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(re)new configurations

Beyond the HCI/Art Challenge: Curating re-new 2011

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Re(new)configurations

Beyond the HCI / Art Challenge: Curating re-new 2011

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ABSTRACT

Whereas many good things can be said about the ability of digital media to facilitate creative transformations the actual reconfiguration that is taking place in the interactive media art field has only been superficially documented and understood. The practice-based innovation and process of 're-newing' the configurations found within interactive media art will appear to be driving the transformations on a cultural scale, and are the focus of this paper.

Categories and Subject Descriptors

J.5 [**Copmuter Application**]: Arts and humanities – *Architecture, fine arts, linguistics.*

General Terms

HCI Design, Human Factors, Post Digital Phenomenology, Theory.

Keywords

Museums, participation culture, experiments, interaction design.

1. INTRODUCTION

A long row of reconfigurations precondition and contextualize the art-ttechnology-science relation: Sonification, conceptual aesthetics, electric light, intermedia, concretism, minimalism, electronic media, performance aesthetics, data, HCI, real time (telematics), embodied (reality based) interaction (Hansen, 2001) (Jacob 2006), and nano/bio science. In this paper I position all those reconfigurations as part of a game of conceptualizing the A-T-S relation. It should be noted that the different reconfigurations are not to be compared with 'periods'. All of the reconfigurations mentioned above are still very active – and, of course, in a way they themselves are just metaphors of, as it were, 'transactions' in a sea of conceptualizations that all, in some way or other, point back to the necessity and need to work with and understand the A-T-S relation. As such, they are part of a very complex and overall structural change of the art-field (and humanism before the advent of human sciences) that has taken place since the mid 18th century (perhaps even before that). Transactive art is not a new thing.

Thus, my concern is that of the relational (re)configuration of art, technology and science (a-t-s). The argument: Since the a-t-s relation is not fixed but has been, and still is being, transformed it is important to understand and examine the status and modality of that relation. What is driving the transformation?

2. BEYOND TRANS-AESTHETIC PRACTICE

Almost ten years ago, curating a project called SeeSound / Look At the Music, I wrote a text that began with the conclusion, that 'Sound Art is a Trans-aesthetic Issue'. (Søndergaard, 2001)

Today, that conclusion seems like it was written a very long time ago – in many senses. Whereas it may be said, as it may appear, that the trans-aesthetic project is still very much active, it is NOT in the category of aesthetics - of any aesthetic category - that the greatest challenges and changes have emerged within the last 10 years. It is perhaps not even as ART that the practice and struggle of the media pieces on this years re-new exhibition operate.

What may describe them, then?

Well, first off, we like to place them within the (very wide) category of 'Interactive Media Art'. If we investigate the metaphor of the 'interactive media art' in a broader context, it should be clear that we are dealing with a 'fluent' zone, which has been, and is being, reconfigured continuously. Thus, whereas it is true that Interactive Media Art is changing the categories of aesthetics this is not necessarily a new paradigm in itself but rather, I would argue, the latest reconfiguration of the relation of art, technology and science (the a-t-s relation). The process of reconfiguring, on the other hand, IS the paradigm, and re-new takes it upon itself to investigate this paradigm of reconfigurations.

The term reconfiguration needs to be introduced. First of all, 'configuration', when used most commonly, is denoting computers and 'system configuration' of hardware and software. It is a term that implies that, in order to make things work in an optimum way, they have to be configured proberly. Hardware and software has to be in tune, as it were. In classical mechanics, the configuration space is the space of possible positions that a physical system may attain, possibly subject to external constraints. The configuration space of a typical system has the structure of a manifold; for this reason it is also called the configuration manifold. Figuratively, configuration is a structuring practice in a complex environment, which allows a certain amount of flexibility. Reconfiguration, then, is substantially and structurally different from the concept of 'remediation' (Bolter, 1999). Whereas the argument of remediation is centered upon the assumption that 'New digital media oscillate between immediacy and hypermediacy, between transparency and opacity' which 'is the key to understanding how a medium refashions its predecessors and other contemporary media' (Bolter, 1999), the point of 'reconfigurations' is that it does NOT primarily build upon (new) media or mediacy but is

founded in an investigation of the transactive relationality of art, technology and science.

The a-t-s relation is dependent on configurations – structuring practices – in order to be succesful. However, it is not the same configuration every time… configurations of the a-t-s relation change, are transforming in tune with the demands and transdisciplinary issues in play.

It is possible, I would argue, to establish a long row of reconfigurations preconditioning and contextualizing the a-t-s relation: Sonification, conceptual aesthetics, electric light, intermedia, concretism, minimalism, electronic media, performance aesthetics, data, HCI, real time (telematics), embodied (reality based) interaction (Hansen, 2001) (Jacob 2006), and nano/bio science. The point would be to position all those reconfigirations as part of a game of conceptualizing the A-T-S relation. It should be noted that the different reconfigurations are not to be compared with 'periods'. All of the reconfigurations mentioned above are still very active – and, of course, in a way they themselves are just metaphors of, as it were, 'transinteractions' in a sea of conceptualizations that all, in some way or other, point back to the necessity and need to work with and understand the A-T-S relation. As such, they are part of a very complex and overall structural change of the art-field (and humanism before the advent of human sciences) that has taken place since the mid 18th century (perhaps even before that). Transinteractive art is not a new thing.

Thus, my concern is that of the relational (re)configuration of art, technology and science (a-t-s). The argument: Since the a-t-s relation is not fixed but has been, and still is being, transformed it is important to understand and examine the status and modality of that relation. What is driving the transformation?

At this point, it may be worth stating what this article is not about: It is not a claim to yet a new theoretical 'reading' of interactive media art as a new media art, or as a 'new' genre. It does not seek to predefine the argument into any specific theoretical camp. Nor does it interest itself with 'new media' as 'new', in the sense that it converge or break with 'old' media in some sort of fake chronology of development due solely to technological progress. Thus, it would perhaps be possible, in search of valid metaphor that may replace 'transaesthetic art', that the re-new exhibition 2011 describes, tentatively, a 'transinteractive', or a 'transactive media art'.

In fact, transactivity, in my view, is the very defintion of the 'fluent' zone – instead of describing a rather narrow albeit interesting aesthetic behavior, it metaphorizes a complex field of practices that draws upon a still wider range of non-aesthetic influxes. The 'fluent zone' is a game-field of conceptual and contextual investigation and production. For artists, it becomes a question of how to navigate the fluent zones – how to practice, as it were, in the A-T-S relation. A question of entering, or at least experiment with, new roles… as scientific investigators or something completely different...?

Ultimately, each reconfiguration is imperfect – there is no 'intention' of the transactivity. it is not a conscious field of collectice production, but rather a row of similar patterns or algorithms that an otherwise undefinable group of people and a set of technological, scientific, and/or artistic mindsets carry out.

3. HCI / ART CHALLENGES

The 'relationship' between humans and computers – often termed HCI, Human-Computer Interaction, should be explained shortly here. It is the technical term for understanding how this is happening in practice. We need to understand the new parameters of reality and develop an understanding of 'the museum as interface.' The research in Human-Computer Interaction has run through some interesting phases, since the development of the digital computer in the 1940s to the development of the 'mouse' and the 'GUI' – Graphic User Interface by Xerox in the 70s. In the 1980s Macintosh made GUI a standard for all so-called personal computers – or, PCs.

But the true potential of HCI remained still somewhat unrealized in a critical domain since the contact of human and computer is still very much happening on the terms of technological interface – which is mostly grasped academically by computer science and other variants from the field sometimes termed as 'hard science'. However, several different attempts of critical analysis have looked further into the 'cognitive' or 'phenomenological' levels of HCI. In the 1990s, and founded in linguistic research, Mark Johnson and Mark Turner formulated the notion of the embodied mind and conceptual integration as a structuring principle of knowledge (Johnson; Turner). In the last decade, the idea of the embodied mind, bodily based rationality, cognition based upon physical and bodily active relations with the surrounding world have entered the stage of artistic as well as aesthetic research.

Paul Dourish, on the other hand, should be mentioned as one who wants to nourish HCI from a phenomenological stance, and claim that one should recognize "the embodied practical action in the world as the foundation of our conscious experience" (Dourish).

A kind of interesting middle ground between those two theoretical camps emerged around the year 2000. Based on practical interface research, often in artistic-based projects, the idea of the 'implied' body present in every interaction took this into the field of cultural and psychological representation.

As an active critical source of transforming cultural patterns and forms of representation, the Augmented Reality Project from 2000 was important. This transformation happened on two levels: 1) the transformation of a few 'common' public spaces into many potential 'public spaces' – many of which are only ubiquitously present or simulating 'real' space.; 2) critical faculties, if they exist, are almost entirely defined by the culture of everyday life and commerce – undermining the traditional authority of the museum and the 'implied' visitor The two examples – 10 years apart – show the premises of a expanding digital field as an aesthetic and artistic field and, more importantly, I would claim, point towards two important reconfigurations of interactive art.

The first, and early, example is the "Augmented Reality Project, Part 1-3" (1998-2008) by the Danish media performance group, Boxiganga (a.k.a. Kjell Petersen and Karin Søndergaard), which was shown at The Museum of Contemporary Art in Roskilde, Denmark. The other is Electrohype 2008, the fifth version of the Swedish biennale on electronic art, which was shown at Malmö Konsthal.

Augmented Reality Project by Boxiganga was a project designed to investigate the invisible patterns of communication in a museum space. It is also an experimental research project concerning augmentation as a strategy within the paradigm of reactive media (Søndergaard, 2009), where the focus is on the experiences that take place on the edge of our senses, as they put it:

This edge, the fusion of performing mind and technological body, is clearly visible in the practice and artistic strategy of Boxiganga. In 1998, they formulated the principles for an environment for exploring the use of the relation between humans and computers in an artistic/ performative exploration of the museum space. Building from a tradition of Noh drama and "classic" performance art practice in the 1980s, the augmented reality project was to be realized in three parts: "Relational Mechanisms" (1998-2000), "Constructed Interactive Spatiality" (2000-2005), and "A Sensing Sculpture in Public Space" (2005-2008). The result of the first part of the project was shown at The Museum of Contemporary Art in Roskilde, January - March 2000 – and later, on the first Electrohype at Bella Center in Copenhagen. Working with a network of Apple G3-computers, the basic principle was to place the computer and data processing in the background; this is a precondition of achieving the illusion of reality in the "human-computer interaction".

Art, the way Boxiganga sees it, is conceived as a network of open systems. The Augmented Reality Project part 1 is organized in four complex, spatial constructions: *Smiles in Motion*, *Mirrechophone* (Mirror+Echo+Phone), *I think You — You think Me*, and *The Different Stories of a Bride and Groom*. Each construction – or: augmented installation - plays with the notion of constructing the preconditions for how we are experiencing actual phenomena and relations in physical space, through hidden data processing.

