical linear "shift" in computing. Rather than disappear, I suggest that the form that the digital interface takes in ubicomp has been restructured both physically (its shape and size) and theoretically.

For example, the digital interface, in a ubicomp context has physically shrunk in size and embedded into the environment, where it is locked down, by the designer or manufacturer, via various black-boxing techniques. Thus, the interface has been physically restructured – it has become both *imperceptible* and *inaccessible* to the user interacting with it. The

imperceptibility of the digital interface is conflated with, and then referred to as invisibility or seamlessness in some texts on ubicomp, in order to reposition relationships between humans and computers and information and technology. Thus the interface has been theoretically restructured – everything about it, other than a conversation around its technical functions, has disappeared, to an extent, from discourses on ubicomp. The fact that the imperceptibility of the interface is conflated with invisibility, therefore disappearance, is troubling because the word "invisibility" is misleading. Invisibility, I argue, is deployed not only to make hardware (computers and interfaces) disappear; it is employed to make aesthetic information subordinate to the computational processes that allow the interface to run. The word invisibility is also used to justify Weiser's "shift" in computing. Both Greenfield and Emerson confirm this argument.

Greenfield argues that the claims made by the computing industry and computer scientists around the invisibility of the interface (which he refers to as "the discourse of seamlessness") are of grave concern because they deprive "the user of meaningful participation in the decisions that affect his or her experience".[855] These discourses do this, he posits, by placing value on interfaces that recede from view and then embedding them into the environment, forcing the user to "inadvertently, unknowingly or even unwillingly" interact with them.[856] Greenfield continues, stating that by valuing seamlessness over visibility, scholars in the computer science, engineering and to an extent the humanities fields are homogenizing the deeply heterogeneous infrastructure of interfaces and our experiences with them.[857] This homogenization occurs, he says, because "without seams…it's hard to tell where one thing ends and something else begins – points of difference and distinction tend to be smoothed over or flattened out".[858] In short, Greenfield is arguing that discourses describing seamless interfaces are inherently flawed. The rhetoric is dishonest (it claims ubiquitous interfaces are simple and easy to use when in fact they are complex and often inoperable) and paternalistic in nature (it dictates, to an extent, what *will* happen when users interact with technology instead of allowing them a choice). Furthermore, Greenfield believes, by placing value on

[855] Adam Greenfield. *Everyware: The Dawning Age of Ubiquitous Computing.* (Berkely: New Riders, 2006), p. 137-138.
[856] Ibid.
[857] Ibid.
[858] Ibid.

notions of seamlessness, the rhetoric around ubicomp is simplifying and then standardizing deeply complex human and nonhuman processes.[859]

Emerson echoes Greenfield's concerns, applying them directly to the use of ubiquitous interfaces in humanities contexts. To summarize her argument, Emerson suggests that the word invisibility when used in a ubicomp context, and then applied to the interface, is disingenuous.[860] Users, she argues, are told by those working in the computing industry that the invisibility of the interface is a good thing because invisibility denotes accessibility to information that did not exist in previous modes of HCI.[861] Moreover, words like invisibility, Emerson states, are deployed to make users believe that interfaces have "successfully bridged the gap between the human and the computer", and that "the boundary between human and information is eradicated" because the interface they are using "just works".[862]

These claims of eradication, like the term invisibility, she writes, are a myth that the computing industry "rides on as it attempts to convince us that the dream [that the boundary between human and information is eradicated, the gap between the human and the computer is closed] is now reality through sophisticated sleights of hand that take place at the level of the interface".[863] Contrary to what the computing industry would like us to believe, the boundary between the human and information has not been eradicated and the gap between the biological and the technological has not been closed. Nor do users, as Emerson states, have more access to information than they did before, and computers are not more "natural" because we can touch their screens with our fingers.[864] The boundaries and gaps between human and information and the human and the computer, according to Emerson, have only been widened, and more have been created, through notions of invisibility.[865]

I agree with Emerson and Greenfield's critiques of ubicomp provided above. Echoing and then augmenting their critiques slightly, I argue that the word invisibility, when deployed in the context of interactive new media installations and then applied to the digital interface, not only widens the boundary between the human and information and the human and the

[859] Adam Greenfield. *Everyware: The Dawning Age of Ubiquitous Computing.* (Berkely: New Riders, 2006), p. 137-138.
[860] Lori Emerson. *Reading Writing Interfaces: From the Digital to the Bookbound.* (Minneapolis, MN: University of Minnesota Press, 2014), p. 15.
[861] Ibid. By computing industry, Emerson is referring Apple, Microsoft, Google and other tech giants.
[862] Ibid., pp. x-xi.
[863] Ibid., p. xi.
[864] Ibid.
[865] Ibid.

computer, but the word invisibility also denotes finality. And I believe it is this notion of finality that we should be most concerned with, as finality, in a ubicomp context, implies, among other things, inevitability.

While digital interfaces, like most biological and technological entities, have a lifespan, the notion of finality as it is presented to us in texts on ubicomp is of grave concern. It is concerning because it suggests that invisibility is the material and theoretical end-point (for the user, not the designer) in the development of the ubiquitous interface. It implies that there is only *one* final, definitive or "good" version of the ubiquitous interface – the closed, restrictive and predetermined one – and that no major improvements need to be made to its design, just minor tweaks or upgrades. In short, by suggesting finality we are told that invisibility is compulsory – invisible technology will be everywhere and everybody will be using them so we have no choice but to interact with them unless, of course, we have something to hide.

Furthermore, the notion of finality inscribes, to an extent, ubiquitous interfaces, into what Kember and Joanna Zylinska (2012) call a "progressive developmental narrative" of media and technology.[866] By "progressive developmental narrative" of media and technology, Kember and Zylinska are referring to claims made in some texts in the media theory field that media technologies are said to evolve, or progress, in a straight line.[867] When applied to the interface in interactive new media installations, this evolution entails the progression from technical instrument, to symbolic screen, to abstract invisible organism as detailed in chapter 1.

In *Life After New Media*, Kember and Zylinska employ the phrase "progressive developmental narrative" in reference to commentaries on emerging media (iPads, Facebook) created by those in the media and computing sectors.[868] These commentaries, they state, perpetuate, among other things, false divisions and binary and oppositional thinking (old vs. new, subject vs. object, virtual vs. material).[869] Similar sentiments around linear thinking to those made above, they tell us, inform academic arguments around media and technology.[870]

[866] Sarah Kember and Joanna Zylinska. *Life After New Media: Mediation as a Vital Process.* (Cambridge, MA: MIT Press, 2012), pp. 2-3.
[867] Ibid.
[868] Ibid., p. 3. These comments include but are not limited to statements like: "Everything changes when you use an iPad"; "Television makes you a zombie." (Kember and Zylinska, 2012)
[869] Ibid.
[870] Ibid.

Therefore, the aforementioned "progressive developmental narrative," is not only "restricted to *feelings about* new media: it also structures many *ontological conceptualizations of* them".[871] This narrative, and the commentaries on emerging media that it perpetuates, for Kember and Zylinska, are troubling for a number of reasons, most importantly because they: "introduce the question of time into debates on media while simultaneously freezing this question by immediately dividing media time into a series of discrete spatialized objects, or products that succeed one another."[872]

The trajectory of progressive media development narratives, as detailed by Kember and Zylinska above, is evidenced in Weiser's writings on ubicomp and has consequently been projected onto ubiquitous interfaces in interactive new media art installations. For instance, ubicomp is a "next generation computing environment in which each person is continually interacting with hundreds of nearby wirelessly interconnected computers."[873] Technology in this environment will require, as Weiser states, "radically new kinds of computers of all sizes and shapes to be available to each person".[874] Here Weiser is stating in very simple terms that in order for ubicomp environments to succeed, we must radically change the way we think and interact with interfaces, as well as the actual interface itself. For an interface to become a ubiquitous interface, according to Weiser, it must be different than its predecessor, it must be "new". However, stating, as Weiser does, that for ubicomp to work, the interface needs to be "newer", thus better, than its predecessor, implies some difficulties in regards to my theorization of the digital interface in interactive new media installations as an ongoing and dynamic process, as it suggests some sort of ontological end to the digital interface. Furthermore, it suggests that "newness" is the totality of all the interfaces created in the STS and humanities fields as well as all the written texts related to its use. In this way, I argue that Weiser's theory of ubicomp not only promotes chronological narratives of new media, but suggests that a linear change in technology (the move from desktop to ubiquitous computing) will cause a (positive and progressive) change in culture and society.

Reopening the Question of the Interface: Linear Timelines and Finality

In what follows, I will discuss the linear timelines and progressive narratives that theories

[871] Sarah Kember and Joanna Zylinska. *Life After New Media: Mediation as a Vital Process.* (Cambridge, MA: MIT Press, 2012), p. 3. Kember and Zylinska's emphasis.
[872] Ibid.
[873] Mark Wesier. "Some Computer Science Issues in Ubiquitous Computing." *Commun. ACM* 36, 7 (July 1993). Found online at: http://www.ubiq.com/hypertext/weiser/UbiCACM.html
[874] Ibid.

around ubicomp promote, via the notion of finality, through an analysis of the use of the ubiquitous interface in Scott Snibbe's interactive new media installation *Deep Walls* (2002). *Deep Walls* has been called a social cinematic space produced by a creative community, a new and improved way for a new media artist to engage viewers and a demonstration of exciting interactive technologies that will positively affect the way art is made and experienced in the future (Stern (2013), Witton (2005), Paul (2003, 2005), McQuaid (2005), Simanowski (2011)).[875] I agree with some of the conclusions offered above, but my analysis veers from the interpretations of this artwork that position the relationship between the viewer/participant and the ubiquitous interface as linear and stable, and the interaction occurring with it as isolated and determined. I veer from these interpretations, because they are inadvertently perpetuating the chronological and deterministic narratives of new media discussed earlier. This perpetuation is concerning, as these narratives tend to leave things (entities, processes) out that do not fit into the story critics or theorists are trying to tell. In doing this, they foreclose on possibilities for different interpretations, and inevitably erase the subjects, processes and entities that contribute, thus matter, to the interface and interactive new media installations.

I suggest that *Deep Walls* could be seen as way to intervene in the linear and progressive narratives of new media that ubicomp promotes and the consequent deterministic, cause-and-effect interpretations of technology they bring about. *Deep Walls* does this by presenting the viewer/participant with "a projected cabinet of cinematic memories" – one that requires her to interact with multiple timelines (past, present and future) at once.[876] By asking the viewer/participant to act in terms of the past and future, rather than simply the present, I argue that *Deep Walls* has the potential to disrupt linear and progressive narratives of technology by allowing the viewer/participant to intervene in them and create different ones. In this way, I argue *Deep Walls* provides us with a way to counter notions of finality, linear progression, newness and change by reopening the question of the interface.

Deep Walls consists of a computer, a closed-circuit camera and an enlarged rectangular projection screen (the main screen), which is divided into 16 smaller projection screens (the

[875] Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* Canterbury, Uk: Gyliphi Limited, 2013). Roberto Simanowski. *Digital Art and Meaning: Reading Kinetic Poetry, Text Machines, Mapping Art and Interactive Installations.* (Minneapolis, MN: University of Minnesota Press, 2011). Fiona Whitton. "No More Walls" Catalog Essay. (Los Angeles, CA: Telic Gallery, 2005). Christiane Paul. "Reflections of Our Selves – The Art of Scott Snibbe." Catalog Essay. (Los Angeles, CA: Telic Gallery, 2005). Cate McQuaid. "Interactive Works Capture Interplay of Shadows Light." The Boston Globe. June 24, 2005.
[876] Scott Snibbe. *Deep Walls*. (2002). Found online at: http://www.snibbe.com/projects/interactive/deepwalls

smaller screens).[877] The closed-circuit camera records the actions of the viewer/participant moving in front of it. The recorded performance is then transmitted to a computer located in the same space, where it is processed, generating a shadow of the viewer/participant that is projected onto the main screen.[878] (Figure 82)

Figure 82: Scott Snibbe, *Deep Walls*. (2002).

Each of the smaller screens contains pre-recorded performances of previous viewer/participants. These performances are looped and then repeated until a newer recording is available to take its place. When a viewer/participant stands in front of the main screen and moves, a shadow mimicking her actions appears.[879] The shadow lacks any physical detail other than size and shape and is controlled by the viewer/participant. Thus it is the shadow that becomes the digital interface. The shadow overlaps and sometimes obscures some of the action occurring in the smaller screens. Each interaction performed, as Stern states, "is thus suspended, stored and re-involved in one of its comic book-like squares. Each supplants an animation that was there before, put alongside 15 others similar to, but different from, it."[880] The performance that *Deep Walls'* loop of action creates, combined with the fact that there are no other on-screen images for the viewer/participant to control, means that the shadow becomes the initial focus of her attention. (Figure 83)

[877] Scott Snibbe. *Deep Walls*. (2002). Found online at: http://www.snibbe.com/projects/interactive/deepwalls
[878] Ibid.
[879] Ibid.
[880] Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* Canterbury, UK: Gyliphi Limited, 2013), p. 166.

Figure 83: Scott Snibbe, *Deep Walls*. (2002).

After interacting with the work for a short period of time, the viewer/participant's initial fascination with her shadow wears off and she begins to focus on the pre-recorded actions occurring within the 16 squares. The action occurring in the smaller screens provides her with, among other things, instruction. It becomes a visual manual for how she should move in the installation. For example, if the viewer/participant notices that the shadow in one of the squares raises its arm, she may mimic this action by raising her arm. Conversely this movement could be interpreted as a message (from the artist, from somebody else) to stop moving, causing the viewer/participant to cease her actions and leave the installation.

Based on personal observation and experience with *Deep Walls*, the content of the projected performances located in the smaller screens seems to suggest that interaction with the piece is seen by the current viewer/participant as a visual message, left by past viewer/participants, for future ones to view or interact with. For example, the current viewer/participant might discover previously recorded performances located in the small screens where shadows address the audience directly (waving their hands), or address each other (two shadows located in parallel squares getting into fights or dancing). (Figures 84 & 85)

Figure 84: Scott Snibbe, *Deep Walls*. (2002).

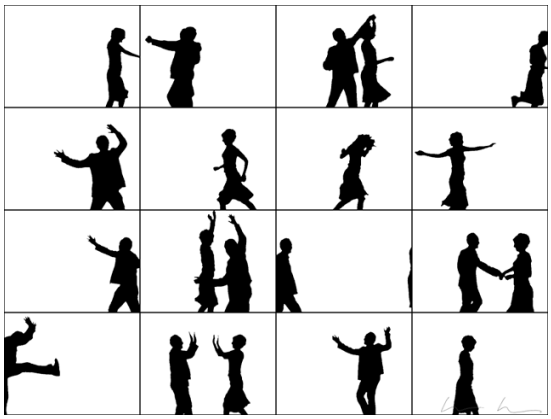

Figure 85: Scott Snibbe, *Deep Walls*. (2002).

Deep Walls then not only requires the viewer/participant to interact with the other entities who are presently located in the same space, but the addition of the performances in the smaller screens enables her to interact with the installation in terms of the past (with or against pre-recorded images), the present (with others located in the same space at the same time) and the future (recording a performance in order to communicate with somebody in the future, or thinking about her actions in terms of their deletion and replacement). Both Stern and Simanowski echo my sentiments in their analysis of the work. Even though users, Simanowski argues, "do not have specific addresses in mind, the movies generated suggest that users understand this interactive installation as an arena where they can stage filmic messages for subsequent users."[881] The visual messages that current users leave for future ones, Stern suggests, are "artifacts of the past, of those who have passed through the space, the shadows are a part of our present, and our presence as we engage with them again".[882]

Building on Stern and Simanowski's interpretations, I argue that *Deep Walls* can be theorized, in terms of Marshall McLuhan's (1964) notion of "all-at-onceness"; that is, a rejection of thinking of technology as a series of orderly, determined and linear progressive developments, to an emphasis on the interconnectedness between, and extension and expansion (rather than isolation or invisibility) of, the human and their interactions with technology.[883] A McLuhanite emphasis on technology as an extension of man is important to

[881] Roberto Simanowski. *Digital Art and Meaning: Reading Kinetic Poetry, Text Machines, Mapping Art and Interactive Installations.* (Minneapolis, MN: University of Minnesota Press, 2011), p 142.
[882] Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* Canterbury, UK: Gyliphi Limited, 2013), p. 169.
[883] Marshall McLuhan. *The Gutenberg Galaxy: The Making of Typographic Man*. (Toronto, CA: University of Toronto Press, 1962), p. 63.

my conceptualization of the ubiquitous interface, because it enables me to counter notions of finality, progression and newness that ubicomp theories promote. Thus it enables me to suggest that the relationship between computation, the interface and aesthetics is a dynamic, temporal and performative unfolding, rather than a purely instructional or representational event.