In our multimedia set-ups, the computer is relegated to a place where data is recorded, processed and transmitted. We can then be concerned with multimedia in a context of Augmented Reality, with creating spatio - sensory, perceptive and reactive constructs. (Karin Søndergaard og Kjell Pedersen, 1998-2008)

Boxiganga works with specific strategies, which uses the audience's actions and reaction as a framework for the creation of an augmentation of reality. But the real power of the project lies in the critique and resulting augmentation of the museum space. It is a pretext for making it possible to experience the construction of reality and by the same token enables the audience to reflect upon their interpretation of this experience – the first stage, I would claim, in an electrohyping of the Art Musem:

In this way, the visitor also becomes involved in an augmenting of what can be sensed and is likewise brought to an augmented state of interpreting that experience. (Karin Søndergaard og Kjell Pedersen, 1998-2008)

Smiles in Motion, the tolargest installation, clearly shows how Boxiganga works with bringing the "edge" of sensing into the experience of the audience. This installation carries out the premise that it always takes at least two persons using it, in order to have an experience: You exchange smiles in the chairs – through real time video transmission of the smile between the chairs; and through motion sensors that are activated by the laughs of the other person.

... These 'sensitive' sculptures ... promote relationships through experiences that may take place at the edge of the senses (Karin Søndergaard og Kjell Pedersen, 1998-2008).

The reactive edge of Human/computer experience is investigated further in the augmented installation, *I Think You – You Think Me*. Here, the reactions themselves are staged by two rather aggressive computer-generated personae – Robert & Roberta. They react to any person entering their stage (looking a bit like a basketball field); first, by being mildly curious; but then, as you move closer to one of them, by showing more and more feelings of the more angry kind – i.e., the closer you get to Robert, the more aggressive he gets (at least, that is our conventional interpretation of their reactions).

This points towards the important notion that what really is being augmented in the Augmented Reality Project is the interface itself:

Augmented Reality involves the body through the installations presented here, and in doing so, proposes 'conversations' at the edge of our normal means of sensing and communicating. (Karin Søndergaard og Kjell Pedersen, 1998-2008)

The reactive installation *Mirrorechophone* shows another way of researching the edge of normal sensing; here, two persons exchange faces – gradually, the different parts of your face is being transmitted to the other persons mirror-image; and vice-versa.

All the mentioned installations are staging an augmentation of relationships, where the human/computer relationship is not so much about the interface itself, but about how relations occur and develop between human beings – how they react on each other:

In fact, the basic function of the installations often requires that two visitors enter into a relationship and investigate an interpretation of the contents of that relationship. These installations then are situations for augmented relationships. (Karin Søndergaard og Kjell Pedersen, 1998-2008)

Thus, it may be interpreted from this, that one important condition for the critical impetus of the implied producer is the activation of the body and senses as well as the 'tangibility' of communication: on the edge of our normal perceptive system. The phenomenology of this situation is not clear – either we have to think in alternatives to phenomenology (and I think we should), or the epistemology behind may still emergent.

But let us consider the possibilities: The relation of humans and computers consists of 1) extended sensing (the body using technology to sense and discover what is outside the grasp of our normal sensing apparatus); and 2), as Mark B. Hansen has pointed out, affective communication (technology receiving consciousness features using the body) (Hansen, 2001). In effect, what we have is a redefinition of the art museum as a reactive interface – a new media that involves the public in an active communication on the edge between past and future values. Even phenomenology is expanding – into non-sensory, ubiquitous fields. Here, much like in the literature of 20th century, poetry and creativity returns – and may even have moved art beyond known configurations in order to reach a different kind of critical momentum.

There is a hint of the re-configuration modality in this formulation since it presupposes an activity of the spectator involving not only the imagination but a construction of a reality as well. The Augmented Reality Project thus could be said to stage a reconfiguration modality that oscillates between an embodied human-computer interface and bodily perception. A cognitive game is unfolding itself where technology is creating a situation that enables the visitor to produce his/her own conception of the reality being simulated by Boxiganga.

It is a rule rather than an exception in the challenges conducted in-between art and HCI that it takes place both in a cognitive and social field of space-production.

1) Humans and computers are related, and 2) technology enhances and transforms the human faculties of art-perception and understanding. 3) HCI challenges art practice on many levels, including 1) and 2).

Examples of this could be Bill Vorns 'Evil/Live 2' (2009), which consists of three large panels of electrical bulbs that each represent a life (light) that is created and dies (turned off). This visual movement of light is based on an algorithm called 'game of life' which, in the context of the exhibition creates a meta-comment on the position you are in as visitor: you are playing a part, being a producer, in the 'game of life'.

The digital algorithm of simulated reality is everywhere – but this ubiquitous evolution of digital life is being represented in Bill Vorns installation, making the implicit producer visible and part of an electronic perception of the world.

Jessica Field's 'Semiotic Investigation into Cybernetic Behavior' heavily underlines the potential powerful dialectics of the impled producer. Two robots, ALAN and CLARA are built from miscellaneous materials and media (new and old). Both are limited in the possibilities of 'sensing' and 'perceiving' the world – but not in the same way. ALAN can only 'sense' movements and CLARA can only 'sense' distance. They try to help each other (they are linked by a network) so that they may interpret what is happening around them when someone is approaching them. They are not very successful in finding out what is going on, or anything else for that matter, and their reactions are bordering the paranoid giving us a sense of 'a couple of poor robots alone in the world' – 'is anyone there?'; 'Someone is moving close to us' etc..'Semiotic Investigation into Cybernetic Behavior' is pointing technology back at us, alone in front of the installation in the middle of a process of understanding. Their limits are our limits, in the sense that we know as little about them as they know about us.

4. RE-NEW 2011: BEYOND THE HCI/ART CHALLENGE

What cybernetic behavior does not achieve in this semiotic investigation is an embodied and reality-based interaction with a space with real people in it. The augmentation of that space into the cybernetic reality is a reductive, not a productive one. To (re)connect the cybernetic 'real' to the reality spaces of the human cognitive game-of-life is the real challenge.

At re-new 2011, The HCI / art challenge, therefore, is presented as a situation under construction. This situation is being investigated by the selected artists:

4.1.1 Peter Tilg: Succubus.
http://www.petertilg.com/sukkubus.html.
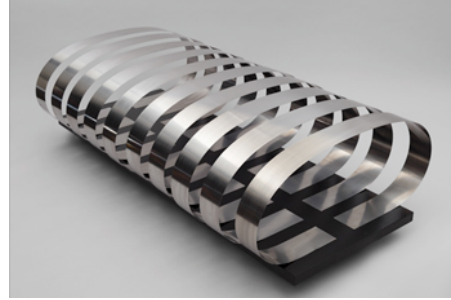
Figure 1 Succubus

"Code = The Demon. The unseen force."

Succubes is a sound sculpture driven by electromagnetism and code controlled by a microcontroller (Arduino). The movement of the sculpture's metal components is generated by electromagnets that are stimulated by a code based on algorithm, composed as a loop with a duration of approximate 3 minutes. After a one minute break the cycle is repeated with additional information that makes the following cycle look and sound different from the previous. The artist has described it as: "After time the sculpture becomes more active like a creature awakening and goes to rest after the given cycle."

4.1.2 Alexander Glandien: Fragmented Body.
monitor animation / lyd installatio

http://www.glandienale.de/daten/fragmented_body/index.html
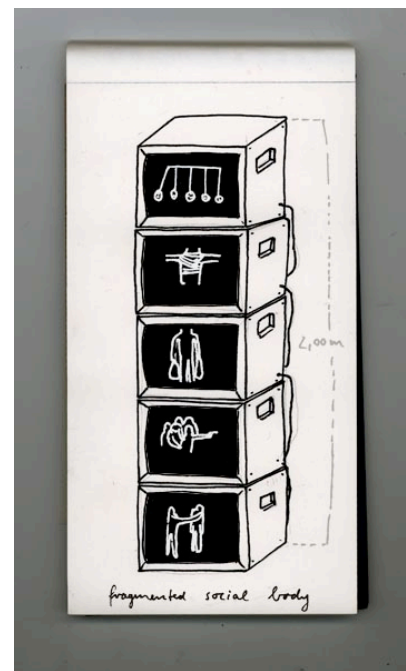
Figure 2. Fragmented Body

In Alexander Glandiens installation the human conditions of pain, love, coexistence, corporeality and violence forms the fragments of a monolithic media body split into five parts. On each of the five screens a hand-drawn video loop repeats one of these conditions underlining both the Sisyphean nature of being human

but also parts of the very nature of being human. That way the thoughts and the technology behind the work join hands and represent several aspects of human conditions of life. The loop effect produces a continuous repetition of the shown messages and each of these sequences are accompanied by their own particular sound that when mixed with the other creates the polyphonic soundtrack of this fragmented body. This way the video column presents itself as a self-contained media body visually fragmented but assembled in the cacophonic soundtrack of human conditions.

4.1.3 Matthieu Cherubini, Afghan War Diary, ongoing
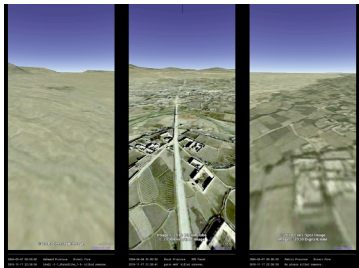
Figure 3 Afghan War Diary

The story of the American war in Afghanistan is retold through the virtual ongoing killings of the computer war game, Counter-strike. The website connects to an online Counter-Strike server to register real time frags (when one player kills another). These continuous frags trigger an online search by chronological order in Wikileaks' Afghan War Diary database – a database containing over 75,000 secret US Military reports, where the majority of these are lethal military actions involving the US military. Using the retrieved data the website displays the geographic locations of these attacks on Google Earth in a three-column layout. The killings done by the Counter-strike players generating the silently zoom and movement of the pointed eye of Google Earth thus generate a neutral computational- interfacial narration and localisation of war in Afghanistan.

4.1.4 Moon Young Ha & Dennis Miller, Amorphisms, 2008
Video 5:47. Loop.

http://www.youtube.com/watch?v=nOdKEHp8SSk (Lyd / animation installation).

An indefinable, abstract animation occurs to absorbing sounds of classical instruments. It seems as if the music and its liquid, colourful backdrop is in continuous transition. The fusion of Moon Young Ha's music and Dennis Miller's sequence of images portrays the encounter between form and the unformed, between a narrative structure and its opposite, which can lead one to ask what form and narrative, really is? Amorphisms, is however the state of amorphous, the state of being formless, and the dissolving of the compositional structure is thus an attempt to depict a state of being without form more than the unformed itself. In this way Amorphisms expands traditional understandings of technology, since its highly controlled structures incorporate abstract and emotional qualities. At the same time the work puts into contrast the different forms and narrative structures within images and

music. In which ways are music able to tell stories? And how can images as existing physical objects depict something formless? Despite the simplicity of Moon Young Ha's musical score, only using pre-recorded piano and harp samples, the music creates a certain fluidity where it is impossible to define the beginning and the end. Combined with Miller's highly controlled visual concept, Amorphisms becomes rather complex, but its complexity is also exactly what makes it possible for new layers of meaning to evolve.+

4.2 Web-political Blends

4.2.1 Baden Pailthorpe: Lingua Franca: Google Translate vs. George Orwell
Interaktive Installation

'Lingua Franca: Google Translate vs. George Orwell' embraces the many facets of a world, where the Internet has great impact on our lives. He wants to examine the boundaries and meaning of the language through Google Translate.