Kember and Zylinska seem to confirm this argument, writing that the McLuhanite notion of "all-at-onceness" poses a challenge to "many forms of conventional media analysis – in which problems such as technology, use, organization and production are frequently studied in isolation".[884] It poses a challenge, they state, because: "It is not simply the case that 'we' – that is, autonomously existing humans – live in a complex technological environment that we can manage, control and use. Rather we are – physically and hence ontologically – part of that technological environment."[885] Thus they conclude: "If we take this process of technological extension seriously enough – not just on the level of theoretical argument, but also through our experiential being with technologies and media…we are obliged to recognize that we human users of technology are not entirely distinct from our tools."[886]

If we take this to be the case, then *Deep Walls* is more than a demonstration of exciting ubiquitous technologies that will positively or negatively affect the way art is made and experienced in the future. I argue that by allowing the viewer/participant to intervene in, and disrupt via creative play, the progressive narratives of new media, *Deep Walls* allows her to create, to an extent, different, non-linear ones. In this way, *Deep Walls* becomes a liminal space. By liminal space I mean the installation becomes an area of social exploration, enabling the viewer/participant to separate, for a temporary period of time, the human and nonhuman entities that congregate there, only to mix them back together again through acts of unconscious and conscious questioning. *Deep Walls* becomes an area where the narratives and myths that theories of ubicomp promotes can be explored, critically questioned, redefined, repositioned and reconfigured by the viewer/participant(s) participating in it.

"You are the Controller": The Instrumentalization and Commodification of the Ubiquitous Interface

The digital interface in interactive new media installations is a threshold; an open-ended and

[884] Sarah Kember and Joanna Zylinska. *Life After New Media: Mediation as a Vital Process.* (Cambridge, MA: MIT Press, 2012), p. 13.
[885] Ibid.
[886] Ibid.

generative process that consists of multiple, co-constitutive agencies. What an interface should do, Emerson states, is "grant access, it also inevitably acts as a kind of magician's cape, continually revealing (mediatic layers, bits of information, etc.) through concealing and concealing as it reveals".[887] Ubiquitous interfaces, she tells us, do the exact opposite – they obscure more information from the user than they actually reveal.[888] The obfuscation of information on behalf of interfaces, Emerson argues, is done deliberately.[889] For instance certain information (functions, technical make-up), she states, is purposefully hidden from the user. This concealment of information is rationalized by those in the computing industry who create and market ubiquitous interfaces "in the name of 'invisibility' and the 'user-friendly' with what's fast becoming an ideology."[890] Emerson clarifies her use of the word ideology, writing: "I use *ideology* not merely in the sense of the adamant belief in making the computer more approachable but more in the sense that *user-friendly* is used quite deliberately to distort reality."[891] This clarification, for Emerson, is important because she is making the argument that the computer industry deploys the words "invisibility" and "user friendly" with the specific intention of convincing users that a very particular version of a ubiquitous interface is "inherently better".[892] Invariably this version is one that relies on and then promotes to the point of celebration the fact that its inner workings are closed-off and imperceptible to the user.

The conflation of the words invisibility and user-friendly with imperceptibility is highly problematic because it alienates, as Emerson states, the user from the underlying computational processes of the device. This alienation occurs, Emerson writes, because the user is denied access to the underlying workings of the device.[893] Building on Emerson, I will suggest that the concealing or "black-boxing" of computational processes forecloses on change, consequently resulting in a very limited, thus highly questionable, concept of ubicomp, aesthetics and the interface in general. I maintain that this approach instrumentalizes the digital interface, reducing it and its multifunctional and generative

[887] Lori Emerson. *Reading Writing Interfaces: From the Digital to the Bookbound.* (Minneapolis, MN: University of Minnesota Press, 2014), p. x.
[888] Ibid.
[889] Ibid.
[890] Ibid., p. xi
[891] Ibid. Emerson's emphasis.
[892] Ibid.
[893] Ibid.

processes and agencies into a tool for consumption, rather than creation of aesthetic and cultural content.

The digital interface however has always been and, to an extent, will always be, a technical device. As stated in the introduction, the word "interface" refers to the point of interaction and communication between two or more entities, usually a technical device and its human user. Furthermore, interfaces have always been, to an extent, a commodity – that is, something of value that can be bought, sold or traded. If the digital interface has always been a highly saleable technological device then what exactly is the problem with the instrumentalization and commodification of the ubiquitous interface?

The problem, I argue, is that texts on ubicomp claim that the user interacts with ubiquitous technologies through "natural" interfaces (Johnson (1997); Vertegaal & Poupryrev (2008); Saffer (2010)).[894] By natural interfaces, these texts are referring to the physical gestures (waving an arm, clapping a hand) and spoken commands (turn on, turn off) that the user makes. These gestures however are not natural, but naturalized. This point is made clearer if we return to Lynn Hershman Leeson's interactive new media installation *America's Finest* (1993-4) discussed in the previous chapter.[895] (Figures 54-57)

The interface in this installation – an M-16 rifle – is programmed to recognize and then reward "normal" actions that somebody would make with a rifle (pull the trigger) and ignore those located outside of the pre-set selection.[896] The viewer/participant can do anything she wants with the interface, but she will not see an image unless she performs the prescribed, or normal, action of the object. She must pull the trigger of the gun. In this example, the "thing" being instrumentalized and commodified is not a technical device (the rifle, a computer) or some ephemeral quality of a human being that we deem to be valuable (creativity). Furthermore, despite the fact that the rifle is part of an artwork that has monetary worth, the rifle is not the thing that has value in this particular context, thus it is not the thing being commodified. I argue that the thing being instrumentalized and commodified is the viewer/participant and her movements. This is because the thing being rewarded in *America's*

[894] These claims are then echoed by critics and engineers working outside of academia like Daniel Terdiman, who in December, 2011 wrote an article for CNET titled "IBM: Mind reading is less than five years away. For real." The article echoed claims made by IBM about how ubicomp devices are so powerful that they will allow us to read each other's minds. (Terdiman, 2011) Found online at: http://www.cnet.com/uk/news/ibm-mind-reading-is-less-than-five-years-away-for-real/

[895] Lynn Hershman Leeson. *America's Finest.* (1993-4) Found online at: http://www.lynnhershman.com/americas-finest

[896] Ibid.

Finest is the viewer/participant's ability to perform the prescribed actions (pull the trigger of the gun).

Given this, I posit that the instrumentalization of the digital interface is not just a question around the commodification of a singular technical device or an issue of information (movements and gestures and the visuals they bring about) becoming an object or a thing, but rather of the normalization and commodification of individual users and their behaviors. Put in simple terms, the "thing" being turned into a valuable object and subsequently sold to the highest bidder in a ubicomp context is not the interface, but the human being. This is because the human is positioned as the means of interaction, translation and navigation in the space they are located in. She *is* the digital interface in these installations, and is consequently described as such in the texts that surround them. How this occurs is best explained by way of example.

In November 2010, Microsoft revealed a new interface to the general public: the Kinect.[897] On their website, Microsoft describes the Kinect as a device that "gets everyone off the couch. Moving, laughing and cheering".[898] The Kinect consists of a webcam-style, black-boxed peripheral interface which enables users to interact with computers with their bodies (moving a limb, speaking) rather than with a visible, hardware-based controller.[899] As Microsoft puts, it, the Kinect: "brings games and entertainment to life in extraordinary new ways with no controller required. Simply step in front of the sensor and Kinect recognizes you and responds to your gestures."[900] Microsoft goes on to celebrate this device that is "inspiring", "extraordinary", "natural" and "controller-free" (the words "natural" and "controller-free" repeated at least six times on one page).[901] Most telling, however, throughout their website, Microsoft explains that the Kinect "could quite conceivably pave the way for new developments in human/computer interaction", that it can "transform how people interact with technology" and that it "enables the creation of real solutions" including,

[897] Kinect. Found online at: http://www.xbox.com/en-GB/Xbox360/Accessories/kinect The Kinect is a line of interfaces for the X-Box and Windows PC's. Microsoft markets the Kinect as a device that "gives computers eyes, ears, and a brain." These aspects according to Microsoft, allow its customers to: "interact naturally with computers by simply gesturing and speaking".
[898] Ibid., Found online at: http://www.xbox.com/en-GB/Xbox360/Accessories/kinect, https://www.microsoft.com/en-us/kinectforwindows/, https://www.microsoft.com/en-us/kinectforwindows/business/default.aspx
[899] Ibid., Found online at: http://www.xbox.com/en-GB/Xbox360/Accessories/kinect
[900] Ibid., Found online at: http://www.xbox.com/en-IN/Xbox360/Accessories/Kinect/kinectforxbox360
[901] Ibid., Found online at: https://www.microsoft.com/en-us/kinectforwindows/business/default.aspx

but not limited to, helping users "explore their creativity".[902] This subtle reminder that ubiquitous technology has supposedly eradicated the boundary between the human and the computer by transforming how people interact with technology is echoed in Microsoft's 2009 concept announcement for project natal (the codename Microsoft used for the Kinect while under development) and their 2011 television ad for Xbox Kinect.[903]

The 2009 concept announcement begins by reminding the viewer that the Kinect is "new" and "controller free". We then see a teenage boy, walking past a television set in his living room. Located on the television set is an avatar. The avatar senses the boy's presence and addresses him by name. Upon hearing his name, the boy stops, turns his full attention to the television and begins to play a video game, sans controller. As the boy moves his arms and legs, the avatar does the same.[904] Here Microsoft is clearly positioning the human body, the boy, as interface. This is because the boy, according to Microsoft, is able to navigate the video game and engage with the visual information presented to him. In case we were not convinced, the words "You Are the Controller" appear on-screen while the boy plays.[905] (Figures 86 & 87)

Figure 86: Microsoft, *Project Natal.* (2009)

[902] Microsoft. Found online at: https://www.microsoft.com/en-us/kinectforwindows/business/default.aspx
[903] Microsoft. *Project Natal Xbox 360 Announcement*. 2009. Found online at: https://www.youtube.com/watch?v=p2qlHoxPioM Microsoft. *Xbox Kinect Commercial.* 2011. Found online at: https://www.youtube.com/watch?v=QjjkqBLRALo
[904] Ibid., Found online at: https://www.youtube.com/watch?v=p2qlHoxPioM
[905] Ibid.

Contrary to Microsoft, the boy, I suggest, is not the digital interface in this context, rather his on-screen avatar is. For, as mentioned above, when the boy moves his arms and legs, the avatar mimics him. In this way, the avatar, not the boy, is the interface in this specific context. This is because the avatar is acting as a mediator between entities (the boy, the on-screen images) and it allows the boy to navigate, communicate and engage with information.

Figure 87: Microsoft, *Project Natal.* (2009)

Moreover, the Kinect, I argue, is not controller free. Although it may seem like the boy is making the on-screen visuals appear, it is the Kinect itself that makes this happen. The Kinect consists of a series of webcams, microphones, motion sensors and software located inside its black box.[906] This hardware and software has the ability to recognize and process a limited set of verbal and gestural commands that then appear as actions on-screen.[907] The viewer, however, is never told that this is how the Kinect works, or what the interface is. Rather, controller-free, full-body interaction just happens. The phrase "you are the controller" is repeated in various iterations ("controller free", "full body scanning", "use your whole body") at least five times throughout the three-minute video in order to reinforce this point.[908] The video then cycles through all the fun things users can do with the device (young boys can be Godzilla, teenage boys can skateboard, teenage girls can play dress-up, adults can watch

[906] Kinect. Found online at: https://www.microsoft.com/en-us/kinectforwindows/develop/default.aspx
[907] Ibid., Found online at: https://www.microsoft.com/en-us/kinectforwindows/business/default.aspx
[908] Microsoft. *Project Natal Xbox 360 Announcement*. 2009. Found online at: https://www.youtube.com/watch?v=p2qlHoxPioM

movies) briefly pausing to tell the viewer about its interesting new features – specifically the fact that it is controller free.[909] (Figures 88 & 89)

Figure 88: Microsoft, *Project Natal.* (2009)

Figure 89: Microsoft, Project Natal. (2009)

This is exactly where the obfuscation of information, or as Emerson calls it "the magic", happens – through the supposedly invisible and the everyday.[910] The Kinect's outer packaging (which is minimalist, sleek and black) and the device's marketing rhetoric are crafted to make it look special and enticing, yet accessible and user-friendly. Microsoft does this, I argue, in the hopes that the user will willingly suspend disbelief and accept the impossible: that they will buy into the aforementioned claims around the naturalness and

[909] Microsoft. *Project Natal Xbox 360 Announcement*. 2009. Found online at: https://www.youtube.com/watch?v=p2qlHoxPioM
[910] Lori Emerson. *Reading Writing Interfaces: From the Digital to the Bookbound.* (Minneapolis, MN: University of Minnesota Press, 2014), p. 14.

newness of the HCI Microsoft purports is occurring, regardless of their actual experience with the Kinect. The suspension of disbelief on behalf of the user, Emerson states, is akin to the way an audience reacts to a magic show.[911]

The audience attending a magic show, she writes: "wants to be amazed by feats that are seemingly impossible."[912] Their amazement, according to Emerson, depends on two key interdependent factors: "They must believe that the magician's assistant is not being sawed in half or that a dove is not actually being turned into a handkerchief, and yet they must remain in the dark (literally and figuratively) about exactly how the trick works."[913] The same logic, I posit, is at work in the Kinect. The user wants to be amazed by seemingly impossible feats (the eradication of the boundaries between the human and technology and the human and information) and then actually do the impossible (control technology with a wave of their hand). Their amazement and consequent participation in this magical feat, however, relies on two interrelated components: the user must believe that Microsoft's claims around HCI are *not* true (and to an extent they do, as they are physically hooking the Kinect up to their televisions or computers and then interacting with on-screen information via an avatar) and they must remain in the dark about how exactly the device works, and to an extent they are. Microsoft never explains how the Kinect actually works to the average user.[914]

The 2011 television ad for the Kinect is essentially the same as the concept announcement with two modifications: the first is that the 2011 ad contained no spoken words and very few text-based elements. Unlike the 2009 announcement, Microsoft no longer feels the need to convince users that their body is the interface. The user's body simply *is* the interface. In this way, it could be argued that the user's body is treated like an object, packaged up with the technological device and sold back to them for a price. The instrumentalization and commodification of the body is reflected by the fact that the phrase "you are the controller" is no longer repeated over and over again. Instead this phrase is now treated, by Microsoft, as an indisputable fact, something users already know and must tacitly accept if they want to use the Kinect.

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[911] Lori Emerson. *Reading Writing Interfaces: From the Digital to the Bookbound.* (Minneapolis, MN: University of Minnesota Press, 2014), p. 14.
[912] Ibid.
[913] Ibid.
[914] I say average user because the software that allows the Kinect to run is open source. For more information on how the Kinect works, see: https://www.microsoft.com/en-us/kinectforwindows/develop/default.aspx

The second modification revolves around notions of creativity – notions that were seemingly non-existent in the 2009 announcement. For example, the 2011 ad featured a family putting on a digital shadow puppet show. They have made a shape of an elephant with their bodies in their living room. This shape is reflected on-screen.[915] (Figure 90)

Figure 90: Microsoft, *Kinect Ad*. (2011).

Instead of the shape appearing on a television set in a living room, it appears on a canvas in a virtual artists' studio. The family is then allowed to get creative. If used correctly, the Kinect offers to turn the family into artists by letting them paint the shape that they created. The family does this by "throwing" grey paint on the elephant-like shape. They are then rewarded for their creativity: their picture is placed in front of a landscape background and the phrase "Work of Art!" is overlaid on top of it. The family can then save their 'Work of Art!' in a photo album application and/or share it with their friends.[916] (Figure 91)

Figure 91: Microsoft, *Kinect Ad*. (2011).

[915] Microsoft. *Xbox Kinect Commercial.* 2011. Found online at: https://www.youtube.com/watch?v=QjjkqBLRALo
[916] Ibid.

This specific part of the 2011 ad is telling in that it reveals an inconsistency hidden in Microsoft's claims around the Kinect and HCI – one that echoes, and then expands upon the inconsistencies in the foundational papers exposed above. Like Weiser's claims around ubicomp, Microsoft claims the Kinect is focused on us and our interactions with technology. Given their humanist focus, the Kinect, according to Microsoft, is a creative device, one that implies active learning and making. After all, it is the user, not technology that is creative. The Kinect just aids in, among other things, the creation of an open-ended, participatory and user-centric experience.

This claim is reinforced on their website: The Kinect allows you to "unleash your creativity".[917] Based on the action occurring in the advertisement, however, creativity with the Kinect, from within a gaming environment, is not an open-ended, participatory and user-centric process. It does not denote the creation or production of content. Nor has it transformed how people interact with technology, thus enabling users to "unleash their creativity" as I lay out above. Instead, I suggest that the type of creativity Microsoft is promoting, is a restrictive, flat or two-dimensional version that amounts to little more than the consumption and surface-level manipulation (via surface-level changes or flipping through pre-programmed settings) of predetermined textual, audio-visual and algorithmic based content that is exploited by Microsoft, repackaged and then sold back to its users for profit.

Microsoft exploits this content in multiple ways: they do it subtly, by releasing the code as "open-source" and then selling access to the community of makers, that Microsoft has deemed "creative" back to its users (inaccessibility becomes exclusivity in this example); and they do it blatantly, by directing content creators to webpages, via drop-down windows titled "monetize" and "publish" which provide detailed instructions on how to sell user-created content and by placing watermarks on user-generated images.[918] In this way, I argue,

[917] Kinect. Found online at: https://dev.windows.com/en-us/games

[918] Microsoft. Found online at: Found online at: https://developer.microsoft.com/en-us/windows/kinect and https://developer.microsoft.com/en-us/store/monetize Every Kinect includes a software development kit. This kit is located on Microsoft's website and is free to the public. It includes tutorials and downloads that help users create content. It also includes a link to an area titled "community additions". The community additions section allows users to connect with and help others and share the work they are creating with "the world". The tutorial sections of the development kit are available to the public. The "community additions" are only accessible to those with a Microsoft Kinect login. Located on the same page is a drop-down menu titled "Docs". Clicking on this menu allows users access to different areas of the website. These areas relate to other Microsoft products (apps, games). The tabs describing these areas contain their own menus, which include words like "monetize,"

Microsoft has not only instrumentalized the user and their consequent actions by turning them into an interface ("you are the controller") it has co-opted the term "creativity", commodified and then exploited it, turning it into a term that is leveraged to drive profit.

The instrumentalization of the ubiquitous interface and the resulting commodification of human beings and aesthetic content, as mentioned in the introduction to this chapter, raises questions around artistic experimentation: namely artistic experimentation by new media artists, with ubiquitous interfaces in interactive new media installations. For example, companies like Microsoft are co-opting experimental ubiquitous interfaces that were developed for interactive new media art installations in the early 1990s for capitalistic purposes.[919] These interfaces have become commercial products and are marketed to users, as detailed above, as "innovative", "creative" and "natural". While their technical make-up is similar, the commercial interfaces discussed above differ enormously, on practical, creative and theoretical levels, from those created for interactive new media installations in the early 1990s. They differ on a practical and creative level in the sense that the normal roles for computers at that time, as Penny (2013) tells us, "did not call for such interfaces".[920] All that was required (and, to an extent available to the general public) to interact with a computer were mice, keyboards and joysticks/video game controllers. While not necessarily new, the interfaces created for interactive installations were novel – specifically in terms of what the viewer/participant could actually achieve (physically contribute to the creation of a virtual environment without high-level technical knowledge) and the type of interaction afforded to them (unencumbered, full-bodied interaction in immersive, (semi)virtual environments).[921]

Interfaces created for interactive installations differ from commercial interfaces on a theoretical level in the sense that the interfaces of the early 1990s were developed and then deployed to combat and sometimes attempt to correct, as Penny argues, "the notion of the (computational) virtual and the confused rhetorics of virtuality" attached to media and technologies like virtual reality and the Internet.[922] The 1990s, Penny writes, saw an

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"promote," and "publish". Clicking on these links takes the user to webpages where they can sell their content. (Microsoft, 2016)

[919] The interfaces I speak of have been created by artists discussed throughout this thesis such as Rokeby, Shaw, Feingold, Penny and Hershman Leeson.

[920] Simon Penny. "Trying to Be Calm: Ubiquity, Cogntivism, and Embodiment." in *Throughout: Art and Culture Emerging with Ubiquitous Computing.* ed. Ulrik Ekman. (Cambridge, MA: MIT Press, 2013), p. 263.

[921] Ibid.

[922] Ibid. By 'rhetorics of virtuality', Penny is referring to claims surrounding the disembodiment of the subject and information in virtual environments discussed in Chapter 2.

"explosion of creative research in interactive and immersive art".[923] This explosion, he states, was fueled by the availability of affordable domestic, computer-based media technologies, the burgeoning rhetoric of cyberculture and the utopian and dystopian narratives that followed it.[924] Given this, new media art, he writes, became "a highly charged vortex" for the development of interfaces "as the traditional commitment [of the fine arts] to material immediacy and finely crafted sensorial effect abruptly confronted a technology framed as abstract immaterial manipulation of information".[925] In this way, the reconciliation of "the sensibilities of arts practices and the capabilities and constraints of emerging computational media technologies" was, as Penny explains, just as important to new media artists, if not more important than a technical exploration of new technology itself.[926]

Since then, ubiquitous interfaces that mimic those created by new media artists for interactive new media installations have been developed and are for sale by commercial entities, like Microsoft, Google and Apple. However, their reliance on, in Penny's words: "virtual reality's stock-in-trade tracking and simulation techniques indicates that ubiquitous computing is less the kind of antithesis of virtual reality that Weiser envisaged and more of a continuity."[927] Thus, the co-option and consequent commercialization of experimental ubiquitous interfaces by the computer industry, Penny argues, has had the effect of reintroducing rhetoric surrounding "the virtual" into discussions around media and technology.[928] In doing this, commercial ubiquitous interfaces like the Kinect perpetuate the exact same narratives about the digital interface that new media artists in the 1990s were attempting to correct. In particular those around disembodiment as perpetuated by science fiction writers and other scholars.[929]

The disembodiment that this rhetoric promotes remains one of the principal concerns raised by ubiquitous interfaces, which have, as demonstrated above, become so small and inexpensive that they can be embedded into a wide variety of objects and spaces. More subtle, however, are the effects that the ubiquitous interface may have and the role that it may

[923] Simon Penny. "Trying to Be Calm: Ubiquity, Cogntivism, and Embodiment." in *Throughout: Art and Culture Emerging with Ubiquitous Computing.* ed. Ulrik Ekman. (Cambridge, MA: MIT Press, 2013), p. 263.
[924] Ibid., p. 265.
[925] Ibid.
[926] Ibid.
[927] Ibid. p. 263.
[928] Ibid.
[929] See Morevec (1988); Gibson (1981, 1984, 1986, 1988); Wiener (1948, 1952); Keller (1992); Doyle (1997). Hayles (1999) provides a thorough discussion of the notion of disembodiment and dispels this myth in her text *How We Became Posthuman*.

play in creating, in Hayles' (2011) words, "an animate environment with agential and communicative powers".[930] Hayles continues, arguing that issues that have been raised around the effects ubiquitous technologies may have "are primarily epistemological (who knows what about whom)."[931] However, the "political stakes" of these environments, she states, encompass much more, including "the changed perceptions of human subjectivity in relation to a world of objects that are no longer passive and inert".[932] Thus, she concludes, the questions raised around ubiquitous technologies are not only confined to epistemological concerns, but they envelop ontological issues as well.[933]

For example, the Kinect, as a ubiquitous interface, operates not only in the realm of commercial gaming and computer science practices as in the sensing, recording and identification of humans, but also in what Hayles, borrowing Nigel Thrift's terminology, calls the "technological unconscious".[934] The Kinect operates in this way, I argue, by working in subtle ("you are the controller") and not-so-subtle ways ("the Kinect transforms how people interact with technology") in an attempt to change the relationship between the human, technology and space. Epistemological concerns about ubiquitous interfaces, like surveillance and privacy (i.e. "who knows what about whom"), Hayles writes, can and are being addressed by both new media artists and theorists through strategies and tactics like regulation, informed consent, circuit bending or critique.[935] Ontological issues, such as to what extent human subjectivity and bodies are being reconfigured by ubiquitous technologies, she tells us, are much more difficult to understand and address.[936] Thus our reaction to them, she writes, mostly exists on the level of resistance (how do we stop this from happening/becoming the norm?).[937] However, she states, if our reactions to the concerns ubiquitous technologies raise remain solely on the level of resistance – as important as that reaction may be – we "lose the opportunity to seize the initiative and explore the technologies potential for shedding the burden of long-held misconceptions about cognition and moving to a more processual, relational and accurate view of embodied human action in

[930] N. Katherine Hayles. "Radio-Frequency Identification: Human Agency and Meaning in Information-Intensive Environments." in *Throughout: Art and Culture Emerging with Ubiquitous Computing.* ed. Ulrik Ekman. (Cambridge, MA: MIT Press, 2013), p. 503.
[931] Ibid. In Hayles case these technologies are RFID tags. In the case of this thesis, these technologies are ubiquitous interfaces.
[932] Ibid.
[933] Ibid.
[934] Ibid., p. 505.
[935] Ibid., p. 503.
[936] Ibid., p. 505.
[937] Ibid.

complex environments".[938] Following on from Hayles, I argue that the challenge that ubicomp presents to us is how to use its potential as an interface in positive and constructive ways while still remaining critical of it. Since the context in which this challenge presents itself to us is interactive new media installations, the question is: how might an investigation into the deployment of ubiquitous interfaces in interactive new media installations help us find alternative routes into, and different ways of thinking about and using, ubiquitous technologies in non-aesthetic realms?

One way that an investigation like this may help, as Hayles points out, is that it enables us to start to unravelling and understanding the concerns and issues around ubiquitous technologies on a deeper level.[939] For example, Hayles writes, fictional representations of ubiquitous technologies, engage us, "on other levels… including embodied affectivity and the unconscious".[940] They do so, she posits, because these depictions "always mean more than they explicitly state", and in doing this "they can address ontological questions as well as epistemological issues".[941] I suggest that new media artist Brian Knep's *Healing Pool* (2006-8), could provide us with one alternative route into addressing the questions and concerns raised by Hayles.

Installed in the Milwaukee Museum of Art in 2008, *Healing Pool* is a large-scale interactive new media installation, consisting of multiple closed-circuit cameras, projectors, computers and a horizontal projection surface.[942] The projection surface is located on the floor and takes up most of the gallery space. The surface is covered from edge-to-edge with neon yellow, cell-shaped patterns. The patterns are generative – they are, to an extent, constantly reproducing themselves – so *Healing Pool* has no evident start or end. There is no perceived finality. Left alone, these patterns slowly pulsate and shift throughout the course of each day. When a viewer/participant walks across the projection surface, the patterns tear apart, revealing a trail of orange spaces or "wounds". (Figures 92 & 93)

[938] Ibid., p. 503.
[939] N. Katherine Hayles. "Radio-Frequency Identification: Human Agency and Meaning in Information-Intensive Environments." in *Throughout: Art and Culture Emerging with Ubiquitous Computing.* ed. Ulrik Ekman. (Cambridge, MA: MIT Press, 2013), p. 505.
[940] Ibid.
[941] Ibid.
[942] Brian Knep. *Healing Pool.* (2008). Found online at: http://www.blep.com/works/healing-series/healing-pool/

Figure 92: B. Knep, *Healing Pool*. (2006-8).

Figure 93: B. Knep, *Healing Pool*. (2006-8).

Placing an object on the projection surface, or standing still produces a similar effect – a gaping orange hole appears. After a certain period of time, the patterns rebuild or "heal" themselves.[943] The healing process does not restore the patterns to their previous, untouched state. It creates "scars" on the surface of the work. [944] The exact location of these scars is based on the placement of an object, or the trajectory of the viewer/participant walking across it. The more viewer/participant interaction builds, the more scars appear, altering the visual appearance of the piece. Since the viewer/participant must walk across the patterns on the floor to reveal the full nature of the artwork, the digital interface, I argue, is her body.

[943] Brian Knep. *Healing Pool.* (2008). Found online at: http://www.blep.com/works/healing-series/healing-pool/
[944] Ibid.

It is imperative at this point to address what could arguably be seen as a contradictory designation of the interface. My designation of the viewer/participant's body as interface in *Healing Pool* could be said to contradict my earlier argument around the designation of the user's body as interface in the Kinect. To recap this argument: contrary to Microsoft's claims, the avatar of the user and not the user's body, is the interface in the Kinect. I argued as such because the avatar, not the user, is acting as a mediator between entities and allowing the user to navigate, communicate and engage with audio-visual information. The difference in my designation of these two examples lies in the deployment of the interface, its exact purpose and positioning (Is it an object? a threshold? Does it mediate? translate? facilitate?) as well as how the relationship between computation, aesthetics and the interface is staged by the artist and performed by the viewer/participant in space (Is it relational, processual, entangled? Or is it determined and closed?).

Should we make the mistake of confusing the staging of the relationship between computation, aesthetics and the interface *Healing Pool* presents to its users for the one Microsoft presents to theirs (appreciation and consumption of beautiful moving images), we learn that the purpose of *Healing Pool* is to provide, as Knep states, a space within which "interactions – among people, between people and the piece, between people and the space they occupy" occur.[945] Here, Knep's emphasis is on relationships between entities and the interaction that these relationships beget. Just as important to *Healing Pool* as its visual aesthetics, then, is the viewer/participant's relationship with technology – specifically how her conscious and unconscious interactions with the interface (her body) can alter, to an extent, the artwork. Rather than trying to erase the interface all together via false notions of invisibility, creativity and control as evidenced above via the Kinect, what is important in *Healing Pool* is the interface – that is, the viewer/participant, her interactions and her creative experience within the installation. In other words, by placing importance on relationships, Knep is emphasizing the experience and expression of the medium and the interface. He does this by making the alterations to the piece that the viewer/participant creates, visible to her. Thus notions of artistic production and creation can begin to shift away from representationalist modes of thinking and cybernetic modes of interacting, to a more performative and experiential exploration of, and reflection on, the possibilities and potentialities of the interface on behalf of the viewer/participant.

[945] Brian Knep. *Healing Pool.* (2008). Found online at: http://www.blep.com/works/healing-series/healing-pool/

Emerson argues that a move away from representation to performance is important when analyzing ubiquitous interfaces as it "works against the hermeneutic tradition [as it is applied in literature], for rather than peel away layers of meanings to arrive at an interpretation, critics have very little choice but to simply describe the unfolding experience".[946] By requiring the critic to describe the experience, Emerson contends attention (of the critic, and I would argue of the viewer/participant) "is turned to the poetic process itself" resulting in an emphasis on the letters and words and the viewer's interactions with them.[947] While related to the ubiquitous interfaces and its use in digital texts and text-based installation art, Emerson's theorization of the interface as both medium and relational poetic process assumes a particular importance in the context of *Healing Pool*.[948] This is because her emphasis on processuality (of the viewer's interactions and the media theorists critique of these interactions) and medium specificity (of the interface), moves us slightly closer towards exploring the ontological effects that ubiquitous technologies may or may not have – specifically Hayles' question above around the extent to which human subjectivity, human bodies and our relationship with technology are being reconfigured.

As mentioned earlier, when the viewer/participant walks diagonally across *Healing Pool's* surface, the patterns split apart. After a certain period of time, the trail knits itself back together, creating visible scars. The more the viewer/participant moves, the more scars she creates. These scars, Knep states, "form a memory of all the interactions that have occurred".[949] Thus, *Healing Pool* "becomes a map of [viewer/participant] movement in space" one that is not only visible to those located in the installation space, but one that they can physically change, to an extent, as well.[950] In this way, I argue that *Healing Pool* does what the Kinect does not: it enables the viewer/participant to "explore her creativity" by allowing her to become "the controller" of the action occurring in the artwork. It does this by simply making the effects that the viewer/participant's embodied interactions have on the artwork visible. By becoming visible, the viewer/participant has the opportunity to begin to critically explore the effects that her interactions with ubiquitous technology may have on the artwork as well as recognize connections between her movements and the movements of others. In other words, emphasis in *Healing Pool* is on viewer/participant movement and

[946] Lori Emerson. *Reading Writing Interfaces: From the Digital to the Bookbound.* (Minneapolis, MN: University of Minnesota Press, 2014), p. 21.
[947] Ibid., pp. 21-22.
[948] Ibid.
[949] Brian Knep. *Healing Pool.* (2008). Found online at: http://www.blep.com/works/healing-series/healing-pool/
[950] Ibid.

experience, not on the response of the machine. Since emphasis is placed on the viewer/participant's experience rather than the end-product of her actions, as it is in the Kinect, I suggest that viewer/participant interactions in *Healing Pool* could be seen as performative artworks themselves. Furthermore, by emphasizing notions of performativity, processuality and visibility, I argue that Knep opens up a space, in *Healing Pool,* for viewer/participant intervention via critical reflection – one in which the viewer/participant can think seriously about her experience with the work, the consequences that her alterations have on the surface of the patterns and how these alterations effect the other entities around her.

"A Radically New Tool": Interactivity and the Aesthetics of the Ubiquitous Interface

The examples of ubiquitous interfaces that I have discussed so far describe, to an extent, distinct, physical objects. They are singular things (a shadow, an avatar), commercialized products (the Kinect) or biological entities (human bodies). Ubicomp however is not just about the subject's interactions with a tangible object for some definite purpose (although sometimes it can be). It concerns the subject's conscious and unconscious engagement with multiple, networked computational systems as well. Given this, things like the Internet, RFID tags and motion-sensor lighting systems can be considered ubiquitous interfaces. They can be considered as such because ubicomp is, as Greenfield writes: "a distributed phenomenon: The power and meaning we ascribe to it are more a property of the network than of any single node."[951] Thus, ubicomp, he concludes: "isn't so much a particular kind of hardware, philosophy of software design or set of interface conventions as it is a situation – a set of circumstances."[952] In this way, Greenfield argues ubicomp is less of an instrumental black-boxed technology and more of a conceptual process – one that is linked "not merely by a technical armature, but by a set of assumptions about the proper role of technology".[953] Here, Greenfield is suggesting that ubicomp is less of a unified theory and more of a series of theoretical assertions – semi-prophetic futuristic visions about what it should be and its function and purpose in our lives.[954]

Greenfield's theorization is important to this chapter as he positions notions of ubicomp and the interfaces that it creates, first of all as a problem, by referring to ubicomp as a set of

[951] Adam Greenfield. *Everyware: The Dawning Age of Ubiquitous Computing.* (Berkely: New Riders, 2006), p. 16.
[952] Ibid., p. 31.
[953] Ibid., p. 32.
[954] Ibid., p. 16.

prophetic assertions. As such, ubicomp could be understood with reference to the digital interface and interactive new media installations as performative. I say performative because ubicomp is a futuristic, ongoing and open-ended project that in its current iteration is surrounded by techno-determinist assumptions about human and nonhuman behaviors. Specifically how interfaces *should* be, how they *should* behave in the environment they are placed in and how users *should* interact with them. A good example of how the assumptions around behaviors that ubicomp makes manifest themselves in interactive new media installations can be seen in Natalie Jeremijenko's *Live Wire* (1995).[955] *Live Wire* is an incredibly important piece to discuss in relation to ubicomp as it is widely considered to be one of the first artworks to incorporate ubiquitous technology or have a ubiquitous interface.[956] It is considered as such, because Weiser, along with co-author John Seely Brown, use it in their essay "Designing Calm Technology" (1995) to explain the concepts of ubicomp.[957]

Live Wire is, in Weiser and Seely Brown's words: "a radically new tool…. Its output is so beautifully integrated with human information processing that one does not even need to be looking at it or near it to take advantage of its peripheral clues."[958] Commissioned by Xerox Research Center, *Live Wire* is an eight-foot long piece of red string that displays Internet traffic. Located below the string is a black and white sign that reads: "Caution Live Wire".[959] (Figure 94)

Figure 93: N. Jeremijenko, *Live Wire*. (1995).