Lingua franca: a language that is adopted as a common language between speakers whose native languages are different.

The codes and algorithms of Google Translate have made Orwell's words meaningless and consequently the work points to the many errors that exist in a digital world along with a new lingua franca.

4.2.2 Julian Scordato: Atropos (2009)
Soundinstallation – 4 min 30 sec to infinite.

'Atropos' is the technological and complex work of Julian Scordato, but also the Greek word for 'inflexible' or 'without bends'.

Through a series of randomly generated sounds, Scordato wants us to feel like being in a dystopian environment. This composition is what is called a 'real-time composition' as the musical elements are arranged in the here and now, based on a series of groups of 'molecules'. Scordato loans the form and codes from the field of genetics, so you can say that it mutates and develops – but always inside the scope of the form and codes, hence the title 'Atropos'.

4.2.3 Susanne Wiegner: just midnight
3D-animation – 3 min 37 sec.
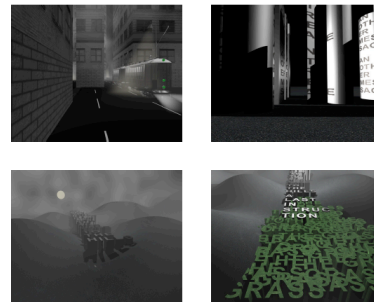
Figure 4 Just Midnight

'just midnight' is a poem by Robert Lax, that describes a temporal and spacial situation by very minimal means. For Robert Lax the composition of the letters and words on the paper was very important. And so he created one of his vertical typefaces, that

was transferred for the film. The letters become spaces and actors, crossed and circled by the camera. Step by step a three-dimensional formation of words is generated and disappears again in a sheet of paper.

4.2.4 Richard Schwartz: Crossings
Responsive media installation – video.

Figure 5 Crossings

The driving force in the installation by Richard Schwarz is the question of time and how we get our understanding of time. It is said that one of the problems according to this understanding is the difficul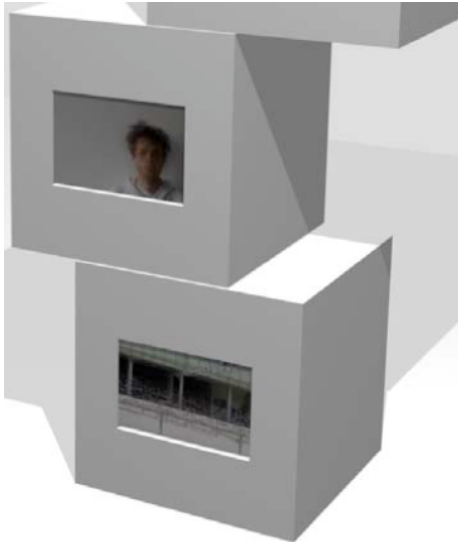ty to picture time. As cameras can both do long exposure or high speed there are various methods that use pictures to analyze the movements of sportsmen or workers through time in order to optimize and save time – thereby making the runner go faster or the worker more effective. But as Schwarz states "history has shown, that speed and acceleration have not released us from pressure." And one could add that it has not brought us closer to the concept of time either. Therefore the installation is trying to put a different focus on time. Inspired by the methods for analyzing and optimizing Schwarz asks if there is a way to get time into a picture that gives us a hint on how we travel through time?

5. CONCLUSION
In this paper, I have argued that HCI and art enters into a situation where a large number of reconfigurations of the a-t-s relation are constantly in process. HCI and art are challenging each other, but to get a graps on the real potential of HCI / art, we have to move beyond the challenge itself. The point being: Always be on the lookout for new reconfigurations – and of asking unconventional artistic, technological and scientific questions.

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Synthetic Biology and the Emotions (after Charles Darwin)

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ABSTRACT

Rapid changes in science, technology and new media will lead to more sophisticated ideas about what it means to be human, in thought, body, emotional response and artistic expression. New relationships will form between humans, machines and animals with the human functioning as a networked resource that can be accessed globally over the internet.

Genetically emotionally or otherwise enhanced individuals could become the fashionable norm; synthetic biology could replace plastic surgery, with the further complication of not knowing where those genetic modifications will take them as individuals or us as a species.

This paper documents both the technical and theoretical development of the collaborative interactive new media video project "The Emotions (after Charles Darwin)" which explores some of the above concepts. "The Emotions" first tries to establish the existence of the universality of emotions at a biological level, as empirically measured and documented by the results of the control group (non-autistic subjects, as the goal is to document "normal", i.e. universal emotional response) at the Brain Mind Institute in Switzerland. Secondly, it suggests the potential for subsequent futuristic misuse through genetic and or technological modification (demonstrated by the observer's ability to interactively modify or transform a given emotion's video stream at will).

Keywords

Cognitive and computational neuroscience, embodiment, bioethics, emotions, interactivity, Plutchik, amygdala, face perception, synthetic biology.

1. INTRODUCTION

Princeton's WordNet web dictionary defines universal behavior as a "convention or pattern characteristic of all members of a particular culture or of all human beings; *some format of religion seems to a human universal."*

Donald E. Brown, an anthropologist, shares that view and believes that certain behavioral traits including facial expressions of emotions are common to all humans irrespective of culture. He compiled a list of approximately 400 behavioral traits and their implications that is included as an appendix in Steven Pinker's book *The Blank Slate: the Modern Denial of Human Nature.* For example "ambivalence is meant to suggest that males engage in more coalitional violence" and "the facial expression of anger suggests rape proscribed."

Although Darwin was incredibly prescient in his discoveries about what role the nervous system might play in regulating emotions, developments in neuroscience did not begin until well over a 100 years later, partially due to the lack of sophisticated recording and analytical tools such as neuro-imaging and computation made easier, enhanced through software algorithms and applications executed on computers.

This co-mingling of previously unrelated and seldom overlapping disciplines means that new media itself, its practices, applications and theories will continue to be in constant flux and development. It used to be standard practice in beginning art classes to ask what is art? But now the question is not only what is art, but who or what makes art (i.e., sometimes art now takes on a life of its own, extending beyond the control of its creator).

For example, the interactive new media video project "The Emotions (after Charles Darwin)" attempts to prove the universality of emotions by transcending cultural categorizations such as species, race, age and gender and instead relates emotions to their neurobiological origins and functions. It further suggests that once empirically known, that this information can be used to genetically or technologically alter human emotion(s) in individuals or groups to create new beings or new emotional interiors that better conform to culturally desirable behaviors. This of course raises bioethical questions about the future nature of life for humans and animals; the embodiment and containment of the self and its symbiotic integration and enhancement with technology and machines.

"No Longer is human existence defined by its unique temporal and spatial coordinate; one body, one life in a specific space and time. Instead human life is increasingly defined by the agential, instrumental deployment of resources for bodily renewal, both its temporal and spatial context subject to extensions or translocations", according to Susan Merrill Squier, in *Liminal Lives: Imagining the Human at the Frontiers of Biomedicine*.

As Joanna Zylinska states in her book *Bioethics in the Age of New Media,* "This is by no means to suggest that the human has been reduced to information in the age of new media and that we can therefore do away with embodiment; it is only to point to the emergence of new discourses of the human which undermines its centering around some fixed biological characteristics or moral values."

She adds, "The human does not disappear from the kind of nonhumanist bioethics envisaged here: in fact, it functions as its strategic point of entry. What we are dealing with, however, is not so much a "human being" understood as a discrete and disembodied moral unity but rather a "human becoming"; relational, co-emerging with technology, materially implicated in sociocultural networks, and kin to other life forms."

Neil Badmington in *Alien Chic* talks about how recent trends in techno-science have unsettled post humanist critics. For example he talks about how Donna Haraway's "Cyborg Manifesto (1991)" first deconstructed humanist relationships such as organism/machine, reality/fiction/human/animal, physical/non-physical and self/other and replaced them with chimeras; cyborgian fabrications of machine and organisms. He goes on to say that the latest trend in post-humanism seems to involve merging with animals, which ironically was not a concept alien to Darwin 140 years ago when he studied, documented and sought to define similarities with animals' emotions and our own.

Badmington quotes numerous television and news reportage from *Newsweek* to *Nature*, who discovered that reason, tool use, tool making, altruism and language are not unique to humans, neither I might add, is making or performing music (last year I presented "Birdsongs; the Language Gene", in the "Sonic Fragments Soundart Festival" at Princeton University which digitally reconfigures bird songs into human music).

2. DARWIN AND NEUROSCIENCE

Over a hundred years ago, Charles Darwin theorized that the universality of emotions existed in humans and animals at a biological level. He posed questions such as can we feel happy, sad or fearful when we are alone or are emotions a unique result of being with others in a social situation? He suggested that the reason for the universality of emotions was due to an underlying biological basis that communicated our needs to others. We experience an emotion and specific areas of the brain send signals to specialized muscle groups that respond to communicate our feelings.

Darwin believed that the following principles were responsible for most of the expressions and gestures involuntarily exhibited by humans and animals while experiencing emotions: habitual actions initiated by certain states of mind in order to relieve or gratify certain sensations, habitual inverse actions initiated by the exact opposite states of mind and actions initiated by the nervous system mostly independent from both will and habit.

In post Darwin times, scientists study what regions and chemicals in the brain control different emotions and if these regulators can be modified to elicit alternative results. For example, emotions are studied to determine their affect on the immune, cardiovascular and endocrine systems. There is also the possibility for misuse, what if we could invoke certain emotions in people at will through a drug or by permanently or temporarily altering structures in their brain? Perhaps at the same time we could remove their ability to feel remorse or guilt. Could this form of genetic intervention be used randomly against individuals or during war-time to induce people to commit violent acts?

The neuroscientist Joseph Ledoux says the brain has not evolved to the point where connectivity exists for cognitive systems to control our emotions. But even so, he says that wouldn't necessarily be good, because Mr. Spock (a character lacking in human emotions from the 60's TV show Star Trek) may not be an ideal kind of human that we'd like to become. Additionally, Ledoux talks about futuristically controlling undesirable emotions such as fear through drug regulation, stating that once we can identify the neurotransmitters that are involved in producing fear,

we could create a chemical profile of fear in the amygdala and then develop a drug to attack it.