[955] Natalie Jeremijenko. *Live Wire.* (1995). Found online at http://tech90s.walkerart.org/nj/transcript/nj_04.html *Live Wire* is also referred to as *Dangling String*.
[956] Mark Weiser and Jon Seely Brown. *The Coming Age of Calm Technology.* October 5, 1996. Found online at: http://www.ubiq.com/hypertext/weiser/acmfuture2endnote.htm Authors who consider *Live Wire* as such include, but are not limited to: Simanowski (2013), Hansen (2013), Eckman (2012) and Penny (2012).
[957] Ibid.
[958] Ibid.
[959] Mark Weiser and Jon Seely Brown. *The Coming Age of Calm Technology.* October 5, 1996. Found online at: http://www.ubiq.com/hypertext/weiser/acmfuture2endnote.htm.

The string and the sign are the only parts of the piece that the user can see. *Live Wire*, however, consists of many more hardware and software based components, which are embedded in the ceiling. They are imperceptible to the user, thus they are considered unimportant to the installation. These elements are so unimportant, that Weiser and Seely Brown state that *Live Wire* "uses no software" and "does not contain a computer at all".[960] While *Live Wire* does not require a PC in its final iteration, it does contain a motor, an Ethernet cable and the Internet. These components are integral to *Live Wire*, as they allow it to function. Thus they are incredibly important to the artwork.[961] For example, the string is attached to a small electric motor. The motor is located in the ceiling and is connected via an Ethernet cable to the Internet. The string is pre-programmed to respond to network activity. It does this by twitching, or as Weiser and Seely Brown call it, "waving".[962] (Figure 95)

Figure 95: N. Jeremijenko, *Live Wire*. (1995).

In this way, the string could be considered to be the interface in this work because the string is the point of mediation and interaction between entities: the human (the viewer/participant) and the nonhuman (Internet). It provides the user with information (Internet activity) as well. My brief description of the artwork, provided above begs two questions: If all that is visible is a dangling string, then how exactly does a user interact with *Live Wire*? Moreover, what does interactivity imply in this context?

All a user has to do to interact with *Live Wire,* according to Weiser and Seely Brown, is walk past it.[963] For instance, *Live Wire* was originally installed in an unused corridor of a hallway

[960] Mark Weiser and Jon Seely Brown. *The Coming Age of Calm Technology.* October 5, 1996. Found online at: http://www.ubiq.com/hypertext/weiser/acmfuture2endnote.htm
[961] Ibid.
[962] Ibid.
[963] Ibid.

in Xerox Paolo Alto Research Center's Computer Science Lab.[964] When an office worker, or user, walked through the corridor that *Live Wire* was located in, she saw it and, to an extent, heard it. What she saw or heard depended on the amount of Internet traffic happening at that precise time. If a user passed through the corridor when the network was busy, then *Live Wire* twitched a lot. So much so, that the user did not only see the string move, but she heard it move (via the grinding of the motor in the ceiling.)[965] If the user happened to pass through the corridor during a lull in activity, *Live Wire* was programmed to twitch every few seconds. The user could then decide to stop and view the work and the information that it was presenting to her, or ignore it – walk past it and carry on with her day.[966] It does not matter what she did (if she stopped or continued). Simply passing by *Live Wire,* for Weiser and Seely Brown, implied interaction.[967] This is because regardless of whether or not the user stopped, she was receiving a constant flow of information from the piece. In this way, *Live Wire,* according to Weiser and Seely Brown, is a perfect physical or "real world" representation of the concepts of ubicomp and calm technology in the sense that it allows for "peripheral attunement" on behalf of the user.[968] By peripheral attunement, Weiser and Seely Brown mean that users can glean specific information from *Live Wire* (Internet traffic) without consciously interacting with it.[969] Furthermore, unlike other screen-based displays of Internet traffic, the information it transmits does not require a lot of "interpretation and attention" on behalf of the user.[970] Thus *Live Wire*, according to Weiser and Seely Brown informs users without overburdening them, because, *Live Wire,* they argue, provides users with clues about their environment.[971]

Simanowski (2013) finds the way in which information is presented to users in *Live Wire* and consequently analyzed by Weiser and Seely Brown, to be problematic.[972] It is important to recognize, Simanowski states, that information in *Live Wire* is "not simply present in the

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[964] Ibid. Roy Want's *Internet Stock Fountain* (1999) was also installed at the Xerox Palo Alto Research Center. *Internet Stock Fountain*, as Simanowski (2013) states, "indicates, by the rate of its water flow whether Xerox shares are up or down."
[965] Mark Weiser and Jon Seely Brown. *The Coming Age of Calm Technology.* October 5, 1996. Found online at: http://www.ubiq.com/hypertext/weiser/acmfuture2endnote.htm
[966] Ibid.
[967] Ibid.
[968] Ibid.
[969] Ibid.
[970] Ibid.
[971] Ibid.
[972] Roberto Simanowski "Text as Event: Calm Technology and Invisible Information as Subject of Digital Art." in *Throughout: Art and Culture Emerging with Ubiquitous Computing.* ed. Ulrik Ekman. (Cambridge, MA: MIT Press, 2013), pp. 191-192.

background, moving to center stage when needed, but also that it has changed its nature through the specific way of presentation".[973] Information has changed via presentation, for Simanowski, because ubicomp, as represented by *Live Wire,* "makes not only computers invisible – so that they disappear into the environment – but also information. *Live Wire* does so…by rendering information imperceptible".[974] Here, Simanowski is arguing that *Live Wire* is filtering information through the processes of selection, subtraction, translation and reflection as detailed in previous chapters. Therefore it is altering the information that it transmits to users.[975] In this way information, for Simanowski, is rendered imperceptible because some of the information that *Live Wire* presents to users (specifically the information that is not relevant to the narrative of the artwork) is erased or obscured through the filtration process.[976]

I suggest that Weiser and Seely Brown are participating in the same process of filtration in their theorization of *Live Wire.* In their article they are selecting, translating and then reflecting information back to readers about *Live Wire* and ubicomp that is relevant to their argument (*Live Wire* is a perfect example of ubicomp), while filtering out the information that contradicts their argument (ubicomp obscures information).[977] In doing this, I argue that Weiser and Seely Brown are not only rendering interfaces and information imperceptible, but they are unintentionally using information and, to an extent, technology, as a way to fix user's behaviors with ubiquitous interfaces. They do this, I argue, by regulating, to the point that they are determining how a ubiquitous interface should look (invisible), what it should do (calm, inform) and how users should interact with it (constantly).

Let me explain by way of example. A ubiquitous interface, according to Weiser and Seely Brown, should not only be invisible, calming and informative, but it should be effective – it should provide the user with helpful information without being obtrusive.[978] However, when a user walks past *Live Wire,* as Simanowski tells us above, she does not receive the "full

[973] Roberto Simanowski "Text as Event: Calm Technology and Invisible Information as Subject of Digital Art." in *Throughout: Art and Culture Emerging with Ubiquitous Computing.* ed. Ulrik Ekman. (Cambridge, MA: MIT Press, 2013), p. 191.
[974] Ibid., p. 192.
[975] Ibid.
[976] Ibid.
[977] Mark Weiser and Jon Seely Brown. *The Coming Age of Calm Technology.* October 5, 1996. Found online at: http://www.ubiq.com/hypertext/weiser/acmfuture2endnote.htm
[978] Ibid.

picture", just blurred information.[979] The user knows that if the string twitches a lot, if there is a lot of Internet traffic and if it is not twitching, there is minimal to no Internet traffic, but she does not receive specifics, she never gets exact measurements of Internet traffic at a moment's flux. Given this, it could be argued that *Live Wire* is an ineffectual ubiquitous interface. I use the word ineffectual, because the interface does not perform the calming and informative functions Weiser and Seely Brown claim it does. The string mediates and translates information and then provides it to users but it does not inform, nor is it calming or effective. Instead the information parsed by *Live Wire*, as Simanowski writes, is "mapped only as movement" and in being this way, he argues, the interface contradicts, to an extent, Weiser and Seely Brown's theory of ubicomp by calling attention to itself. [980] Building on Simanowski's analysis, I posit that the way that interaction is presented to the viewer/participant in *Live Wire* and consequently theorized by Weiser and Seely Brown is as ineffectual as the issues around information and their theorization of the interface. This is because the way Weiser and Seely Brown analyze user interaction with *Live Wire* contradicts, to an extent, their theory of ubicomp.

Interactivity in interactive new media installations, as Stern tells us, is an embodied, relational and mutually emergent process that humans perform with and as technology, together.[981] Interactivity is, he states, varied in its engagements and consists of multiple human and nonhuman entities (viewer/participants, technology, the artist) that slowly become confused over time.[982] In doing this, viewer/participant interaction in interactive installations, Stern suggests, has the ability to "intervene in, and challenge, not only the construction of bodies and identities, but also the ongoing and emergent processes of embodiment, as they happen."[983] Thus interactivity is a process that he argues frames, articulates and amplifies "how the body's inscriptions, meanings and matters unfold out while the world's sensations, concepts and matters enfold in".[984] Given this, interactivity in interactive new media installations, for Stern is: "a *situation* that accents embodiment and signification…It *frames*

[979] Roberto Simanowski "Text as Event: Calm Technology and Invisible Information as Subject of Digital Art." in *Throughout: Art and Culture Emerging with Ubiquitous Computing.* ed. Ulrik Ekman. (Cambridge, MA: MIT Press, 2013), p. 192.
[980] Ibid.
[981] Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* Canterbury, UK: Gyliphi Limited, 2013), p. 5.
[982] Ibid.
[983] Ibid., p. 4
[984] Ibid.

how we *move-think-feel* with and…as an articulation of meaning."[985] Based on their theorization of human interaction with ubiquitous interfaces like *Live Wire*, Weiser and Seely Brown seem to agree, to an extent, with Stern's theorization of interactivity.

For example, users should, according to Weiser and Seely Brown, be able to interact with ubiquitous interfaces without being constantly bombarded with information.[986] They write that ubiquitous interfaces enable this type of interaction in two ways: first by moving from the center of the user's attention to the periphery and back in an easy manner, and then by enhancing the users "peripheral reach", making information accessible that would otherwise be out of reach or inaccessible, thus increasing the user's knowledge and ability to interact with information if they so choose, "without increasing information overload".[987] Here Weiser and Seely Brown are suggesting that ubiquitous interfaces should provide users with easy access to information. If the user requests information from the interface, then this information should come to the fore and the user should be able to interact with it in an easy and perhaps even fun manner. If the user does not want to receive information, then the interface, and the information it is transmitting, should fade into the periphery.

Live Wire, as Weiser and Seely Brown argue, is a perfect practical example of how a user should interact with ubiquitous technologies.[988] As they write: "At first it [*Live Wire*] creates a center of attention just by being unique. But this center soon becomes peripheral as the gentle waving of the string moves easily to the background. That the string can be both seen and heard helps by increasing the clues for peripheral attunement."[989] *Live Wire's*, ability to move from the center to the background of the user's attention, they state, "increases our peripheral reach to the formerly inaccessible network traffic".[990] Thus interaction with *Live Wire* allows the user to attend to and consequently interpret the information provided to her, as well as reflect on the experience of *Live Wire* without feeling overloaded. In short, user interaction with *Live Wire* for Weiser and Seely Brown should be a mutually co-constitutive process, one that helps frame and articulate the information being presented to her and understand the world. They also believe that interaction with *Live Wire* offers the user more

[985] Nathaniel Stern. *Interactive Art and Embodiment: The Implicit Body as Performance.* Canterbury, UK: Gyliphi Limited, 2013), p. 4. Stern's emphasis.
[986] Mark Weiser and Jon Seely Brown. *The Coming Age of Calm Technology.* October 5, 1996. Found online at: http://www.ubiq.com/hypertext/weiser/acmfuture2endnote.htm
[987] Ibid.
[988] Ibid.
[989] Ibid.
[990] Ibid.

choice and possibilities, in regards to the way she accesses information, via its ability to move from the center to the periphery of their attention.

However, as mentioned above, interaction with *Live Wire* is positioned by Weiser and Seely Brown as compulsory. The user is required, by way of presentation, to act, or at least to view *Live Wire.* The user walks down the corridor of the office that *Live Wire* is located in and there it is – moving, making sounds, bombarding her with a constant flow of semi-coherent information and forcing her to interact with it. By making interaction compulsory, I argue that Weiser and Seely Brown are taking away the user's choice as to whether or not she would like to interact with *Live Wire*. In doing this, I argue that Weiser and Seely Brown are not allowing the user to make decisions around her experience with the artwork. Thus I posit that the notion that interactivity with *Live Wire* offers the user more choice and possibilities, as suggested by Weiser and Seely Brown, is false and counter-productive. I say false and counter-productive because *Live Wire* does not actually do what Weiser and Seely Brown say it does (offer the user more choice, thus possibility.) Moreover, just because an interface has the ability to move from the center to the periphery of the user's attention does not mean the user has any awareness of or fully comprehends the activity she is willingly or unwillingly participating in. The user might be able to freely access information that *Live Wire* provides them, as Weiser and Seely Brown suggest above, but I argue she does not have the ability to regulate the flow of, or understand, the information being provided to her. In this way, I posit that user interaction with *Live Wire* and *Live Wire* itself becomes the opposite of what Weiser and Seely Brown position it as – it is an obtrusive, incomprehensible and determined, rather than an informative and calming, experience.

Weiser and Seely Brown, as Simanowski notes, do not discuss the issue surrounding the incomprehensibility of information in their article.[991] Nor do they address the contradiction around interaction, pointed out above.[992] This lack of acknowledgement explains why they are able to present *Live Wire* as a perfect example of how ubicomp should be, without taking into account the extent to which *Live Wire* allows for informed actions on behalf of the user. It also provides some insight into their confusing description of *Live Wire*, as a tool, rather than a work of art.

[991] Roberto Simanowski "Text as Event: Calm Technology and Invisible Information as Subject of Digital Art." in *Throughout: Art and Culture Emerging with Ubiquitous Computing.* ed. Ulrik Ekman. (Cambridge, MA: MIT Press, 2013), p. 192.
[992] Ibid.

In Conclusion

I will conclude my exploration into the use of ubiquitous interfaces in interactive new media installations by examining the potential artistic experimentation with ubiquitous interfaces has in demystifying ubicomp claims. My starting point for this exploration lies in Greenfield's suggestion that ubicomp is a set of assumptions rather than a unified theory. I use Greenfield's suggestion as a starting point because it indicates, in my mind, that there is a possibility for alternative versions and visions of ubiquitous interfaces – versions and visions that open up a space for exploration and experimentation on behalf of the artist creating the interface and the viewer/participant interacting with it. It also suggests that we can employ different, less techno-deterministic approaches to analyzing ubiquitous interfaces. In short, the ubiquitous interface may be limited in its responses and the information it gives to the viewer/participant (as this information and these responses are almost always constrained as they are almost always pre-programmed), but Greenfield's statement suggests that there are limitless possibilities in terms of how we critically investigate and explore it.

Following Greenfield, I suggest that artistic experimentation with ubiquitous interfaces in interactive new media installations, is important because through experimentation, new media artists are able to defamiliarize ubiquitous interfaces and intervene in the myths that surround them, making them, to an extent, recognizable and visible for critique. Furthermore, artistic experimentation with ubiquitous interfaces in interactive new media installations allows us to think seriously about what the relationship between aesthetics, computation and the interface possibly could become, rather than accepting what we are told it is or has to be.