The amygdala is an almond-shaped structure in the frontal portion of the temporal lobe near the hippocampus in the brain that allows us to both feel and perceive negative emotions. It regulates our reactions to events that are important for survival such as the presence of danger, sexual partners, enemies, food and those in need. The amygdala works as a system with other related structures because unique sets of regions in the brain are connected to each other and work together to control different emotions. It also plays an important role in emotional regulation and studies have shown that emotional disorders can manifest themselves both functionally and structurally (it can become asymmetrically enlarged in depressed individuals). Patients who have had their amygdala destroyed due to stroke are able to recognize all emotions expressed by facial expressions except for fear.

The amygdala's connectivity with the neo-cortex is also not symmetrical; the amygdala's connection to the neo-cortex is much stronger than the neo-cortex's connection to it (as shown in David Amaral's studies of primate brains), which in part explains, according to neuroscientist Joseph Ledoux, why emotions are often hard to turn off once initiated. The body also releases hormones and long acting substances at the exact time that we experience strong emotions. Additionally, there is a relationship between the visual system and emotions. In *The Expressions of the Emotions in Man and Animals*, Darwin talks about the importance of visual cues when seeking mates, prey and avoiding danger, therefore it's not surprising that studies show that the visual cortex is more activated in response to visual emotional stimuli than visual non-emotional stimuli.

Darwin acknowledged individual variance in emotional reactivity due to differences in development (for example he noticed that insane persons had strong passions which they openly expressed). But he never addressed the idea of emotion regulation which didn't come into being until the development of neuroscience a hundred years later.

Davidson defines the study of individual differences in emotional reactivity and emotion regulation as affective style consisting of the threshold to respond, the magnitude of the response, the rise time to the peak of the response, the recovery function of the response and the duration of the response. The duration of emotional responding is important in understanding individual differences and can also indicate psychopathology since some mood disorders are associated with either an abnormally early onset or inability to turn off a response quickly enough.

3. THE EMOTIONS

"The Emotions" is a multi- channel interactive video where each of four panels will display close-up graphic, moving images of men, women and children of all ages and races, expressing a specific emotion such as happiness, sadness, fear or anger (categorized as such by the results of the control group). Each panel's images will morph/blend to form a continuous stream of soundless images whose emotion will not be identified so as to allow the viewer the ability to form their own conclusion as to what emotion they feel is being expressed (which will also test the universality of emotions).

A fifth panel will record live audience reaction/ participation at the actual site of the installation in order to test mirroring behavior of the emotions displayed in the other four panels. Additionally the observer will have the ability to interactively modify, convert or morph emotions; demonstrating a futuristic ability to alter emotions genetically and or technologically at will. "The Emotions" is a collaboration with the Brain Mind Institute in Switzerland whose experiments done using my photographs validates their universality as images of specific emotions and forms the basis for the video.

Shortly after "The Emotions" was accepted into the New Media Collection (Rhizome) at the New Museum, I was contacted by Britt Russo, a neuroscientist who had seen the project posted on their web-site. She asked me if I would be interested in collaborating with her lab at the Brain Mind Institute in Switzerland and would allow them to use my photographs for emotion perception research in autistic subjects. The lab had never used photographs from life before, only those of staged actors. In return they would present my work at international meetings and publish it in scientific journals. Although the lab wanted to use my photographs for research in autism; a neurodevelopmental disorder that impairs social functioning, I knew I would be primarily interested in the results of the control group as I wanted to document what was perceived as "normal" or "neurotypical" response and therefore universal, not the responses evidenced solely in autistic patients. However I thought that I might learn more about emotional response in general; its measurement and analysis by including the observation of autistic patients since I had the opportunity.

At the first meeting I had with Britt in Manhattan in the third week of December 2007, she informed me about the institute and its practices. The Brain Mind Institute was considered a world-class research facility for neuroscience whose goal was to synthesize and create a knowledge base by advocating a multidisciplinary approach across disciplines and by linking different research laboratories.

As taken from their web-site: "The mission of the Brain Mind Institute is to understand the fundamental principles of brain function in health and disease, by using and developing unique experimental, theoretical, technological and computational approaches. The scientific challenge addressed by the BMI consists in connecting different levels of analysis of brain activity, such that cognitive functions can be understood as a manifestation of specific brain processes; specific brain processes as emerging from the collective activity of thousands of cells and synapses; synaptic and neuronal activity in turn as emerging properties of the biophysical and molecular mechanisms of cellular compartments." The group that I would be working with was headed by Dr. Nouchine Hadjikhani; a specialist in neuroimaging.

3.1 Testing at the BMI Lab

In the lab, functional magnetic resonance imaging (fMRI), Electroencephalography (EEG) and magnetoencephalography MEG) were used to visualize brain activity and electromyography (EMG) was used to measure facial muscle activity of autistic subjects while they viewed images of human emotional facial expressions (autistic people display different brain activity patterns and facial muscles reactions than normal or "neurotypical" people). A Tobii eye tracker was used to trace the path of the subject's eyes, while they viewed images.

According to Dr Hadjikhani's research, autism was thought to be related to the dysfunction of the mirror neuron system that plays a critical role in the perception of other people's intentions including empathy. Autism Spectrum Disorder (ASD) is a behaviorally defined neurodevelopmental disorder of early onset whose subjects suffer from a social disability that profoundly affects their ability to understand other people's feeling and to establish reciprocal rewarding relationships. The disorder manifests itself by exhibiting restrictive and or repetitive interests and behaviors. Persons suffering with ASD typically fail to engage in social interactions because of an inability to correctly interpret facial expressions and their meanings. Abnormalities in face perception (crucial to social-communicative competence) and the accurate identification of the deficient components of the face processing system are essential to the understanding of ASD.

The lab's primary area of study was the functional and structural integrity of the social cognition network as it relates to autism and also the amygdalas's connectivity to the mirror neuron system (Figure 1).
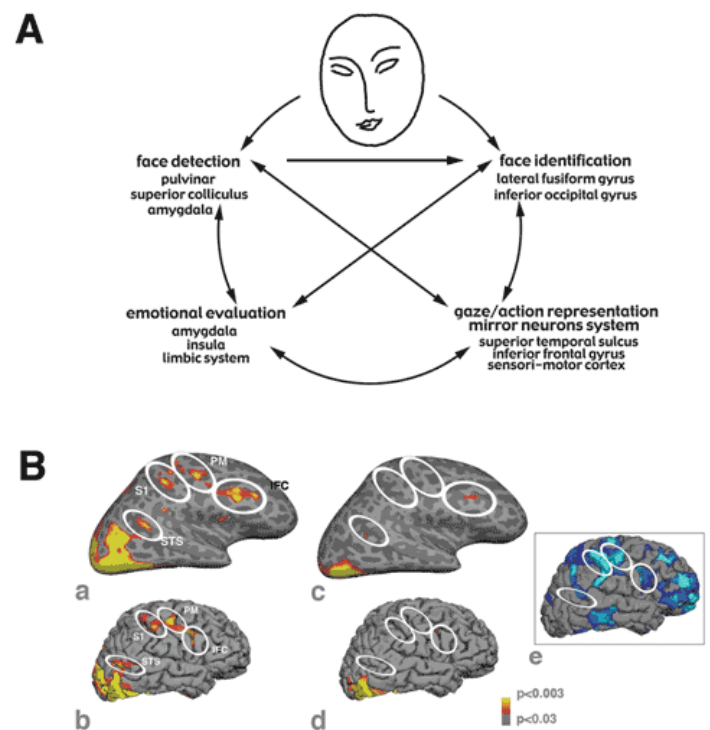
Figure 1. Social Cognition Network

A. Elements of the network exert reciprocal influences on each other. Face processing deficits can arise from the dysfunction of one or more elements of the network and to or from each element's termination.

B. During face perception, the face identification system is activated in both healthy controls and in individuals with ASD when cued to look at the eye-region. However, face perception

also activates areas of the MNS (see a and b) in healthy controls but these same areas remain quasi silent (see c and d) and exhibit a thinner cortex (see e) in individuals with ASD. The face processing difficulties exhibited by ASD individuals could be due to the dysfunction of the MNS.

In summary, the lab's studies showed cortical thinning of the mirror neurons system and an abnormal recruitment of mirror neurons areas during face perception as well as abnormal temporal activity in face-processing areas. They had also disproved a popular theory that said that autistic patients were lacking in the brain area devoted to face identification, opening up new therapeutic strategies and areas of inquiry.

3.2 Image Preparation

Britt sent me instructions on how I needed to prepare the photographic images for the MRI scanner experiments (Figure 2) to be performed by the autistic subjects and the control group (I would later extract the results of the control group and use them for my video). The goal was to make the photographs neutral and uniform in appearance, displayed with minimal luminance and no distracting background elements.

Each image was cropped from the hairline to the chin and formatted so that the eyes were always in the center of each photograph, therefore the autistic person did not have to move their eyes in order to focus on a red fixation cross while in the MRI scanner. Dr. Hadjikhani had discovered that by placing a red fixation cross in the center of each image and telling the subjects to focus on it while in the scanner that the fusiform face area was activated in autistic brains, just like it was activated in non-autistics. Earlier studies had failed to show activation of the face area in autistics probably because they weren't actually looking at the faces in the photographs.

The lab at first wanted me to mask out the backgrounds but then decided that they wanted to test (using an eye tracker) what part of the photograph the autistic person spent more time looking at; the faces or the backgrounds. Previous studies had found that autistic persons spent more time looking at backgrounds than at faces in photographs. They also performed experiments comparing responses to the staged photos of actors used by the lab with my photographs from life using magnetoencephalography (MEG) to visualize brain activity.

I adapted a lot of the lab's methodology not only in the way I prepared images for their experiments but also how I planned to later group (according to the results of the control group), animate and display them in the video. I wanted my images to appear as objective and scientific as possible. For example, I also centered

the eyes in the images but instead of completely masking out the background in my photos as the lab did, I achieved a similar but more naturalistic affect by tightly cropping the images and minimizing any unwanted background distractions.
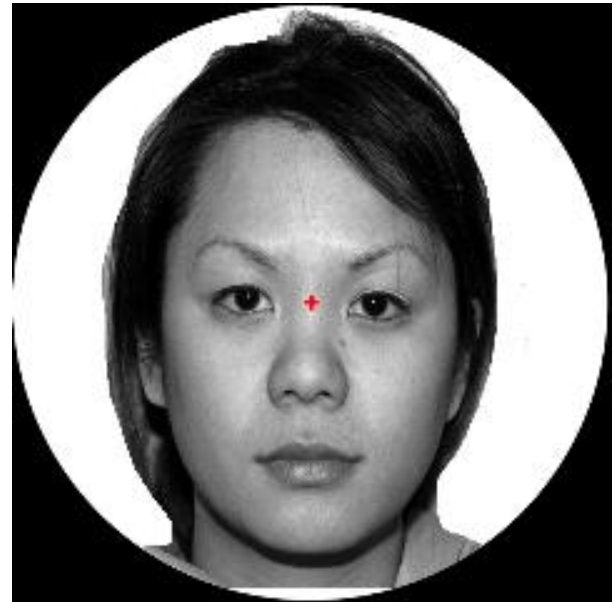
Figure 2. Modified photo for fMRI experiments

Luminance could be contained by creating an adjustment layer in Photoshop. I planned to import the photos as an image sequence into Photoshop Extended and convert the images to video layers in order to edit them. I also created and applied displacement and particle maps in Photoshop and After Effects to create subtle movements and blending from one image to another and outputted the files to Flash in order to create behaviors for looping of the four separate videos. For the fifth channel I planned to hook up a digital camcorder to a projector to capture possible mirroring behavior and to also allow observers to interactively modify, convert or morph emotions. I sent Britt a color-coded schematic of what I envisioned for 4 channels of my video consisting of the emotions happy, angry, surprise and sad. I wanted to relate each photograph graphically and logically to a specific emotion (Figure 3).