Throughout their article Weiser and Seely Brown refer to *Live Wire* as a "radically new tool" one that provides the user with "bits [of information] through motion, sound and even touch".[993] While I believe it was incredibly radical at the time it was created, *Live Wire,* I argue, is not a tool. It is a work of art. It is a work of art because it was created by an artist – Natalie Jeremijenko.[994] The fact that *Live Wire* is a piece of art, according to Simanowski reveals another issue in Weiser and Seely Brown's theory of ubicomp.[995] This issue, he writes is: "the fact that an artwork logically contradicts the notion of ubiquity and invisibility

[993] Mark Weiser and Jon Seely Brown. *The Coming Age of Calm Technology.* October 5, 1996. Found online at: http://www.ubiq.com/hypertext/weiser/acmfuture2endnote.htm
[994] Natalie Jeremijenko. *Live Wire.* (1995). Found online at http://tech90s.walkerart.org/nj/transcript/nj_04.html
[995] Roberto Simanowski "Text as Event: Calm Technology and Invisible Information as Subject of Digital Art." in *Throughout: Art and Culture Emerging with Ubiquitous Computing.* ed. Ulrik Ekman. (Cambridge, MA: MIT Press, 2013), p. 192.

because by nature its aim is to call attention to itself as an intervention into the everyday life environment."[996]

Simanowski's statement about *Live Wire*, foregrounds an important questions in terms of how we relate to, form relationships with and make meaning of technologically-based artworks and artistic practices. As argued, via Jones (2000) in chapter 2, in its triparte role as "creator of social-space", "actualizer of power" and "site of resistance", the human body is able to become explicitly "non-universal" and "non-transcendent", and in its ability to become this way lays the potential for radically dislocative practices.[997] One of these radically dislocative practices, as demonstrated throughout this thesis, is a rethinking of the digital interface, as human body, in interactive new media installations. However, by designating a form so intimate to us (the human body) as interface and then advocating for invisibility, as theories of ubicomp do, the interface, as a technical form that articulates, filters, facilitates and organizes activities between two or more entities, is naturalized. And in being this way, when designated as interface, the human body – specifically its ability to act as "the actualizer of power" and "the site of resistance" – is, to an extent, neutralized. So, what does this naturalization (of the interface) and neutralization (of the human body) mean for artistic experimentation with ubiquitous interfaces in interactive new media installations? What happens when an artwork used to epitomize the main tenants of ubicomp (invisibility, attractiveness, calm) like *Live Wire* negates it? And can this negation provide us with a framework for a different understanding a whole range of contemporary artworks that employ ubiquitous interfaces and the relationship between the body and technology that surrounds them?

Taking these questions into account, I would like to provide a different interpretation of *Live Wire* than the one offered by Weiser and Seely Brown. Contrary to Weiser and Seely Brown's claims that *Live Wire* is a perfect representation of ubicomp, I would like to suggest that *Live Wire* represents a very specific reaction to the three concepts of ubicomp that have been central to my discussion– aesthetics (or attractiveness), invisibility and interactivity. *Live Wire* reacts to the notion of invisibility, by defamiliarizing information, presenting

[996] Roberto Simanowski "Text as Event: Calm Technology and Invisible Information as Subject of Digital Art." in *Throughout: Art and Culture Emerging with Ubiquitous Computing.* ed. Ulrik Ekman. (Cambridge, MA: MIT Press, 2013), p. 192.
[997] Amelia Jones. "Survey: Body, Splits" in *The Artist's Body*. ed. Tracey Warr. (London, UK: Phaidon, 2000), p. 22.

information as a performative event – information in motion or "data as movement".[998] It reacts to notions of interactivity, in a similar way. *Live Wire* defamiliarizes common preconceived notions of interactivity in interactive new media installations through the lack there of it. Finally, it reacts to notions of attractiveness and aesthetics by existing as an artwork.

I argue that *Live Wire* is defined by a refusal, on behalf of the artist, to turn information into aesthetically pleasing data.[999] Jeremijenko reiterates these sentiments in her statements around the work: *Live Wire,* she tells us, "is tacit information, rather than more of the precisely graphed, data fetishism of information rhetoric".[1000] Thus, in contrast to screen-based graphs of Internet activity, *Live Wire,* she writes, "is a shared social display of information".[1001] The tacit information aesthetic and shared social display of information that Jeremijenko wishes to achieve is set against its own silence in the parts of *Live Wire* that are visible to the viewer/participant (the red string and the black and white printed sign).[1002] This combination creates a sparse, uninteresting, uninteractive and uninformative environment – one that I posit provides the viewer/participant with the ultimate form of control: to critically reflect on and then to reject, to an extent, the artwork and the concept of ubicomp and walk away from it. *Live Wire* then is not interactive in the way in which viewer/participants are normally accustomed to. Interactivity with this piece is not about viewer/participant's clicking links, reading on-screen information, making a specific semiotic gesture or performing a choreographed dance. Rather, by pushing the lack of aesthetics, information and interactivity to such an extreme, I argue that *Live Wire* acts as an intervention into normative assumptions around interactivity and aesthetics in interactive new media installations. For example, asking viewer/participants to critically reflect on and then to reject, to an extent, the artwork and the underlying concepts that it is based on, is a gesture made by Jeremijenko that turns notions of ubicomp against themselves and away from the mindless, repetitive and surface-level forms of HCI that it promotes. Thus, rather than fostering the illusion that *Live Wire* is a democratic tool, the absence of choice – specifically the choice whether or not to interact with it – is accentuated.

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[998] Roberto Simanowski "Text as Event: Calm Technology and Invisible Information as Subject of Digital Art." in *Throughout: Art and Culture Emerging with Ubiquitous Computing.* ed. Ulrik Ekman. (Cambridge, MA: MIT Press, 2013), p. 192.
[999] Natalie Jeremijenko. *Live Wire.* (1995). Found online at: http://tech90s.walkerart.org/nj/transcript/nj_04.html
[1000] Ibid.
[1001] Ibid.
[1002] Ibid.

Live Wire also eschews the aesthetic and information-based conventions of ubicomp as laid out by Weiser in the foundational papers. *Live Wire,* I suggest, troubles Weiser's notion that the invisibility of information is a good thing and that interfaces should not be attractive. It does this by unabashedly calling attention to itself through its messy, dissonant and difficult aesthetics. The messy, found-object aesthetics of the work and its placement serves two purposes: it acts as a visual response to the "precisely graphed, data fetishism"; and it acts as a response to notions of invisibility and attractiveness in that it looks like it does not belong in the space it is located in, ultimately piquing viewer/participant interest, thus attracting viewer/participant attention.[1003] Furthermore, the string is almost always in motion. When Internet traffic is high, the motor the string is attached to makes a grinding sound, calling even more attention to the fact that it exists, rather than effacing it altogether as a means to better foster the illusion of invisibility.[1004]

The exact meaning of the information that *Live Wire* is presenting to the viewer/participant is as confusing as the piece's interface and aesthetics, simply because, the viewer/participant is receiving incomprehensible information. Thus, in opposition to Weiser and Seely Brown's attempt to naturalize information to the point of invisibility, *Live Wire*, makes information confusing, unfamiliar and uncomfortable. In this way, I argue that *Live Wire* could be seen as an artwork that is simultaneously of, and not of, ubicomp. It works as a response to notions of invisibility, inaccessibility and interactivity – notions that prevent any kind of informed action on behalf of the viewer/participant beyond surface-level interventions. With its messy aesthetic, its minimalist interface and the constant low-level of obscured information that it transmits, *Live Wire*, works against, via defamiliarization, some of the main tenants of ubicomp, while simultaneously helping to define what a ubiquitous interface is, what it should do and how we should interact with it in interactive new media installations.

[1003] Natalie Jeremijenko. *Live Wire.* (1995). Found online at: http://tech90s.walkerart.org/nj/transcript/nj_04.html Again, *Live Wire* is located in a corridor in an office.
[1004] Ibid.

Conclusions: *The Five Interfaces*

The main objective of my dissertation has been to propose an analytical framework for the digital interface in interactive new media installations. My aim has been to develop an understanding of how the digital interface can be seen as an important actor in positioning and (re)shaping specific ways of relating to the self, to technology, to artistic practice and to others. That is to say, in this thesis I have been interested in examining what a digital interface *may be*, and exploring potential ways of thinking, doing and making that it could possibly bring about when theorized in non-instrumental ways, from within aesthetic-based contexts. My main argument is that in the past decade a significant transformation has occurred at the boundary of media studies and art history regarding the way the digital interface has been understood. I suggested that this shift in understanding allowed what was previously thought of as a viewing subject to embody technology and become a "viewer/participant". I then proposed that this shift in perception and positioning of the subject, combined with the subject's ability to embody technology and become a viewer/participant, results in the "disappearance" of the object-based digital interface and the emergence of the physical human body as the locus of interaction in interactive new media art installations. The word disappearance does not mean that the interface, its functions, properties and the processes and entities that it encompasses are physically gone. Rather, disappearance allowed me to signal towards what I saw as an unresolved difficulty in texts on the interface that conflate, among other things, invisibility with perceptibility, agency with subjectivity, subjects with objects, and entities (subjects, plural) with individuals (the subject, singular). I used the terms "obsolete" and "inadequate" in relation to theories that advanced this type of thinking throughout my thesis to reinforce this point. I turned to performance artist Stelarc's critique of assumptions about the body – specifically to his statement "the body is obsolete" – in order to theorize the inadequacy of theories of the interface that position it as such.[1005]

In my dissertation, the term "digital interface" has not merely referred to the point of interaction between two or more parts of a technical system, or the symbolic software that enables humans to use computers, but also to a technology that mediates, and thus creates, relationships between viewer/participants, artists and artworks as well as influences the

[1005] Joanna Zylinska and Gary Hall. "Probings: An Interview with Stelarc" in *The Cyborg Experiments: The Extension of the Body in the Media Age*. ed. Joanna Zylinska. (London: Continuum, 2002), p. 114.

movements and perceptions of those interacting with it. This definition has allowed me to conceptualize the interface as technical material, cultural form and artistic practice, something that has been constructed and designed in a specific way for a specific purpose, a procedure for mediating, translating and disseminating information, a way of relating, a form of embodiment and a mode of communication. I have been guided by Emerson's (2014) understanding of the interface in a broad sense as a technology that mediates relationships between entities and the surface-level objects they produce, as well as the technical machine-based processes that take place below the surface. [1006] I have used her definition as a primary analytical framework in which to understand the interface and to rethink it as a dynamic, hybrid, aesthetic and cultural process that emerges out of, shapes, and is shaped by, our interactions with it in interactive new media installations. Here, emphasis is placed on the aesthetic and the cultural processes that help shape the digital interface, not the technical and the mechanic ones (although these processes are important and I do discuss them as evidenced in chapters 3 and 4). Thus my conceptualization of the interface differs, albeit slightly, from Emerson's in that the interface is positioned, in my thesis, as form that mediates, and to an extent creates, relationships between entities (the artist, the viewer/participant) and the aesthetic objects that it produces (the artwork) as well as the aesthetic and creative processes that are hidden from view (artistic experimentation).

In chapters 3 and 4, I have shown how the interface governs the interactions of the viewer/participant by restricting or reinforcing certain types of viewer/participant behaviors. It does this, I argued in two ways: through instruction provided to the viewer/participant by the artist via the digital interface; and through the deployment of metaphors and models (an interface shaped to look like a bicycle, an icon located on a desktop shaped to resemble a trash can or the use of the word invisibility to imply imperceptibility). I demonstrated how instruction and the concept of ubiquity function as important control mechanisms for what users are allowed to see (the artwork) or not see (the device itself), how they are to behave and how they should interact. My investigation into the use of cybernetic and ubiquitous interfaces in interactive new media installations offered a way to address the question of how the interface – its processes, and relationships – can be analyzed as potentially (re)shaping concepts of subjectivity, agency, the body, embodiment, ubiquity and aesthetics.

[1006] Lori Emerson. *Reading Writing Interfaces: From the Digital to the Bookbound.* (Minneapolis, MN: University of Minnesota Press, 2014), p. x.

The designation of the viewer/participant as locus of interaction – or interface – as discussed throughout these chapters, means that the illusion that the artist has complete control over the action occurring in the installation is, to an extent, broken. Thus the interface in interactive new media installations, I suggested, can be said to be unstable, uncertain and, to a certain extent, open to reconfiguration. Regardless of whether or not they are perceptible to us, digital interfaces permeate our environments and play an active role in the space they are located in. In chapters 1 and 2 I showed how the relationship between the digital interface, the viewer/participant and the artist not only supports interaction, but is what makes interaction in interactive new media installations possible in the first place. Although quite different in scope, the concepts of aesthetics and embodiment show how this relationship needs to be made visible and how integral it is to interactive new media installations.

In the preface, I explained my motivation behind the selection of reviewed artworks found in my thesis. Drawing on Donna Haraway's 1988 notion of Situated Knowledge, I argued that my selection process was informed, in part, by my curatorial and educational experiences. Situated knowledge, according to Haraway, is an approach to knowledge that requires us to become ethically and politically accountable for what we learn and how we see the world.[1007] In short, I argued that the claims to knowledge made throughout my thesis, were partial, located, embodied and situated relative to personal, social and geographic contexts – they were formed and informed by my situated knowledge. In doing this, I was able to show how knowledge about the digital interface, its processes *and* relationships emerge out of, shape and are shaped by, our personal interactions with it in interactive new media installations.
I also discussed the non-chronological and non-linear approach I took to theorizing the artworks located throughout my thesis. Non-chronological and non-linear approaches can seem, at times, confusing as the field of digital media art did not evolve in a straight line. The works that compose the corpus of digital media art run parallel to each other and are non-sequential. Thus, I argued that non-linear and non-chronological approaches to art movements like digital media art function as an important mechanism for dispelling linear developmental narratives of technology and notions of finality. My use of this approach, I stated, was important as it offered a way to raise questions around traditional perceptions of digital media art as a medium – that is a linear outgrowth of technologically based art forms

[1007] Donna Haraway. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies.* 14 (3). Autumn, 1988.

(photography and cinema). It also presented me with a way to address the question "why does the digital interface matter in interactive new media installations?" in the sense it allowed me to examine, from different perspectives, the types of relationships that exist between artists, interfaces and viewer/participants in interactive new media installations.
In what follows, I will elaborate on the main contributions of my dissertation. I will do this by relating my arguments in each chapter to the five digital interfaces commonly deployed in interactive new media installations. These interfaces, originally discussed in the preface and introduction, are: the aesthetic interface, the agential interface, the embodied interface, the cybernetic interface and the ubiquitous interface. These five interfaces directly relate to the five key concepts (aesthetics, agency, embodiment, cybernetics and ubiquity) that inform my thesis.

In chapter 1, I theorized the aesthetic interface. Aesthetic interfaces, refer to devices that digitally encode, encompass or make reference to theoretical and aesthetic-based concepts, contents or techniques (the use of artistic tools (film cameras, paintbrushes) to signify creativity of the viewer/participant or co-authorship, again on behalf of the viewer/participant, of the work). They also refer to the appropriation of aesthetic perceptions and languages (the use of the word theme to describe the background of a website) used to drive the narrative of the work forwards and/or implied modes of reception and spectatorship used by curators and academics to legitimize artwork.[1008] These aspects of the aesthetic interface (terms, tools, modes of reception), I argued, are simultaneously deployed in order to make the aesthetic aspects and processes of the interface visible and to make them disappear, as illustrated in my reading of Alexander Galloway's 2012 interpretation of the interfaces found in Norman Rockwell's iconic illustration *Triple Self-Portrait* (1960).[1009]

In order to theorize the aesthetic interface, I questioned the dominant philosophical conceptions and definitions of the digital interface. These definitions and conceptions, I argued, substantially reduce the digital interface to an instrument, positioning it as an object, a tool or a thing in service of something or someone else. I turned to the work of scholars (Andersen and Pold (2011), Hookway (2011), Galloway (2012)) who have distanced themselves from such deterministic understandings and have instead proposed different, non-

[1008] Examples of these interfaces can be seen in the works by artists such as Camille Utterback (*Untitled 5*, *Text Rain*), Jeffrey Shaw (*Place – A User's Manual*), David Small (*Illuminated Manuscript*), and Luc Courchesne (*McLuhan's Massage Parlor*) discussed throughout this thesis.
[1009] Alexander Galloway. The Interface Effect (Cambridge: Polity Press, 2012), pp. 34-39.

binary readings of the digital interface, acknowledging and critically discussing the significance of the complex and sometimes contradictory aesthetic and cultural aspects. Andersen and Pold call this approach "interface criticism" – a term they argue aids in the development of critical discussions around "the computer and how it relates to art and culture today".[1010] I then argued for a rethinking of the digital interface in interactive new media installations – one that positions it as a dynamic, hybrid, aesthetic and cultural process in interactive new media installations. A pivotal role in my rethinking of the interface was given to the concept of obsolescence as theorized by the artist Stelarc in his critique of assumptions about the body and technology – specifically his statement that "the body is obsolete".[1011]

Stelarc's questioning of the idea of "the human" and its obsolescence, I argued, dismantles naturalized and linear descriptions of the human body, technology and our relationship with technology, exposing their simplicity and in effect, their inadequacy. In doing this, Stelarc enables the relationship between the body and technology to be seen as what Hall (2002) calls "as an irruption of the other, the unforeseen disrupting the very criteria in which it would have been captured".[1012] When the relationship between the human and technology is theorized as the merger of one separate human entity and one separate and foreign technological object, what is at stake is neither futuristic ideology nor a linear repetition of a symmetrical past and future. Rather, what is created, as Hall terms it, is "undecidability".[1013] Hall's notion of "undecidability", I argued, is what Cubitt (1998, 2005, 2016) is referring to when he writes that digital aesthetics is "unknowable".[1014] Highlighting what he considers to be the characteristics of digital artworks (non-identity, ephemerality, unknowability), digital aesthetics, Cubitt argues, is dependent on the mediation of the senses of vision and hearing – and these senses are always temporal and always rooted in the present.[1015] Given this, the term digital aesthetics, he suggests, serves as a descriptor for the mediated experience of

[1010] Christian Ulrik Andersen and Søren Bro Pold. "Interface Criticism, Aesthetics Beyond Buttons" in Interface Criticism: Aesthetics Beyond Buttons. ed. Christian Ulrik Andersen and Søren Bro Pold. (Arhaus, DK: Arhaus University Press, 2011), p. 1.
[1011] Joanna Zylinska and Gary Hall. "Probings: An Interview with Stelarc" in *The Cyborg Experiments: The Extension of the Body in the Media Age*. ed. Joanna Zylinska. (London: Continuum, 2002), p. 114.
[1012] Gary Hall. "Para-Site" in The Cyborg Experiments: The Extension of the Body in the Media Age. ed. Joanna Zylinska. (London: Continuum, 2002), p. 140.
[1013] Ibid.
[1014] Sean Cubitt. *Digital Aesthetics.* (London, UK: Sage, 1998); Sean Cubitt. *EcoMedia.* (Amsterdam, NL: Rodopi, 2005); Sean Cubitt. "Aesthetics of the Digital" in *A Companion to Digital Art,* First Edition. ed. Christiane Paul. (London, UK: John Wiley & Sons, 2016)
[1015] Ibid.

time.[1016] Since digital aesthetics is a descriptor for the mediated experience of time and since this experience is always rooted in the present, any critical theory of digital aesthetics, Cubitt writes, must take into account the relationship between the artwork, its audience and "the social that forms both of them".[1017] Drawing on Cubitt's theorization of digital aesthetics I suggested that the term "aesthetics" when applied to the digital interface, not only describes the characteristics of the installation the interface is deployed in but also encapsulated the characteristics of the interface itself. Thus, I argued aesthetics does not only shape our experience of digital artworks, it also shapes our interactions with, and by extension, our experience of, the digital interface.