Figure 3. Color-coded Schematic for "The Emotions"

3.3 Plutchik's Emotional Index

The lab typically used black and white photos for their testing but decided to use my color images in an eye tracking experiment. They could then later convert them to black and white and flatten the luminance if needed (as previously shown to be necessary in early eye-tracking experiments) if the autistic subjects were distracted by the glare unavoidably caused by high-contrast lighting situations.

Britt sent me a schematic representation of Plutchik's color-coded "Emotional Index" which was comprised of eight basic emotions arranged as four pairs of opposites and their increasingly less intense variations (Figure 4). Plutchik believed that emotions were evolutionarily adaptive and part of a process involving both cognition and behavior. The cone's vertical dimension represents intensity and the circle represents degrees of similarity among the emotions.

She had the control group categorize each photo by choosing one of the words from the entire diagram instead of just limiting them to one of the eight basic emotions because she thought that would generate a more accurate rating given the subtlety of some of the photographs that I sent her.

After the Plutchik test, an eye tracking pupillometry study would then be conducted on the control group subjects to systematically rate each photo by its emotional intensity; from bad through neutral through good. I could then select images by emotion and or emotional intensity to be used in the video. For example I could select faces that were rated high intensity (terror), medium intensity (fear) or low intensity (apprehension). Additionally by using Plutchik's Schematic I could relate each emotion for the video not just by emotional category and or intensity but also by its associative symbolic color as it appeared on the chart.

According to *The Handbook of Psychological Testing* by Paul Kline, Plutchik's Emotional Profile Index is based on eight basic emotions which are joy, acceptance, surprise, fear, sadness, disgust, expectation and anger. Individuals choose from pairs of personality traits that describe them and each trait results from combining two or more primary emotions (i.e, shyness implies fear; gloominess implies sadness). The results are then plotted on a circumplex arranged according to similarities and bipolarities.

A fMRI study was performed after rating the photographs by emotional intensity. Other considerations were evaluating direct verses indirect gaze, group make up and image order. The lab administered Oxytocin and using the eyetracker, found that Oxytocin reduced the activation of the amygdala while viewing photos of direct gazes, from neutral unfamiliar faces. This enabled the participants to feel more relaxed; which increased their amount of direct eye contact. In previous studies (Guastella, Mitchell and Dadds, 2007) Oxytocin was shown to greatly increase gaze enhancement to the eye region (the focal point for emotion, threat and interpersonal interest) which enabled participants to better detect emotions in others.

The lab sorted my photographs into direct and averted gaze because the brain responds more dramatically to direct gazes than averted ones. They were also grouped into children and adults. Two sets of images were created (so the lab could experiment with the same group of subjects but use a fresh set of faces) that were balanced in terms of age, sex, emotion and intensity.

A small pilot study was conducted to look at the possible effects of image order on each subject's ratings. If presented one at a time, then ratings could be unduly influenced by the previously presented photo, for example, a mildly sad photo following an intensely happy one might be thought of as more intensely sad than it would be if presented by itself. If this proved to be the case, an entire set of photographs could instead be presented simultaneously, and each subject would be asked to rate individual photos relative to each other. There were disadvantages to this method but at least the lab would have a whole set of photographs that would be internally consistent.
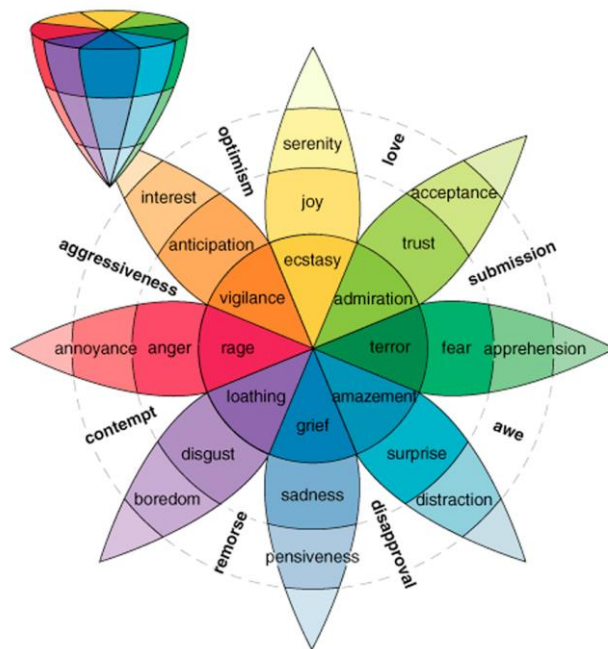
Figure 4. Plutchik's Emotional Index

The order in which the photographs were presented was found to affect a perceived emotion's intensity. I would make the video accordingly, being careful to place photographs with similar ranked emotions and intensity ratings together contained within an individual video channel, which would have the affect of displaying a group of related photos simultaneously as described in the pilot study.

Additionally the lab was thinking of adding a self-recognition test into the protocol (it has been suggested that autistics have self face recognition deficits) by randomly inserting photos of the subject brought in from home and also by presenting new ones that the lab would take themselves but that the subject wouldn't see before the experiment.

The idea of the self recognition test reinforced my idea about including a 5th interactive "self-recognition" video channel (by hooking up a digital camcorder to a projector at the exhibition site) to record live emotional reaction including possible mirroring behavior and to allow the participant to be part of the experiment. Additionally the observer would have the ability to interactively "intensity, convert or morph emotions";

demonstrating a futuristic ability to modify emotions genetically and or technologically at will.

The "Intensify Emotion" command would use a slider to make emotions appear more intense. This would be achieved by interactively applying behaviors/animations globally to a specified video stream by using After Effects/Flash software (animations would be achieved by creating frame by frame parent/child relationships affecting the eye and mouth regions). "Morph Emotions" would utilize a program/behaviors that scrambles all four channels simultaneously by selecting and replacing video content from each of the four channels at random. "Convert Emotion" would allow the user to morph any stream of emotions into another by creating parameters that would select and replace video content from one video stream to another. The original color filter associated with Plutchik's color coded schematic would be applied to the new video stream, maintaining its original Emotional Index categorization reference point.

The lab decided to organize an open-house of talks and presentations for the public to celebrate the first World Autism Day on April 2, 2008, as instituted by the U.N. They teamed up with two other autism labs, one that worked with rats and other with robots. They hoped that it would generate more research subjects and also enlighten the public about autism. The lab's areas of research (including the brain areas studied) and my collaborative role are graphically summarized in Figure 5.

Figure 5. Hadjikhani Autism Lab

4. CONCLUSION AND FUTURE WORK

We finished corresponding in the summer of 2008, as the research was completed and my photographic images were categorized and documented by the control group. Throughout our correspondence, I had Britt send me any relevant documentation on what her group under Dr. Hadjikhani was researching; the technological and computational tools used to both measure and record experiments and their theoretical methods, applications and implications. The photographs that I submitted to Britt were spontaneous photos from life, never posed and taken well before I had ever thought of doing the project (so I never associated any of them with a particular emotion). They were pretty objective, the

only issue being that the person being photographed was sometimes briefly aware of my presence (the lab previously used only staged photographs by actors for their testing).

In conclusion the interactive new media project "The Emotions (after Charles Darwin)"; a multi-channel interactive video consisting of multiple panels displaying close-up graphic, moving images of men, women and children of all ages and races, each expressing a specific emotion such as happiness, sadness, fear or anger (as categorized by the results of the control group) supported Darwin's ideas about the universality of emotions on a biological level.

A strong relationship was shown to exist between the control group's rating and ranking of each image's emotion (as determined by Plutchik's Emotional Index) and emotional intensity as determined by the battery of tests including pupillometry eyetracking after Oxytocin administration, functional magnetic resonance imaging (fMRI), Electroencephalography (EEG) and magnetoencephalography (MEG) to visualize brain activity and electromyography (EMG) to measure facial muscle activity.

So far emotions appear to be universal at a biological level which futuristically suggests that now that we know that, how can we modify them to elicit more desirable behaviors? Does the intensification, conversion and morphing (induced by the application of random software behaviors) of universal scientifically determined emotions used in this project bring up suggestive ideas about genetic and technological modifications of emotion regulation of the future?

In *My Mother was a Computer* by N. Katherine Hayes, she states "where the Holocaust and other atrocities provide horrifying examples of humans not counting as persons, intelligent software packages offer the spectacle of bots being mistaken for human interlocutors." She later states that "we are both in the world and of it- a truth that becomes only more inescapable as we create machines in our own image and envision ourselves as computational mechanisms like them."

Although acceptance and performance of universally endorsed behaviors and characteristics are necessary for all peoples and animals to effectively communicate and co-exist within groups, one of the primary dangers in proposals such as "The Emotions" is that if we were to use the results of the control group to develop a range of acceptable universal behaviors and then genetically alter subjects emotional capabilities like a plastic surgeon would so that they conform to them using synthetic biology and other appropriate methods, there may be unforeseen and equally undesirable consequences or dangerous side effects; both for the individual and for us as a species.

Ongoing work would include the exploration and visual interactive representation (perhaps using game theory, robotics or artificial intelligence) of emotion regulation and control through the implementation of one or a combination of drugs, genetics or technological enhancements.

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TECHNOLOGICAL MASHUPS - building HiFi wearables

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ABSTRACT

The state of the art in digital technologies allows for tools to help prototyping interactive artifacts much faster than ever before. Even if many of those might not be ready for entering the everyday life, they become relevant pieces within the art and design fields. This paper explores the creation of wearable artifacts including digital intelligence with the ability of getting/serving information feeds from/to the internet and bringing them to live as haptic feedback patterns on wearables.

We hereby present a way to quickly deploy wearable sensor networks that will either give physical feedback to the user or broadcast that information to a remote location. We will focus in where to host the intelligence of the system, and how to implement the communication between the different devices in our suggested design solution.

This technological mash-up of several hardware and software parts, can be used to create everything from art pieces to medical devices. The systems should be able of operating by themselves but also give control to external flows of commands.

Topic and Subject Descriptors

D.3.3 [**Wearable HiFi Prototypes**]: Sketching Interactive Systems – Prototyping Techniques, Interactivity Design: Software and Hardware Tools, Embodiment, Open Source Tools.

Keywords

HiFi prototyping, Open Source Software, Open Source Hardware.

1. INTRODUCTION

During the last years our research has focused on the creation of high-fidelity prototypes. The artifacts we create range from wearable sculptures to solar powered handbags. The aim behind these objects is not as much to emulate the real functionality of a potential everyday life device as analyzing the experience of having this object. In other words, we research how to prototype the user experience by means of interactive objects that resemble real life ones, or that could eventually become everyday objects.

We have been studying existing prototyping platforms and we have concluded that the best alternative to create wearble interactive objects consists in a mash-up of a series of open source tools: an Android mobile platform, an Arduino board, and a piece of Java software. We will release all of our tools in the public domain, and we want this paper to be an explanation of the system, the needs that triggered its design and the decisions we took.

1.1 Definition: Low-Fidelity and High-Fidelity Prototypes

Low-Fidelity (LoFi) prototypes are normally understood as limited in their functionality and interaction possibilities. They are constructed to illustrate concepts and often designed or laid out with inexpensive materials and within strict time constraints. LoFi prototypes are not intended to show how an artifact is intended to operate in detail [1].

In contrast High Fidelity (HiFi) prototypes have a high degree of finishing. They present a lot of the intended functionality and overall look-and-feel. Unlike LoFi these prototypes often require additional skills and materials [2]. The advantage of HiFi prototypes is that they can give an idea of how the final artifact would be in a more realistic manner in terms of design and interaction patterns.

2. OUR VIEW ON WEARABLES

Historically most wearable computing systems have been HiFi prototypes. There is a long list of technically advanced devices offering novel ways to interact with digital machines. For many, the first true wearable computer was a shoe-based system developed by researchers and scientists in California in the 1970s [3].

The purpose of this shoe was to aid people in gambling on roulette at casinos. This system was fully functional but it was also entirely embedded inside a normal shoe.

2.1 Trying means embracing

Steve Mann, known for his work both in the arts and the engineering fields, thinks that the ubiquitousness of wearable system has played a minor role in his definition of wearable computing (or WearComp) [4]. Back in the early 1980s he developed his first wearable computer. He has been wearing it, and its subsequent versions, ever since.

From the first design iterations he worked with HiFi prototypes in order to achieve high degrees of functionality. One of his initial ideas was based on an issue he found as photographer. He was constantly missing the moment of a "good picture" because of

having to bring the camera out of its bag. Once he was ready to take the picture the moment had already passed. To test his idea that a wearable camera could solve this situation he had to implement the functionality of a camera in his wearable system. The device was constantly taking pictures in every direction he was looking to and storing them [4].

2.2 Reshaping the form factor

The need for HiFi prototyping of wearables doesn't come from its potential technological novelty. On the contrary most wearable systems are a combination of old technologies in a new form factor. But by making technology wearable we can provide the wearer with information that was previously unavailable [5].

In later years wearable computing has become an extension of ubiquitous computing. This post-desktop user-centric paradigm of
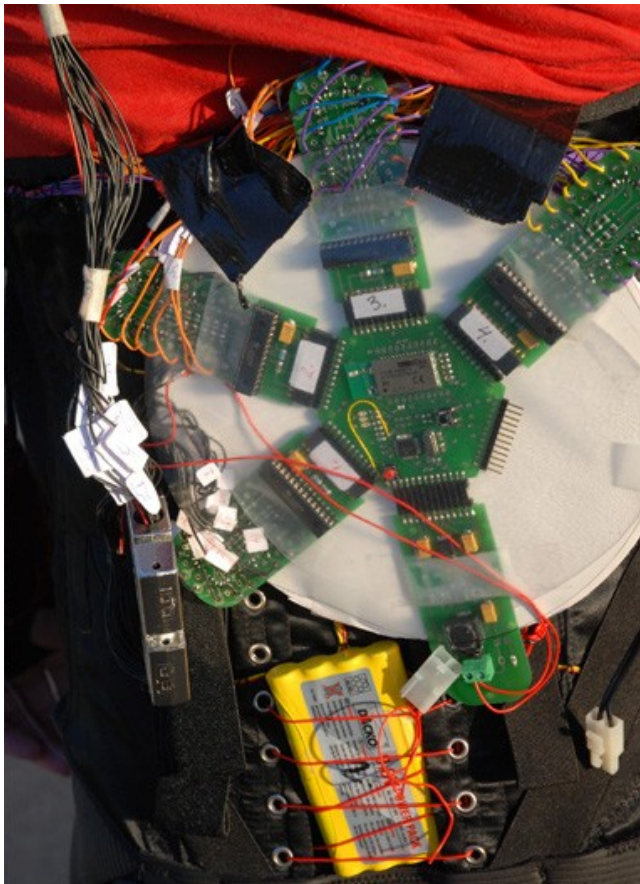
Illustration 1: HiFi Prototype for the Psychoplastic Project

human computer interaction focuses on embedding computational power seamlessly in every day objects [6]. York also refers to it as machine fitting into the human environment [7].

For wearable computer prototypes this forces a higher degree of finishing. For Mann this was imposed by a social factor. While wearing earlier versions of his system other people would treat him differently and he could not conduct his life as he normally would [4]. So he had to embed his system into everyday objects that people would normally wear.

The development of wearable systems has the potential to provide new intimate forms of interactions when they exist within a

wearers space but the only way to test the interaction is to provide the wearer with a HiFi prototype.

An example of this can be seen at the Psychoplastic Project shown in Illustration 1. It is a vest that provides users with auditive and physical feedback in the form of 3-D sound and vibration patterns. It carries 64 motors and is controlled by an out-of-the-shelf mobile phone. As mentioned on the author's project report [8]:

The suit imprints stories about corporal ecstasy. The touch based bodysuit renders the stories physical. So the experience becomes a real, personal and intimate play with ones' own body and identity.

As seen in the image, the object is at a prototype stage, and it was used at several art venues, but it required a high degree of finalization and craftmanship. The technology involved in that object was not innovative in technological terms, it just required to be reshaped to fit the purpose. It inspired us to think about which are the main component blocks needed to be part of a prototyping platform for high-fidelity wearables.

3. A HiFi PROTOTYPING PLATFORM

In this document we suggest a platform to quickly prototype wearable computing devices. This object is made out of the combination of different existing technologies, it is a hybrid or, how we like to call it, a mash-up.

It is our aim to provide designers and artists interested in creating pieces that require embodied interaction with a toolbox to do so. We understand wearable as a combination of hardware and software. When prototyping with digital technology, there is always the question about where the intelligence of the system should be located.

3.1 The System

Our system is made of a series of blocks. The wearable itself is made of two hardware pieces: an Android smartphone[1] and an Arduino microcontroller board [9]. The board runs as a peripheral to the phone using a communication protocol we have created for the purpose.

The phone carries all the system's intelligence, it can use its internal sensors (like accelerometer, touch interface, compass, buttons, GPS[2]...) or the ones attached to the microcontroller as a way to trigger events. It will make decisions based on thresholds, thus programmed comparison values.

The microcontroller board has a double function. It provides an input for sensors not present on the phone like a distance sensor, a potentiometer or a gyroscope. It also allows controlling outputs like e.g. motors.

One issue is how to map the inputs (events) to the outputs. That is made on the phone's user interface. Yet another issue is how to program sequences of outputs, what we call patterns. In order to create output patterns we have created a Java tool that programs them in a computer and sends them straight to the phone (the wearable).

In this way, a designer willing to create a prototype, like e.g. a jacket that will guide people to a location when a button is pressed, can use a computer to plan the patterns and the location

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[1] Smartphone: mobile phone with extended capabilities

[2] GPS: Global Positioning System

based feedback, and upload the patterns, maps and thresholds to the phone. From then and on, the wearable will be ready to run the experience.

It is pretty obvious that a device aimed to a general audience would be made in a different way, looking into ways to optimize cost, integrating everything into a single unit, etc. The aim of this toolkit is to prototype experiences using wearable technology as the mediator.
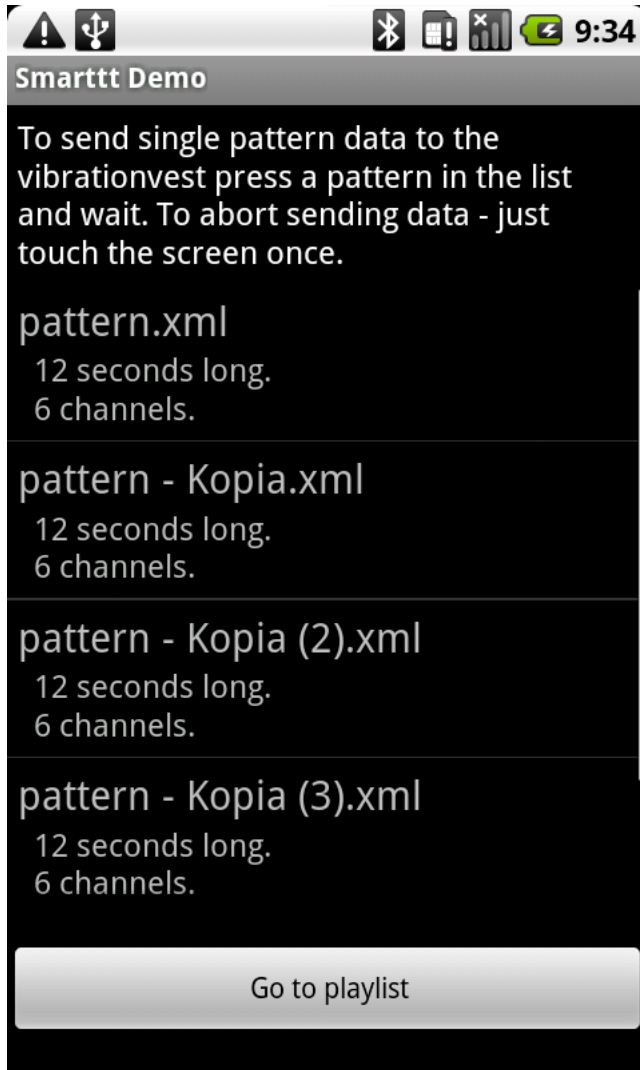

Illustration 2: Android UI to launch patterns

3.2 Why Android

Currently there are five main mobile platforms, understood as the operating systems (OS) running the devices: Symbian from Nokia, iOS from Apple, Android from the Open Handset Alliance, RIM from Research In Motion, and Windows 7 Mobile from Microsoft.

At the time of writing this paper, Windows 7 Mobile was too young for us to have tried it out. It isn't easy to have an opinion on a platform you haven't tested.

Symbian, on the other hand, happens to be the OS that is present on the biggest amount of mobile devices, however the diversity of the hardware makes it hard to port the technology between devices and its development tools' future is uncertain [10].