Furthermore, Cubitt's analysis of digital aesthetics emphasizes the confusion or "unknowability" of the relationship between aesthetics, the human and the interface that I discussed throughout chapter 1. Digital aesthetics demonstrated the need to, not necessarily make the digital interface "knowable" and solve the problems that this relationship creates, but to draw these problems to the fore, to make them visible, and use them to critically question and rethink the interface. Thus, I highlighted the importance of understanding the interface, not only in terms of how the viewer/participant "makes sense" of or understands the information being presented to her in the installation she is located in, but also how the aesthetic aspects of the digital interface, or the aesthetic interface, is an integral and important part of her experience in interactive new media installations.

In chapter 2, I explored the agential and embodied interfaces. I did this through an exploration of the relationship between the body and the interface. Agential interfaces, I argued, set in motion in Stiegler's (1999) notion of "originary knowledge" a theorization which suggests that agency is not merely confined to humans, but encompasses nonhuman entities as well.[1018] While instrumental theorizations of the interface define it as a way of connecting two entities together (via its ability to facilitate communication and disseminate information), I argued its use in interactive new media installations sheds light on the agency of technical devices. Thus I showed how interfaces are a productive and important part of the phenomena that they create.

[1016] Ibid.
[1017] Ibid.
[1018] Bernard Stiegler. Technics and Time, 1: The Fault of Epimetheus. tr: Richard Beardsworth and George Collins. (Palo Alto, CA: Stanford University Press, 1998), p. ix.

The third interface is the embodied interface. Current interface aesthetics, as Jeong (2013) writes "emphasizes that the material interface with digital code often remains meaningless until we access it through our physiological sensory organs".[1019] The embodied interface in interactive new media installations, I argued, augments this point of view, suggesting that the viewer/participant is not only accessing information, via participation, but contributing aspects of her own evolving material ontology to her experience through their engagement with and embodiment of technology. I then argued that a study of the relationship between the body, embodiment and technology, or the agential and embodied interfaces, is important for a rethinking of the digital interface. Following insights provided by theorists such as Barad (2007) and Hayles (1999), I set out to investigate how the use of the digital interface in aesthetic settings can illuminate the role technology plays in the co-constitution of the human. That is how the use of the interface in interactive new media installations positions the relationship between the body and technology as a mutually entangled and collaboratively produced experience. I also examined how the instrumental and deterministic conceptualizations of the digital interface (as an object or a thing) can still be said to be at work in theorizations of the relationship between the body and technology.[1020] The relationship between the body and technology in interactive new media installations, I argued, is unstable, uncertain and to a certain extent open to reconfiguration by the viewer/participant. Instability signals the fact that the interactions that emerge out of the relationship between the viewer/participant and the digital interface are dynamic, open-ended and performed. From here, I was able to offer a more performative and entangled understanding of the relationship between the viewer/participant and the digital interface – one that allowed these relationships to come into view, not as pre-coded results of pre-programmed cybernetic systems, but rather as in-process happenings that emerge out of, and with, the viewer/participants' interactions with the interface in interactive new media installations. I then focused on the effects and events that this performance produced.[1021] Through a close reading of interactive artworks (Vesna (2005-7), Tmema (2006), Hemmer (2012)) I demonstrated that it is the specific events and effects that the relationship between

[1019] Seung-hoon Jeong. Cinematic Interfaces: Film Theory After New Media. (NY, NY; Routledge, 2013), p. 11.
[1020] Karen Barad. *Meeting the Universe Halfway: Quantum Physics and the Entanglements of Matter and Meaning.* (Chapel Hill, NC: Duke University Press, 2007). Katherine Hayles. How we Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics. (Chicago, IL: University of Chicago Press, 1999).
[1021] These effects include a possible creation of ruptures in traditional artistic practices and narratives, the destabilization of binary notions such as the division between the material and the informational, a rethinking of the boundaries between the artist and the viewer/participant and a renegotiation of social and private space.

the body and technology helps create, that bring the digital interface into being thus allowing it to actually "matter" in interactive new media installations.

The fourth and fifth types of interface, the cybernetic interface and the ubiquitous interface are viewed as a mode of transmitting instruction by the artist to the subject using it. They are often theorized in terms of the power that this instruction has in controlling the actions of its subjects and/or its own invisibility. The interface may be regarded, by the artist, the scholar or the viewer/participant as an invisible, cybernetic tool that simply controls interaction, limits access and regulates viewing habits. But its nature changes, to an extent, I argued, when deployed in interactive new media installations as viewer/participants have the ability to resist or intervene in the instruction given and generate moments of rupture in the spaces they are located in. The focus I suggested therefore shifts from the cybernetic transference of immaterial data to the embodied actions of the viewer/participant. When this shift occurs, the viewer/participant, rather than the interface, becomes the locus of interaction in interactive new media installations. While cybernetic and ubiquitous interfaces emphasise the mutual co-constitution of the human and technology and the embodiment of technology by the viewer/participant (or the embodied and agential interfaces), this shift in power from technical tool (the interface) to human being (the viewer/participant, the artist), can be problematic. This shift to human body, I argued, has led to theorizations of the interface that position it as "invisible" or "user-friendly" when it is just imperceptible to the viewer/participant. This specific description of the "invisible", "user-friendly" interface is echoed in commercial interfacial products like Mircosoft's Kinect – a device that positions the user as creative and completely in control of their virtual experience.[1022] The conflation of the claims of invisibility and user-friendliness with imperceptibility, I argued, is troubling because it alienates the user from the underlying computational processes of the device and ultimately the artwork itself.

In chapter 3 and 4, I demonstrated how this shift in power and control from technical tool to human user occurs and the problems that come with it. I also provided examples of artworks that subvert and resist it (Knep (2006, 2008), Rokeby (2012), Jeremijenko (1995), Snibbe (1998, 2002), Karasic, (2008)). I began my investigation into the cybernetic and ubiquitous interfaces in chapter 3 through an exploration of the use of instruction and instructional processes. I focused specifically on the destabilizing effects that the resistance to, or the

[1022] Kinect. Found online at: http://www.xbox.com/en-GB/Xbox360/Accessories/kinect

subversion of instruction on behalf of the viewer/participant had on the way they both intra-acted with, and thought about, the digital interface in interactive new media installations.[1023] My main argument was that resistance and subversion on behalf of the viewer/participant begins to shift focus away from theorizing the viewer/participant as an outside operational entity whose actions are structured and defined as exterior to technology, towards considering them an integral part of the installation – an embodied and active subject whose intra-actions with the digital interface have consequences in interactive new media art installations.

Instruction was understood, in this chapter, as a method of arranging and then transmitting explanatory or directional information to the viewer/participant by the artist via the digital interface. In interactive new media installations, instruction was transmitted to the viewer/participant through the reappropriation and designation of common objects (bicycles, telephones, books, microphones) as interfaces. The viewer/participant then interprets these objects as instruction – an action which I posit enables the viewer/participant to (re)orientate herself in the installation through the duplication and reconstruction of familiar processes, spaces and entities that they may encounter on an everyday basis in the physical world.[1024] These objects were employed, I suggested, to reinforce and regulate viewer/participant behaviors and viewing habits by providing her with something familiar and recognizable. This was done to manage and sometimes to limit communication between the viewer/participant and the other entities located in the same space.

In *Human Machine Reconfigurations: Plans and Situated Actions,* Suchman (2007) critiques the notion of instruction as a regulatory device that reinforces problematic modes of communication between humans and machines.[1025] For Suchman, and others, Wiener's notion of cybernetics and the instructional process, which positions instruction as a method of controlling a system by reinserting into it the results of its past performance, is the basis for how instruction is deployed through digital technology.[1026] Wiener's theorization of these

[1023] These destabilizing effects in interactive new media installations include, but are not limited to the possible creation of ruptures in traditional artistic practices and narratives, the destabilization of binary notions such as the division between the material and the informational, a rethinking of the boundaries between the artist and the viewer/participant, a renegotiation of social and private space and the rethinking of the digital interface.
[1024] The duplication and reconstruction of familiar processes, spaces and entities in this chapter include reading, cycling, human bodies, modes of communication (phones) and production (looms) as well as recording studios as exampled in the works of Small (2002), Courchesne (2011), Hemmer (2008), Dunning and Woodrow (2001) and Lubell (2009).
[1025] Lucy Suchman. *Human Machine Reconfigurations: Plans and Situated Actions*. (Cambridge, UK: Cambridge University Press, 2007)
[1026] Ibid., p. 251

concepts, Suchman argues, is troubling, because it is predicated on the assumption that there is symmetry between biological and technical entities. This assumption, she suggests, reinforces, among other things, the separation of the human and the machine.[1027] It also strips the human entity of agency. Given this, I suggested that when deployed in certain interactive new media installations, the digital interface can provide options for viewer/participant intervention, via resistance and/or subversion of instruction.

In the second half of chapter 3, I explored how the resistance to and subversion of instruction can alter the dominant metaphors and models used in interactive new media installations. My argument was that resistance has the ability to allow for certain destabilizing effects such as the creation of a different dialogue between the viewer/participant and the digital interface through the modification of the underlying frameworks that compose the relationship between the human and the machine. The emergence of a different type of dialogue between the viewer/participant and the digital interface, I argued, does not occur because the actions that the viewer/participant makes with the digital interface are somehow different. Instead, drawing on Jones's (2001) theorization of new technologies I argued that this dialogue has appeared because the conceptual frameworks for understanding the relationship between the body and technology have changed.[1028] This change has led what theorists such as Weiser call "a shift in computing".[1029]

In chapter 4, I directly addressed this changing conceptual framework and the restructuring of interfaces in my analysis of the "invisible" ubiquitous interface. My argument in this chapter was that the word invisible, when applied to the interface in interactive new media installations, represents the commodification of bodies and things as well as the erasure of the multiple agencies that contribute to and help allow the interface to work. The viewer/participant does not interact with others via invisible interfaces and interaction does not "just occur" like magic; interfaces themselves also contribute to the creation of these interactions. In this way, the "invisible" ubiquitous interface does not only represent the commodification of bodies and the erasure of things. It also implies, I argued, a linear process of technology whereby relationships, entities and technological developments are linked together in a predetermined fashion and that the ubiquitous interface - which is

[1027] Ibid.
[1028] Amelia Jones. "The Body and Technology" in Art Journal, Vol. 60, No. 1 (Spring, 2001), p 20.
[1029] Mark Weiser. "The World is not a Desktop." November, 1993. Found online at: http://www.ubiq.com/hypertext/weiser/ACMInteractions2.html Mark Weiser. "The Computer for the 21st Century." Scientific American, September 1991. Found online at: http://www.ubiq.com/hypertext/weiser/ACMInteractions2.html

positioned as a natural, intuitive and creative device that will transform the way we interact with computers and with each other forever - is the final, thus best, iteration.

The ubiquitous interfaces explored in chapter 4, however, are not the product of new technological developments. Most of the ubiquitous interfaces we currently interact with existed, in some shape or form, in interactive new media installations.[1030] Therefore, I argued that an investigation into aesthetic experimentations with ubiquitous interfaces is important because these experimentations not only affect the interfaces used in art but they influence those developed elsewhere. In this way, interactive new media installations, I suggested, offer an important and much-needed critical perspective on ubiquitous technologies – one that seeks to challenge the hegemony of ubicomp theories by intervening in normative assumptions concerning the interface. As was shown in the previous chapter on cybernetic interfaces, critically questioning, and then challenging and intervening in the dominant narratives that surround our relationship with technology, complicates the picture of how new technologies like ubiquitous interfaces work in the world. Ubiquitous interfaces do nothing by themselves, but once they become part of our artworks, communities and everyday lives, they become part of our discourse. Thus they become invested with the power to open up and make different things visible, but also to constrain, close down on and erase possibilities, modes of interaction and communication. Interactive new media installations, I argued, are invaluable in this respect because, in being artworks, they call attention to themselves, thus they allow us to critically evaluate the principal claims and question the foundations on which the concept of ubicomp is based.

Ultimately, I believe much is to be gained from understanding the role the digital interface plays in interactive new media installations. My dissertation shows how the digital interface introduces different forms of thinking, doing and making in interactive new media installations by mediating, thus creating, relationships between viewer/participants, artists and artworks and influencing the movements and perceptions of those interacting with it. I have made the case for understanding the digital interface as an ongoing, dynamic, hybrid aesthetic and cultural process. I have suggested that such an understanding requires an analysis of the various aspects of the interface including how the viewer/participant relates to

[1030] The interfaces I speak of have been created by artists discussed throughout this thesis such as Rokeby, Snibbe, Shaw, Feingold, Penny and Hershman Leeson.

and thinks about the interface, how this thinking and relation are translated into viewer/participant interaction and how this interaction reshapes our relationship to technology in interactive new media installations. Through this analysis I demonstrated not only how the interface is used, but *why* its deployment in interactive new media installations matters. It matters, I argued, because the interface is representative of the increasingly messy relationship between bodies, spaces and technologies in our culture.

There are as many ways of representing the relationship between bodies, spaces and technology as there are interactive new media installations. Digital interfaces are but one way of representing this relationship, albeit one that provides a very useful example of showing how easily the relationship between bodies, spaces and technologies can be managed, controlled and sometimes commodified by both inside and outside forces (the technology industry, artists, academia, the viewer/participant). For example, when embedded into interactive new media installations and rendered imperceptible, the interface allowed us to reimagine what a body, be it human or technological, may be and what the relationship between them may become, as represented through Karasic's *Hu^mann* (2008) and Vesna's *Mood Swings* (2005-7) in chapter 2. Given this, I argued that what is at stake in my investigation of the interface in interactive new media installations is not what an interface is or may be, but rather what bodies are, what they can become.

Yet, the interface, when utilized as a device that regulates and dictates movements and actions – as it so often is in interactive new media installations – rapidly becomes an issue of power, control and regulation, as exampled by installations that rely on the cybernetic feedback loop of instruction discussed in chapter 3 (Hershman Leeson (1993-4); Lozano Hemmer (2008); Corchesne (2011-2012)). The reimagining of what a body may be on behalf of the viewer/participant, however, does not imply a process whereby the interface (a technological form) suddenly disappears, and re-emerges as something else (a human body) or somehow changes something (a relationship, a viewer/participant's movement, a visual in an artwork) in a predetermined, linear fashion. The interface may suggest a plan, but it does not determine anything, as the interface does not pre-exist its relationship with others as argued in chapters 2 and 3. Rather, the digital interface, by virtue of its role in helping us reimagine what bodies can become, can serve as a potential site of intervention against the control and regulation that the interface exerts as illustrated by my (re)reading of Jeremijenko's *Live Wire* (1995) in chapter 4. In this way, the use of the interface in

interactive new media installations reveals not just the regulatory, but also the transformative, aspects of HCI. Thus it shows the important role the interface plays in positioning and (re)shaping specific ways of relating to the self, to technology, to artistic practice and to others. At the heart of this thesis, then, is the notion that the digital interface matters to contemporary society and that a critical exploration of it in aesthetic contexts can help us understand and possibly reconfigure our relationship with technology.

Bibliography

Abowd, Gregory and Elizabeth Mynatt. (2000) "Charting Past, Present, and Future Research in Ubiquitous Computing". *ACM Transactions on Computer-Human Interaction*, Vol. 7, No. 1. pp 28-58.

Aarts, Emile and Stefano Marzano. (2003) *The New Everyday: Views on Ambient Intelligence*. Rotterdam: 010.

Anderson, Christian Ulrik and Soren Bro Pold. (2011) *Interface Criticism: Aesthetics Beyond Buttons*. Arhaus, DK: Arhaus University Press.

Auslander, Philip. (1999) *Liveness: Performance in a Mediatized Culture.* New York, NY: Routledge.

Barad, Karen. (2007) *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning.* Durham, NC: Duke University Press.

Barad, Karen. (2003) "Posthumanist Performativity: Toward an Understanding of how Matter Comes to Matter." in *Signs: Journal of Women in Culture and Society*. vol. 28, no. 3. pp 801-831.

Barkuus, Louise and Anind Dey. (2003) "Location-Based Services for Mobile Telephony: a Study of Users' Privacy Concerns." in *Proceedings of the INTERACT 2003, 9th IFIP TC13 International Conference on Human-Computer Interaction.*

Barkhuus, Louise et al. (2008) "From awareness to repartee." in *CHI '08 Annual SIGCHI Conference on Human Factors in Computing Systems.* p. 497.

Bergson, Henri. (2004) *Matter and Memory*. tr: Nancy Margaret Paul and W. Scott Palmer. Mineola, NY: Dover Publications.

Bernhardt, Andre et al. (2001) "Traces: Embodied Immersive Interaction with Semi-Autonomous-Avatars." *Convergence*, Vol. 7, No.2. pp 1-26.

Benford, Steve and Gabriella Giannachi (2011) *Performing Mixed Reality*. Cambridge, MA: MIT Press.

Bijker, Wiebe E, Thomas P. Hughes and Trevor Pinch. (1989) *The Social Construction of Technological Systems.* Cambridge, MA: MIT Press.

Bishop, Claire. (2012) *Artificial Hells: Participatory Art and the Politics of Spectatorship.* Brooklyn, NY: Verso Books.

Blackman, Lisa. (2008) *The Body: The Key Concepts*. Oxford: Berg.

Blackwell, Alan. (2006) "The Reification of Metaphor as a Design Tool" *ACM Transactions on Computer-Human Interaction (TOCHI),* 13(4). pp 490-530.

Bolter, Jay David and Richard Grusin. (1999) *Remediation: Understanding New Media.* Cambridge, MA: MIT Press.
Bolter, Jay David and Diane Gromala. (2005) *Windows and Mirrors: Interaction Design, Digital Art and the Myth of Transparency.* Cambridge, MA: MIT Press.
Bourriaud, Nicolas. (2004) *Postproduction*. New York, NY: Lukas & Sternberg.
Braidotti, Rosi. (2002) *Metamorphoses: Towards a Materialist Theory of Becoming.* Cambridge: Polity Press.
Braidotti, Rosi. (1994) *Nomadic Subjects: Embodiment and Sexual Difference in Contemporary Feminist Theory*. New York: Columbia University Press.
Braidotti, Rosi. (2006) *Transpositions: On Nomadic Ethics.* Cambridge: Polity Press.
Braidotti, Rosi. (1996) "Cyberfeminism with a Difference." Accessed: 26, October 2016, http://www.let.uu.nl/womens_studies/rosi/cyberfem.htm
Braidotti, Rosi. (2013) *The Post Human.* London, UK: Polity Press.
Butler, Judith. (2000) "Critically Queer" in *The Routledge Reader in Politics and Performance*. ed. Elizabeth Goodman and Jane De Gay. London: Routledge. pp 167-171.
Butler, Judith. (1997) *Excitable Speech: A Politics of the Performative*. New York: Routledge.
Butler, Judith. (1999) *Gender Trouble: Feminism and the Subversion of Identity*. New York, NY: Routlege.
Butler, Judith. (2010) "Performative Acts and Gender Constitution," *The Feminism and Visual Culture Reader 2nd Edition.* ed. Amelia Jones. London: Routledge. pp 482-491.
Castells, Manuel. (2000) *The Rise of the Network Society*. Oxford: Blackwell.
Causey, Matthew. (1999) "The Screen Test of the Double: The Uncanny Performer in the Space of Technology." in *Theatre Journal* 51.4. pp 383-394.
Chalmers, Matthew. (2003) "Seamful Design and Ubicomp Infrastructure." in *Proceedings of Ubicomp 2003 Workshop at the Crossroads: The Interaction of HCI and Systems Issues in Ubicomp.* pp. 577-584.
Chalmers, Matthew et al. (2003) "Seamful Design: Showing the Seams in Wearable Computing." in *Proceedings of IIE Eurowearable.* pp 11-17.
Chalmers, Matthew and Areti Galani. (2004) "Seamful interweaving: heterogeneity in the theory and design of interactive systems." in *Symposium on Designing Interactive Systems, 1-4 August 2004.* pp. 243-252.
Chalmers, Matthew et al. (2006) "Interweaving mobile games with everyday life." in *Conference on Human Factors in Computing Systems, 22-27 April 2006.* pp. 417-426.

Chandler, John and Lucy Lippard. (1971) “The Dematerialization of Art” in *Art International* 12, no. 2 (February, 1968): reprinted in Lippard, *Changing: Essays in Art Criticism.* New York: E.P. Dutton. pp 255-77.

Chun, Wendy Hui Kyong. (2008) “The Enduring Ephemeral, or the Future Is a Memory” *Critical Inquiry,* Vol. 35 (Autumn). pp 148 – 171.

Chun, Wendy Hui Kyong. (2006) *Control and Freedom: Power and Paranoia in the Age of Fiber Optics.* Cambridge, MA: MIT Press.

Clarke, Timothy. (2000) “Deconstructions and Technology” in *Deconstructions: A User’s Guide*. ed. Nicholas Royle. Basingstoke: Macmillan. pp 282-305.

Courchesne, Luc. (2011) *McLuhan’s Massage Parlor.* Accessed: 26, October 2016, http://courchel.net/#

Cramer, Florian; Fuller, Matthew. (2008) “Interface” in *Software Studies: A Lexicon.* ed. Matthew Fuller. Cambridge, MA: MIT Press. pp 149-152.

Crary, Jonathan. (1990) *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*. Cambridge, MA: MIT Press.

Crary, Jonathan. (2002) “Gericault, the Panorama and Sites of Reality in the Early Nineteenth Century.” *Grey Room 09,* Fall. pp 5-25.

Cubitt, Sean. (2016) “Aesthetics of the Digital” in *A Companion to Digital Art,* First Edition. ed. Christiane Paul. London, UK: John Wiley & Sons, 2016.

Cubitt, Sean. (1998) *Digital Aesthetics.* London, UK: Sage.

Cubitt, Sean. (2005) *EcoMedia.* Amsterdam, NL: Rodopi.

Davies, Char. (1995) *Osmoses.* Accessed: 26, October 2016, http://www.immersence.com/osmose/

Deleuze, Gilles, Guattari, Felix. (2004) *A Thousand Plateaus: Capitalism and Schizophrenia.* Trans; Brian Massumi. London: Continuum.

Deleuze, Gilles, Guattari, Felix. (2009) *Anti-Oedipus: Capitalism and Schizophrenia*. Trans; Robert Hurley, Mark Seem, and Helen R. Lane. New York: Penguin.

Deleuze, Gilles. (1992) “What is a Dispositif?” in T.J. Armstrong (ed), *Michel Foucault Philosopher*. Hemel Hempstead: Harvester Wheatsheaf. pp 159 – 168.

Derrida, Jacques. (1992) *Given Time I: Counterfeit Money.* tr. Peggy Kamuf. Chicago; London: University of Chicago Press.

Derrida, Jacques. (2000) *Of Hospitality/Anne Dufourmantelle invites Derrida to Respond*. tr. Rachel Bowlby. Stanford University Press: Stanford, California.

Dinkla, Söke. (1994) The History of the Interface in Interactive Art: in Tarkka, Minna (ed.) ISEA (International Society of Electronic Arts) Proceedings (September 19, 1994).
Dourish, Paul. (2001) *Where the Action is*. Cambridge, MA: MIT Press.
Dourish, Paul and Genevieve Bell. (2011) *Divining a Digital Future: Mess and Mythology in Ubiquitous Computing*. Cambridge, MA: MIT Press.
Dunning, Alan and Paul Woodrow. (2001) *The Einstein's Brain Project: The Madhouse.* Accessed: 26, October 2016, http://people.ucalgary.ca/~einbrain/new/main.html.
Electronic Disturbance Theater. (1997-1998) *FloodNet* Accessed: 03, May 2017, https://www.thing.net/~rdom/ecd/floodnet.html
Ekman, Ulrik. (2013) *Throughout: Art and Culture Emerging with Ubiquitous Computing.* Cambridge, MA: MIT Press.
Emerson, Lori. (2014) *Reading Writing Interfaces: From Digital to the Bookbound.* Minneapolis, MN: University of Minnesota Press.
Farman, Jason. (2012) *Mobile Interface Theory: Embodied Space and Locative Media.* New York, NY: Routledge.
Feher, Michel. (1987) "Of Bodies and Technologies". in *Discussions in Contemporary Culture*, *1.* ed. Hal Foster. Seattle, WA: Bay Press. pp 159-165.
Feingold, Ken. *Interior*. (1997) Accessed: 26, October 2016, http://www.kenfeingold.com/artworks90s.html
Fifield, George. (2011) *Act/React: Interactive Installation Art.* Milwaukee, WI: University of Wisconsin Press.
Friedberg, Anne. (2006) *The Virtual Window: From Alberti to Microsoft.* Cambridge, MA: MIT Press.
Flanagan, Mary. (2006) *[giantJoystick]* Accessed: 26, October 2016, http://www.maryflanagan.com/giant-joystick.
Fujihata, Masaki. (1995) *Beyond Pages* Accessed: 03, May 2017, http://zkm.de/en/media/video/beyond-pages
Galloway, Alexander. (2004) "Playing the code: Allegories of control in *Civilization*" in *Radical Philosophy* 128 (November/December). pp 33-40.
Galloway, Alexander. (2012) *The Interface Effect*. Cambridge: Polity Press.
Gaudreault, Andre; Dulac, Nicolas; Hidalgo, Santiago. (2012) *A Companion to Early Cinema.* London, UK: Wiley-Blackwell.
Gaver, William. (1996) "Situating Action II: Affordances for Interaction: The Social Is Material for Design." in *Ecological Psychology* Vol. 8, Issue 2. pp 111-129.

Graham, Beryl and Sarah Cook. (2010) *Rethinking Curating: Art after New Media.* Cambridge, MA: MIT Press.
Grau, Oliver. (2007) *Media Art Histories*, Cambridge, MA: MIT Press.
Greenfield, Adam. (2006) *Everyware: The Dawning Age of Ubiquitous Computing*. Berkely, CA: New Riders.
Hall, Stuart. *Representation: Cultural Representations and Signifying Practices*. (1997) London: Sage in association with the Open University.
Hansen, Mark. (2006) *Bodies in Code: Interfaces with New Media*. London: Routledge.
Hansen, Mark. (2004) *New Philosophy for New Media*. Cambridge, MA: MIT Press.
Hansen, Mark. (2013) "Ubiquitous Sensation: Toward an Atmospheric, Collective, and Microtemporal Model of Media." in *Throughout: Art and Culture Emerging with Ubiquitous Computing*. ed. Ulrik Ekman. Cambridge, MA: MIT Press.
Haraway, Donna. (1991) "The Cyborg Manifesto: Science, Technology and Socialist-Feminism in the Late Twentieth Century." in *Simians, Cyborgs and Women.* London: Free Association Books. pp 127-148.
Haraway, Donna. (1992) "The Promises of Monsters: A Regenerative Politics for Inappropriate/d Others." in *The Haraway Reader*. eds Lawrence Grossberg, Cary Nelson, Paula A. Treichler. (London: Routledge). pp 295 – 337.
Haraway, Donna. (1988) "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies*, Vol. 14, No. 3. (Autumn). pp 575-599**.**
Hayles, N. Katherine. (1999) *How We Became Posthuman.* Chicago IL: University of Chicago Press.
Hayles, N. Katherine. (1999) "Simulating Narratives: What Virtual Creatures Can Teach Us." *Critical Inquiry*, Vol. 26, No. 1. (Autumn), pp 1-26.
Hayles, N. Katherine. (2003) "Flesh and Metal: Reconfiguring the Mindbody in Virtual Environments." in *Data Made Flesh*. ed. Robert Mitchell. (Psychology Press). pp 297-320.
Hayles, N. Katherine. (2013) "Radio-Frequency Identification: Human Agency and Meaning in Information-Intensive Environments." in *Throughout: Art and Culture Emerging with Ubiquitous Computing*. ed. Ulrik Ekman. Cambridge, MA: MIT Press.
Heaton, Kelly. (2001) *The Pool.* Accessed: 26, October 2016, www.kellyheatonstudio.com/reflection-loop-2
Hemmer, Rafael Lozano. (2008) *Microphones.* Accessed: 26, October 2016, http://www.lozano-hemmer.com/microphones.php

Hemmer, Rafael Lozano. (2010) *People on People.* Accessed: 26, October 2016, http://www.lozano-hemmer.com/people_on_people.php
Hemmer, Rafael Lozano. (2001) *Body Movies.* Accessed 03, May 2017, http://www.lozano-hemmer.com/body_movies.php
Heidegger, Martin. (1996) *Being and Time: A Translation of Sein und Zeit*. tr: Joan Stambaugh. State University of New York Press: NY.
Hookway, Branden. (2011) *Interface: A Genealogy of Mediation and Control.* Unpublished PhD Dissertation, Princeton University. Ann Arbor: ProQuest/UMI.
Huhtamo, Erkki. (2004) "Elements of Screenology; Toward an Archaeology of the Screen." *Iconics*, Vol.7. pp 31-82.
Huhtamo, Erkki (2004) "Trouble at the Interface or the Identity Crisis of Interactive Art." *Framework, The Finnish Art Review*. pp 1-9.
Iles, Anthony. (2010) "In the Mud and Blood of Networks: An Interview with Graham Harwood. Interview with Graham Harwood". Mute Magazine, Volume 3, No. 1. *Double Negative Feedback.* Accessed: 03, May 2017, http://www.metamute.org/editorial/articles/mud-and-blood-networks-interview-graham-harwood
Ishii, Hiroshi and Brygg Ullmer. (1997) "Tangible Bits: Towards Seamless Interfaces between People, Bits and Atoms". *CHI'97*. March 22-27. pp 234-241.
Jeong, Seung-hoon. (2013) *Cinematic Interfaces: Film Theory After New Media.* New York, NY: Routledge.
Jeremijenko, Natalie. (1995). Live Wire. Accessed on 26, October 2016. http://tech90s.walkerart.org/nj/transcript/nj_04.html.
Johnson, Ken. (2007) "Back to the future – New technologies meet old ideals at the Boston Cyberarts Festival". The Boston Globe, April 27, 2007. Accessed: 26, October 2016, http://www.boston.com/news/globe/living/articles/2007/04/27/back_to_the_future/?page=full
Jones, Amelia. (1998) *Body Art/Performing the Subject.* Minneapolis, MN: University of Minnesota Press.
Jones, Amelia. (2006). *Self/Image: Technology, Representation and the Contemporary Subject.* London, UK: Routledge.
Jones, Amelia. (2001) "The Body and Technology." *Art Journal,* Vol. 60, No. 1, Spring. pp 20-39.
Jones, Amelia. **(**2002) *The Feminism and Visual Culture Reader*. London: Routledge. First Edition.

Jones, Amelia. (2000) “Survey: Body, Splits” in *The Artist’s Body*. ed. Tracey Warr. London, UK: Phaidon. pp 1-41.
Kaipainen, Mauri, et al. (2011) “Enactive Systems and Enactive Media: Embodied Human-Machine Coupling beyond Interfaces.” In *Leonardo*, Vol. 44, No 5, October. pp 433-438.
Kaufman, Henry. (2010) “The Lightness of Your Touch” in *Leonardo* Vol. 43, No. 4, August. pp. 398-9.
Kember, Sarah and Joanna Zylinska. (2012) *Life After New Media: Mediation as a Vital Process.* Cambridge, MA: MIT Press.
Kember, Sarah. (2013) “Ambient Intelligent Photography.” in *The Photographic Image in Digital Culture*. ed. Martin Lister. New York, New York: Routledge.
Karasic, Carmin. *Hu^mann* (2008-Present). Accessed: 26, October 2016, http://humann.carminka.net/index.php.
Karasic, Carmin. *With Liberty and Justice For All* (1998). Accessed: 03, May 2017, http://www.carminka.net/wlajfa/pledge1.htm
Klein, Richard. (2013) *Brian Knep: Deep Wounds.* Ridgefield, CT: The Alrdrich Contemporary Art Museum. Accessed: 26, October 2016, http://www.blep.com/files/5513/6910/1141/KnepBrochure.pdf
Knep, Brian. (2006) *Deep Wounds.* Accessed: 26, October 2016, www.blep.com/works/deep-wounds/
Knep, Brian. (2008) *Healing Pool*. Accessed: 26, October 2016, http://www.blep.com/works/healing-series/healing-pool/
Knep, Brian. (2003) *Healing I*. Accessed: 26, October 2016, http://www.blep.com/works/healing-series/healing-1/
Knep, Brian. (2007) *Drift Wall*. Accessed: 26, October 2016, http://www.blep.com/works/drift-series/
Krantz, Laura. ““Harvard Unveils Plaque in Memory of Slaves.” The Boston Globe, April 6, 2016. Accessed: 26, October 2016. https://www.bostonglobe.com/metro/2016/04/06/harvard-unveil-plaque-memory-slaves/pjc6lmg8HY0awonqLLE2EP/story.html#comments
Krauss, Rosalind. (2000) *Bachelors*. Cambridge, MA: MIT Press.
Krauss, Rosalind. (1999). “Reinventing the Medium.” *Critical Inquiry,* Winter, Vol 25, No 2. pp 289-305.
Kwastek, Katja. (2013). *Aesthetics of Interaction in Digital Art.* Cambridge, MA: MIT Press.
Latour, Bruno. (1993) *We Have Never Ben Modern*. tr: Catherine Porter. Cambridge, MA: Harvard University Press.