RIM's OS is not very friendly when it comes to developing applications, besides the ecology of devices offered by it is not very wide, which limits the possibility of using it in prototyping.

Therefore the discussion for us, like for many other designers, went into which was the best development platform: the one provided by Apple [11] (creator of the iOS, the OS for the iPhone, iPod, and iPad devices) or the one provided the Open Handset Alliance [12] and the Java Community (Android is an adaptation of the open source technology made by the Java Community to the mobile world).

We decided on Android because of the portability between devices. This portability means that we could create an application for a certain phone and make it run on a different one without too much trouble. But also that it should be easy to port it between different screen form factors: like taking an application made for a phone and make it work in a tablet format.

On the other hand, the limitation in terms of installation of the software made for the iDevices makes it really hard to consider Apple's OS as a development platform, mostly because of the way applications are distributed to final users [13].

In our system we are using an Android phone as a way to connect our wearable piece to the network, but also to be able of gathering data from sensor technology already available on that specific device like acceleration, location, the arrival of an SMS, images, etc. The phone can be used to collect and send data, but also to act as the brain of our wearable device.

We have created a software package that allows activating a series of patterns on the actuators of our wearable platform. The program offers a user interface where to enable certain output patterns based on the arrival of a certain event. The event is triggered either by the readings of a sensor within the wearable, or by the readings of the sensors on the phone. Again, Android is extremely designer friendly to this extent, since other systems won't allow triggering events on e.g. a phone call or any other phone-related operations. iOS' development documents are very specific when it comes to the way designers can make use of the core-functions of the device [13].

The first version of the software is looking at two types of events; the location based ones and the sensor based ones. An example of a sensor triggered event consists in detecting a button press or whether a knob's reading has reached a certain value. An example of a location triggered event consists in looking at the phone's GPS information and detecting a location previously configured as a target. This is how we solved the Psychoplastics Project prototype technically[8].

Future iterations of the software will be including more of the different options available in different devices: arrival of calls or SMS, use of the accelerometer, detection of light levels, use of the multitouch screen, etc. It is possible to modify it to be triggered by potentially anything, however we focus in the ease of use and configurability of the software as a way to make prototypes, therefore we have decided to compromise on some of the potential features.

3.3 Why an Arduino compatible I/O board

On the hardware side of our wearable platform, we have decided to use an Arduino [9] compatible microcontroller board which is a

derivative of the Arduino Bluetooth board[3]. The license agreement [14] on the Arduino boards allows doing this. It makes it very easy to test our sensors and actuators on a normal Arduino[4] board and later migrate all the code to its bluetooth equivalent that will wirelessly communicate with the phone.
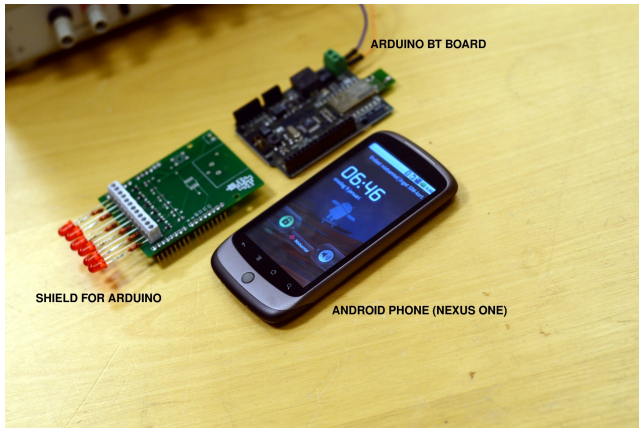
Illustration 3: HiFi Toolkit version 1

We should mention that our initial design looked at a feature that Android phones offer of using the USB data port as a serial port. However there is no standard in the way this can be made, nor it is available at all devices without having to either root[5] the phone or make a complex update to the phone's firmware. We realized that most of the Android devices are equipped with a bluetooth communications port and that the communication through it to and from an Arduino BT board was easy to implement.

We created a prototype on this platform in the form of a so-called Arduino shield, this is a board plugged on top of an Arduino, that allows to easily plug in/out wires to -in this case- motors to give force feedback to users. We wrote a piece of code for the Arduino board (firmware) that gets it to read data from the phone over a bluetooth connection at very high speeds. We reach up to 5 updates of the actuators per second, but the theoretical limit is higher. This allows for very accurate control of the motors, but also any other devices we could be interested in using like LEDs, peltier elements, etc.

Our second prototype is a self-made circuit board integrating both the Arduino BT board and the shield in one single piece. This platform counts with 6 inputs for analog sensors and 6 outputs able of sending out analog signals to devices. This is an Arduino compatible board[6] that communicates with the phone in the same

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3 Arduino Bluetooth or Arduino BT: microcontroller board from the Arduino brand that communicates over a bluetooth port to other devices in a wireless fashion.

4 A "normal" Arduino board is a microcontroller board that communicates over USB to a computer. Since current computers have USB ports as a standard communication method, the Arduino USB board can literally be plugged to any computer for testing and prototyping.

5 To root a phone: technical term that refers to the technique of acquiring the ability to literally install any software package on the device. Usually this feature is disabled by the manufacturer or the carrier selling the device. Rooting a phone implies voiding the warranty and this is something we wanted to avoid.

6 Arduino compatible board: a microcontroller board created as a derivative design departing from the design file of an Arduino

way the previous prototype did, it is just smaller and easier to embed in the wearable piece. It gives away pins available in the
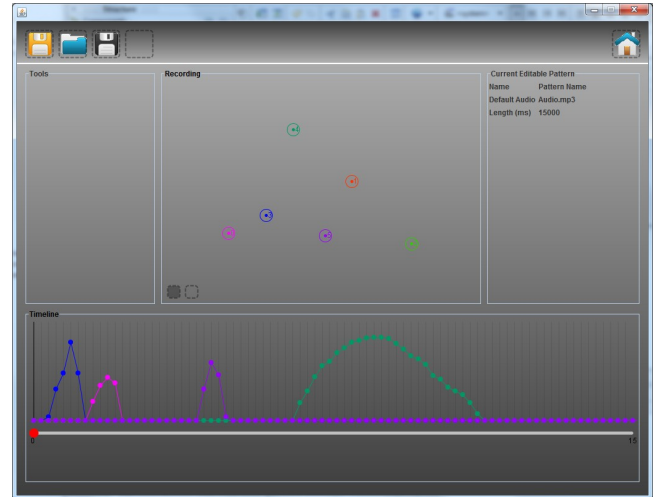
Illustration 4: GUI to the pattern editor on a computer

microcontroller platform, but trades them for pins that are fully compatible with each other at a functional level.

3.4 The Glue: a Protocol

The key idea in this prototyping tool is that designers, our users, will look at the combination phone+microcontroller as a single piece of hardware. For real it is a distributed computer with two processors: the phone has its own, and the microcontroller platform also has its own.

The glue between both parts is a communication protocol to exchange information between them at high speeds. There is no embedded intelligence inside the microcontroller board beyond the exchange of data with the phone and the ability to turn off all the outputs if there was no signal coming from the phone for some time (as a safety measure).

There are other protocols to reach a similar functionality to this one like Firmata [15], a protocol to exchange data between an Arduino board and a computer application, and Amarino [16], a whole platform to link an Arduino BT board with an Android device over a bluetooth connection. We tried both and none of them were giving us either the speed, or the safety we needed. Therefore we decided to implement our own protocol focusing on those two aspects.

Reaching high data transfers is important in our case since we understand that an event can trigger a whole series of actions on the actuators that can last for a certain amount of time. Since the microcontroller platform of our choice doesn't count with very much memory for data, we decided that it should not be storing any data besides the current state of all the inputs and outputs. Therefore any changes to be made on an output must come over the bluetooth connection instantly.

When it comes to the safety, the best is to explain this concept through an example. Imagine we connected a motor to give force feedback to a user and that the phone -for whatever reason- broke or ran out of batteries after some time while the motor was running. There would be no way to stop the motor besides

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   branded board.

pressing the reset button on our wearable device. But imagine the user is carrying the phone in a pocket and is not looking at it. There is no way he/she can know the phone is not working. This is why we went for implementing a watchdog[7] safety mechanism to stop the device without provoking any harm or a failure.

Our communication protocol implements all sort of redundancy and error checking mechanisms to make it safe without compromising the speed. All of these are made in a transparent way to the user. He/she will just see a wearable device that will react as programmed and if it stopped working it will be as a whole, or at least react in a way that could easily be understood by the user.

3.5   The Java Software

As explained earlier, we foresee that many experienced designers will be interested in the creation of feedback patterns in the form of vibrations, light shows, or temperature changes. We have therefore created a piece of software in Java to interactively create patterns for the different actuators. As for version 1 of this software, it lets the users program the 6 outputs available on our shield and our board and to export them directly to the phone acting as controller.

The patterns are stored as XML[8] files inside the phone's application, which means that it should be possible to edit them with a text editor as well or to create whatever other application to fulfill the same purpose as ours. Also the phone allows selecting which pattern should be activated for each event.

At this point, this part of the programming is still handled by the phone's software, it could of course be made on the computer side. Our vision is that we will integrate all of the tools on the phone in order to be able of doing the programming of the interaction while carrying the wearable on site. Because of Android being a Java based language, porting the application from the computer to the phone is theoretically easy.

4.   CONCLUSION

This paper defends the need to create HiFi prototypes in fields where embodied interaction will be put to test. There are some fields within research where their novelty makes it hard for users to imagine the functionality and therefore traditional interaction design techniques like paper prototyping make it hard to understand the implications behind using the device being created.

Wearable computing, the field where the computer gets dismantled and attached to the body, is a field that invites using HiFi prototyping as a tool to illustrate concepts.

The hereby proposed toolkit allows for quickly creating and trying out wearable artifacts that can respond with patterns to events triggered by any kind of sensor. In order to keep the complexity of programming the wearable as low as possible, we present a series of tools that will allow going from idea to HiFi prototype in a very short time. Also many designs can be created without any knowledge in electronics or software, just by dealing with interaction design concepts like patterns (event sequencing), or sensor mapping via a simplified graphical user interface.

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[7] Watchdog: technical term for a time based monitoring device.

[8] XML: eXtended Markup Language, text- and tag-based language used to sort data inside documents.

We are also strong believers in open source, and therefore besides the scope of this publication, we offer all the source code and schematics needed to replicate our experiments.

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sound plates as piano interface

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ABSTRACT

The vision of "dancing music" is quite old and interactive implementations have been tried out. The interface of a dancer playing piano has to be a dancing interface for machines. For the music-theatre performance "Maschinenhalle #1" for 12 dancers this new instrument has been developed with the choreographer Christine Gaigg and the composer Bernhard Lang and implemented as a metal sound-plate and interpreted by a robotic piano player.