Leeson, Lynn Hersman. *America's Finest.* (1993-1996). Accessed: 26, October 2016, http://www.lynnhershman.com/americas-finest/
Leeson, Lynn Hershman. (1990). "The Fantasy Beyond Control." in *Illuminating Video: An Essential Guide to Video Art*. New York: Apeture/BAVC.
Lévy Pierre. (1997) *Cyberculture*. tr: Robert Bononno. Minneapolis, MN: University of Minnesota Press.
Lister, Martin, et al. (2009) *New Media: A Critical Introduction*. London: Routledge. 2nd Edition.
Lubell, Bernie. (2009). *A Theory of Entanglement.* Accessed: 26, October 2014, http://bernielubell.com/03entangleinstall.htm
Lynes, Krista. (2012) *Prismatic Media, Transnational Circuits: Feminism in a Globalized Present.* Global Cinema Series. New York: Palgrave Macmillan.
MacKensie, Adrian. (2002) *Transductions: Bodies and Machines at Speed.* London: Contiuum.
Marks, Laura. (2002) *Touch: Sensuous Theory and Multisensory Media.* Minneapolis, MN: University of Minnesota Press.
Marvin, Carolyn. (1988) *When Old Technologies Were New: Thinking About Electric Communication in the Late Nineteenth Century.* New York: Oxford University Press.
Massumi, Brian. (2002) *Parables for the Virtual: Movement, Affect, Sensation*. Durham, NC: Duke University Press.
Massumi, Brian. (2011) *Semblance and Event: Activist Philosophy and the Occurrent Arts*. Cambridge, MA: MIT Press.
Manovich, Lev. (2000) *The Language of New Media.* Cambridge, MA: MIT Press.
Microsoft. (2015) Accessed: 26, October 2016. www.microsoft.com.
Microsoft Xbox. (2015) Accessed: 26, October 2016. www.xbox.com.
Microsoft. (2009). *Project Natal Xbox 360 Announcement*. Accessed: 26, October 2016. https://www.youtube.com/watch?v=p2qlHoxPioM.
Microsoft. (2011). *Xbox Kinect Commercial.* Accessed: 26, October 2016. https://www.youtube.com/watch?v=QjjkqBLRALo
McLean, Alex. *Live Coding: Stepping into Software.* Unpublished lecture, Goldsmiths College, University of London. 14/11/2013
McLuhan, Marshall. (1962) *The Gutenberg Galaxy: The Making of Typographic Man*. Toronto, ON: University of Toronto Press.

McLuhan, Marshall and Quentin Fiore. (1967) *The Medium is the Massage.* London: Allen Lane, The Penguin Press.
McLuhan, Marshall. (1964) *Understanding Media: The Extensions of Man.* London, UK: Routledge.
McLuhan, Marshall (1962). *The Gutenberg Galaxy: The Making of Typographic Man.* Toronto, CA: University of Toronto Press.
McQuaid, Cate. "Interactive Works Capture Interplay of Shadows Light." The Boston Globe. June 24, 2005. Boston, MA US.
Merleau-Ponty, Maurice. (1989) *Phenomenology of Perception*. tr Colin Smith. London, UK; Routledge.
Mengbo, Feng. *Q4U*. (2002) Accessed: 16, October 2014, http://www.shanghartgallery.com/
Mengbo, Feng. *Q4U*. (2002) Accessed: 26, October 2014, http://artasiapacific.com/Magazine/64/MultiplayerOnlineCulturalRevolutionFengMengbo
Mistry, Pranav, and Patty Maes. (2009) "Sixth Sense – A Wearable Gestural Interface". In The Proceedings of SIGGRAPH Asia. Article No. 11.
Morin, Marie-Eve. (2012) *Jean-Luc Nancy.* Cambridge, UK: Polity Press.
Mondloch, Kate. (2010) *Screens: Viewing Media Installation Art*. Minneapolis, MN: University of Minnesota Press.
Nancy, Jean-Luc. (2000) *Being Singular Plural.* tr. Robert D. Richardson and Anne E. O'Byrne. Stanford, CA: Stanford University Press.
Nolan, Carrie. (2009) *Agency and Embodiment: Performing Gestures/Producing Culture*. Cambridge, MA: Harvard University Press.
Paul, Christiane. (2003) *Digital Art 2nd Edition.* New York, NY: Thames & Hudson.
Paul, Christiane. (2005) *Reflections of Our Selves – The Art of Scott Snibbe*. Los Angeles, CA: Telic Gallery Catalog Essay.
Paul, Christiane. (2016) *A Companion to Digital Art.* First Edition. ed. Christiane Paul. London, UK: John Wiley & Sons.
Penny, Simon. (2013) "Trying to Be Calm: Ubiquity, Cogntivism, and Embodiment." in *Throughout: Art and Culture Emerging with Ubiquitous Computing*. ed. Ulrik Ekman. Cambridge, MA: MIT Press.
Penny, Simon. (1998) *Traces.* Accessed: 26, October 2016, http://simonpenny.net/works/traces.html
Phelan, Peggy. (2006) "Broken Symetries: Memory, Sight, Love" *The Feminism and Visual Culture Reader*, ed. Amelia Jones. London: Routledge. Pp 118-127.

Phelan, Peggy. (1993) *Unmarked: The Politics of Performance*. New York, NY: Routledge.
Pollack, Griselda (2010) "Editors' Introduction" in *Digital and Other Virtualities: Renegotiating the Image.* ed. Antony Bryant and Griselda Pollack; London: I.B. Tauris. pp 1-22.
Quaranta, Dominic. (2013) *Beyond New Media Art.* Link Publishing. Accessed: 26, October 2016, http://www.linkartcenter.eu/public/editions/Domenico_Quaranta_Beyond_New_Media_Art_Link_Editions_ebook_2013.pdf.
Random International. (2011) *Swarm Study / III.* Accessed: 26, October 2016, http://random-international.com/work/swarm-study-iii/
Rancière, Jacques. (2009) *Aesthetics and its Discontents.* Cambridge, MA: Polity Press.
Rancière, Jacques. (2006) *The Politics of Aesthetics.* ed. Gabriel Rockhill. London: Continuum.
Raskin, Jef. (2000) *The Humane Interface: New Directions for Designing Interactive Systems.* London: Addison-Wesley.
Rode, Jennifer, A. (2010) "The roles that make the domestic work" *CSCW '10* Proceedings of the 2010 ACM conference on Computer supported cooperative work. New York, NY: ACM. pp. 381-390.
Rode, Jennifer, A. et al. (2011) "(Whose) value-sensitive design?: A study of long-distance relationships in an arabic cultural context." in *Proceedings of the ACM Conference on Computer Supported Cooperative Work*, CSCW, 75-84.
Rode, Jennifer, A. (2011) "A theoretical agenda for feminist HCI." in *Interacting with Computers,* 23 (5).
Rodgers, Yvonne. (2006) "Moving on from Weiser's Vision of Calm Computing: Engaging UbiComp Experiences" *Lecture Notes in Computer Science*, 2006, Volume 4206. pp 404-421.
Rodgers, Yvonne, Helen Sharp and Jenny Preece. (2011) *Interaction Design: Beyond Human-Computer Interaction.* 3rd Edition. Hoboken, NJ: Wiley.
Rokeby, David. (2012) *Hand-Held*. Accessed: 26, October 2016 http://www.davidrokeby.com/handheld.html.
Rozin, Daniel. (1999-Present) *Mechanical Mirrors.* Accessed: 26, October 2016 http://www.smoothware.com/danny/
Rozin, Daniel. (2009) *Rust Mirror*. Accessed: 26, October 2016 http://www.smoothware.com/danny/rustmirror.html
Rush, Michael. (1999) *New Media in Late 20th-Century Art*. New York, NY: Thames &

Hudson.
Shaw, Jeffrey. (2002) *Movies after Film – The Digitally Expanded Cinema in New Screen Media Cinema/Art/Narrative* ed. Martin Rieser/Andrea Zapp. London: British Film Institute. pp 268-275
Shaw, Jeffrey. (1996) *conFIGURING the CAVE*. Accessed: 26, October 2016, http://www.jeffrey-shaw.net/html_main/frameset-works.php
Shaw, Jeffrey. (1995) *Place, a users's manual.* Accessed: 26, October 2016, http://www.jeffrey-shaw.net/html_main/show_work.php?record_id=96
Shildrick, Margrit. *Chimerism and the immune system: De-mythologising self/other distinctions.* Unpublished lecture, Goldsmiths College, University of London. 14/11/2013.
Simanowski, Roberto. (2003) *Very Nervous System and the Benefit of Inexact Control*. Interview with David Rokeby. Providence, RI: Brown University. Accessed: 16, October 2014, http://www.dichtung-digital.de/2003/issue/1/rokeby/index.htm
Simanowski, Roberto. (2004) *Concrete Poetry in Digital Media: Its Predecessors, its Presence and its Future.* Dichtung-digital 3. Accessed: 26, October 2016, http://www.dichtung-digital.org/2004/3/simanowski/index.htm
Simanowski, Roberto. (2011) *Digital Art and Meaning: Reading Kinetic Poetry, Text Machines, Mapping Art and Interactive Installations.* Minneapolis, MN: University of Minnesota Press.
Small, David. (2002) *Illuminated Manuscript.* Accessed: 26, October 2016, http://www.davidsmall.com/portfolio/illuminated-manuscript/
Smith, Marquard. (2005) *Stelarc: The Monograph.* Cambridge, MA: MIT Press.
Snibbe, Scott. (1998) *Boundary Functions*. Accessed: 26, October 2016, http://www.snibbe.com/projects/interactive/boundaryfunctions/
Snibbe, Scott. (2002) *Deep Walls.* Accessed: 26, October 2016, http://www.snibbe.com/projects/interactive/deepwalls
Sobchack, Vivian. (2004) *Carnal Thoughts: Embodiment and Moving Image Culture*. University of California Press.
Sobchack, Vivian. (1994) "The Scene of the Screen" in *Envisioning Cinematic and Electronic Presence*, ed. Hans Ulrich Gumbrect and Karl Ludwig Pfeiffer, tr: William Whobrey. Stanford, CA: Stanford University Press. pp 83-105.
Stern, Nathaniel. (2013) *Interactive Art and Embodiment: The Implicit Body as Performance.* Canterbury, UK: Gyliphi Limited.
Stiegler, Bernard. (1998) *Technics and Time, 1: The Fault of* Epimetheus. tr: Richard

Beardsworth and George Collins. Palo Alto, CA: Stanford University Press.
Suchman, Lucy. (2007) *Human-Machine Reconfigurations: Plans and Situated Actions.* Cambridge: Cambridge University Press.
Suchman, Lucy. (1987) *Plans and Situated Actions: The Problem of Human-Machine Communication.* Cambridge, UK: Cambridge University Press.
Suchman, Lucy. (2007) "Agencies in technology design: Feminist reconfigurations." *Unpublished manuscript*. Accessed: 26, October 2016, http://www.lancs.ac.uk/fass/sociology/research/publications/papers/suchman-agenciestechnodesign.pdf
Terdiman, Daniel. (2011) "IBM: Mind reading is less than five years away. For real." C|Net. Accessed: 26, October 2016. http://www.cnet.com/uk/news/ibm-mind-reading-is-less-than-five-years-away-for-real/
Tmema, *Footfalls* (2006). Accessed: 26, October 2016, http://www.flong.com/projects/footfalls/
Tmema, *Footfalls* (2006). Accessed: 26, October 2016, http://www.tmema.org/wordpress_test/footfalls.
Tmema, *Messa di Voce* (2003). Accessed: 03, May 2017. http://www.tmema.org/messa/
Tromble, Meredith. (2006) *The Art and Films of Lynn Hershman Leeson: Secret Agents, Private I.* Berkeley, CA: University of California Press.
Utterback, Camille. (2004) *Untitled 5.* Accessed: 26, October 2016, http://camilleutterback.com/projects/untitled-5/
Utterback, Camille. (1999) *Text Rain* Accessed: 26, October 2016, http://camilleutterback.com/projects/text-rain/
Victoria and Albert Museum. (2011) *Swarm Study / III* Accessed: 26, October 2016, http://www.vam.ac.uk/__data/assets/pdf_file/0011/179336/Random_international.pdf
Virilio, Paul. (1997) *Open sky*. tr: Julie Rose. London, UK: Verso.van Loon, Joost. (2008) *Media Technology: Critical Perspectives.* Maidenhead: McGraw Hill/Open University Press.
Vesna, Victoria. (2006) *Mood Swings.* Accessed: 26, October 2016, http://www.victoriavesna.com/index.php?p=projects&item=7
Wegenstien, Bernadette. (2006) *Getting Under the Skin: The Body and New Media*. Cambridge, MA: MIT Press.
Weiser, Mark. (1991) "The Computer for the 21st Century". *Scientific American*, Vol. 265, No. 3 (September). pp 94-104.

Weiser, Mark. (1993) “The World is not a Desktop”. *ACM Interactions,* November 7. Accessed: 26, October 2016, http://www.ubiq.com/hypertext/weiser/ACMInteractions2.html
Weiser, Mark and John Seely. (1995). “Designing Calm Technology.” Accessed: 26, October 2016, www.ubiq.com/weiser/calmtech/calmtech.htm
Weiser, Mark and John Seely. (1996) “The Coming Age of Calm Technology.” Accessed: 26, October 2016, www.ubiq.com/weiser/acmfuture/endnote.htm
Wheeler, Michael. (2005) *Reconstructing the Cognitive World: The Next Step*. Cambridge, MA: MIT Press.
Wiener, Norbert. (1950) *The Human use of Human Beings: Cybernetics and Society.* London UK: Free Association.
Wiener, Norbert. (1961) *Cybernetics: Or Control and Communication in the Animal and the Machine.* Cambridge, MA: MIT Press.
Wilson, Laetitia. (2011) “Touch me if you dare: tactility in media art” *Int. J. Arts and Technology,* Vol. 4, No. 4. pp 361-372.
Whitton, Fiona. (2005) *No More Walls.* Telic Gallery Catalog Essay.
Zylinska, Joanna. (2005) *The Ethics of Cultural Studies*. London: Continuum.
Zylinska, Joanna. (2002) *The Cyborg Experiments: The Extension of the Body in the Media Age.* London: Continuum.

Key Cited Artworks (in alphabetical order)

Antonin Artaud, *To Have Done with the Judgement of God* (1947)

Janet Cardiff, *Experiment in F# Minor* (2013)

Luc Courchesne, *McLuhan's Massage Parlor* (2011)

Char Davies, *Osmoses* (1998)

Alan Dunning & Paul Woodrow, *The Einstein's Brain Project: The Madhouse* (1995-2001)

Electronic Disturbance Theater, *Floodnet* (1997-1998)

Ken Feingold, *Interior* (1997)

Mary Flanagan, *[giantJoystick]* (2006)

Masaki Fujihata *Beyond Pages* (1995)

Kelly Heaton, *Reflection Loop* (2001)

Kelly Heaton, *The Pool* (2000-2001)

Lynn Hershman Leeson, *America's Finest* (1993-1994)

Lynn Hershman Leeson, *Lorna* (1985)

Natalie Jeremijenko, *Live Wire* (1995)

Carmin Karasic, *Hu^mann* (2008)

Carmin Karasic, *With Liberty and Justice For All* (1998)

Henry Kaufman, *The Lightness of Your Touch* (2004)

Brian Knep, *Deep Wounds* (2006)

Brian Knep, *Drift Wall* (2007)

Brian Knep, *Healing 1* (2003)

Brian Knep, *Healing Pool* (2006-2008)

Myron Krueger, *VideoPlace* (1974)

Rafael Lozano Hemmer, *Body Movies* (2001)

Rafael Lozano Hemmer, *Microphones* (2008)

Rafael Lozano Hemmer, *People on People* (2010)

Bernie Lubell, *A Theory of Entanglement* (2009)

Feng Mengbo, *Q4U* (2002)

Simon Penny, *Traces* (1998)

Random International, *Swarm Study / III* (2011)

Norman Rockwell, *Triple Self-Portrait* (1960)

David Rokeby, *Hand-held* (2012)

David Rokeby, *Very Nervous System* (1986-1990)

Daniel Rozin, *Mechanical Mirrors* (1999-Present)

Daniel Rozin, *Rust Mirror* (2009)

Tero Sararinen, *Hunt* (2002)

Jeffrey Shaw, *conFIGURING the CAVE* (1996)

Jeffrey Shaw, *Place – A User's Manual* (1995)

David Small, *Illuminated Manuscript* (2002)

Scott Snibbe, *Boundary Functions* (1998)

Scott Snibbe, *Deep Walls* (2002)

Stelarc, *Ping Body* (1996)

Stelarc, *The Third Hand* (1980-1998)

Tmema, *Footfalls* (2006)

Tmema, *Messa di Voce* (2003)

Victoria Vesna, *Mood Swings* (2005-7)

Camille Utterback, *Text Rain* (1999)

Camille Utterback, *Untitled 5* (2007)

Roy Want, *Internet Stock Fountain,* (1999)