Topic and Subject Descriptors

D.3.3 [**machine musician interface**]: musical interfaces, complex systems

Keywords

robots, music instrument, transcription, composition

1. INTRODUCTION

Using sound plates for dancer has been done a lot within the performances "V-Trike", "TrikeDoubleThree" and others developed with the composer Bernhard Lang and Christine Gaigg within the series of "Difference and repetition" at various festivals[1],[2]. Restricting the interface for dancer interaction on a plate driving a surrounded multimedia environment was explored in these pieces. Utilizing the sound of the metallic sound plates equipped with piezoelectric sensor as a cut surface to track the gestures of the dancer for recognizable sound projection and live electronics. There intuitive cognition of sound linked to the repertoire of movements of the dancer was chosen in favor to complex tracking, since gravities cut surface is the floor.

Developing a musical instrument, performed by dancer, was a further issue, shifting from a reproduction in sound to a transcription instrument for piano. This was possible since the Autoklavierspieler[3], a player-piano, was developed transcribing voices to piano for Ablingers series of Quadraturen[4].

This resulted in a machine unit, which can be used as an instrument for dancer, where 12 of them has been implemented in a network for the music-theatre "Maschinenhalle #1" as an opening performance for the styrian autumn 2010 [5]. In the following the sound-plate as an interface for robotic piano players is being discussed and shown.

2. Outline of the paper

Since only abstracts has been requested, here is an overview of the content with pictures to be written for the final paper. Expected 5-6 pages including the transcription engine.

2.1 Historical instrument

A early interface of plate to play music by Leon Theremin.
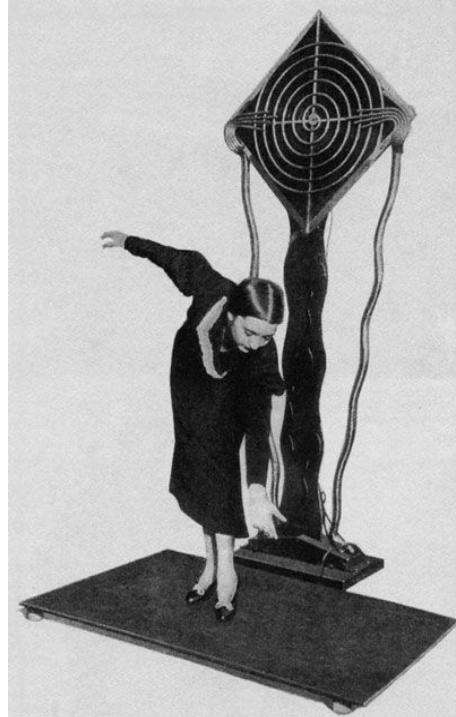
figure 1: Terpistone
by Leon Theremin 1936

2.2 sound plate

Metal plate with piezoelectric and sound amplifying case or external speaker.
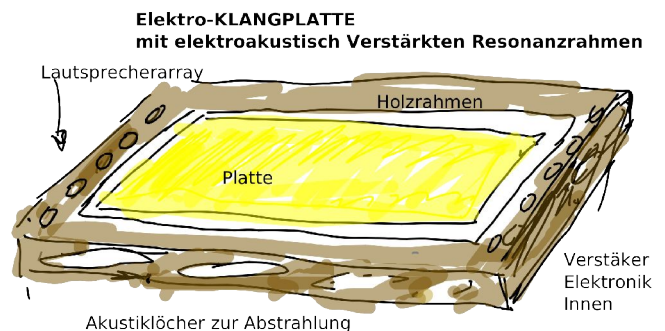
figure 2: sound plate draft

2.3 Audio interface

figure 4: Siemens speaker 1937, 5 Watt

2.4 Piano Interface

This describes the transcription algorithm used to transfer gestures into piano using sets of filters and followers.

figure 5:

Millitron Autoklavierspieler

2.5 Machine unit

Machine unit is the instrument to one dancer.

2.6 Transcription

Here the chosen algorithm used for the transcription from soundplate to piano is described with the features is offer the composer.

figure 3: machine unit with all components

figure 6: machine unit with dancer, robotic player piano, speaker and computer

3. ACKNOWLEDGMENTS

To be written...

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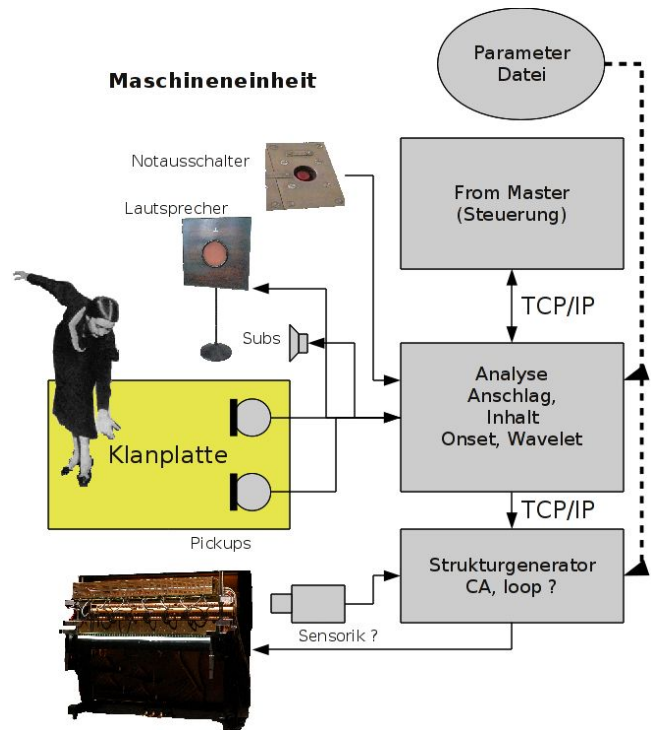[2] Trike Double Three, music-theatre for 6 dancer, 6 sound-plates, 6 projections and 4 channel audio Bernhard Lang, Christine Gaigg, Winfried Ritsch, *first performed 2009 Halle G Museumsquartier Vienna-*

[3] Autoklavierpieler, Winfried Ritsch developed for special needs in new pieces for Peter Ablinger[4], first *performed 2003 Minoritensaal Graz for various compositions* http://algo.mur.at/projects/autoklavierspieler

[4] Quadraturen for Piano, Peter Ablinger see http://ablinger.mur.at/docu11.html

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figure 7: Perfomance maschine shop

Co-created Staging – Situating installations

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ABSTRACT

Staging is the creative act of showing something to an audience. When staging, the artist chooses and creates the *context*, *situation* and *structure* of the presented object, play or installation. The chosen context and situation provide background for the audience *interpretations*. Meaning is co-*created* between the artist and audience, based on the cultural and individual understanding of the context and situation. The term *installation* is *open*, ambiguous and undefined. One does not completely know what to expect and where to find an installation. It is open towards many interpretations. In this paper we present a model for staging and how we worked with staging of two interactive installations in different exhibition situations, to provoke and motivate different *interpretations, expectations* and *interactions*. We argue for staging as a *communicative strategy* to attract and motivate diverse audiences and user groups to collaborate and co-create through interpretation and interaction. Further we argue that installations have to be open to many possible structures, interpretations, interaction forms and roles the users can take, and *shift* between dynamically. When the users dynamically re-structure, interact and shift roles and thereby re-situate the installation, the users are co-creators in the staging act. We call this *dynamic staging*.

Keywords

Interactive art, staging, interaction design, tangible interaction, context, co-creation, situation, genre, installation, music

1. INTRODUCTION

Staging within theater is the creative and aesthetical act of presenting a play on a stage. It includes several activities like; interpretation and adaptation of a text to a performable text, for the actors. Casting and giving the actors characters to play, actions to act, cues to be where and when on stage. Creating the physical environment, set design, lighting and sound that make-up the environment for the actors to act in. Staging is also used when designing other temporal dramatised events, both fictional and real [3, 2, 5, 21]. Like a family conflict, or a historical event in a museum, with real or interactive actors. The act of staging means to interpret and *dramatise a situation*. There are many aesthetical techniques, on different levels and stages, one can use in the process. For instance visual techniques like changing the light on the stage and thereby shift focus. Rhetorical techniques, like an actor changing his tone of voice, and then change the audience expectations. Temporal and narrative techniques, like using pauses when talking, and then changing the user's attention. Or actorial techniques, like making an actor speak to a chair on the stage, and thereby giving the chair the role of a listening actor, just to provide a few simple examples.

In this paper we argue that these staging techniques have great potential, when creating and designing interactive installations, to motivate diverse groups of spectators to interact with the installation. Since we work with interactive and tangible installations, we have used many of these techniques and designed and programmed them into the installation as qualities and potential staging solutions. Solutions, that are revealed through interaction, in the actual situation. Other staging techniques are used, when designing or setting up the installation. But then the installation must facilitate different types of staging, depending on the exhibition event, in order to communicate to different audiences in different situations.

2. FRAMING STAGING

2.1 What is an interactive installation?

Installation art was established as an accepted art genre in the late 1980ies, but one of the first examples of site specific environmental exhibitions was created as far back as the late 1950ies [19]. The essence of installation art is spectator participation. That the installation offers the viewer activities to take part in, and that the meaning of the work, evolves while interacting in the installation [19]. Already in the 1960ies, technology and computers was used in installation art [8]. Since the practice based art field just recently has become academic, not much has been written from a research point of view, regarding the art of staging installations. What can be found, from the art, design and communicative perspective, is exhibition catalogues and set design handbooks for building theatre or film sets.

From a technological and Computer Science point of view it looks very different. A lot of research has been done the last 20 years in the Human Computer Interaction (HCI) and Interaction Design fields. With a handful exceptions [15, 6, 10], it has taken long time before aesthetical and communicative, not only the functional and efficient aspects of computer interaction, have become relevant in this research. Tangible Interaction is a rather new field within Interaction Design, but built on a long tradition within HCI, that might enrich the Art field with its understanding of interaction with technology. The Art and Design field, on the other hand, might contribute with practice based knowledge about the aesthetic challenges and possibilities. So the fields can mutual contribute to each other. With this paper we like to contribute to this mutual understanding with our practise based research and discussion of the possibilities that lies in staging as a communicative strategy.

2.2 What makes a situation?

Every action creates a new situation, and action, as well as learning, understanding and remembering, is situated, argues Lucy Suchman [22]. She is one of the leading advocates for the situated action theory within HCI/Interaction Design [22, 4].

Instead of focusing on the structure and the content of communication, she encourages us to look at how we say or do things in a particular situation. A critique against situated actions comes from activity theory. Activity theorists like Bonnie Nardi argues that context and situation is created through *intentional* actions. [18]. It is the *goal behind* a person's action that makes it possible to separate one action from another For us who work with interactivity and computers, both perspectives are inspiring when designing interactive installations. Since the computer potentially can register all actions through sensors, and one can programme the computer to make interpretations of the actions, both perspectives on situation and actions represents an interesting design potential when dramatising a situation.

But both situated action and activity theory lack a discussion of aesthetic potentialities and experiences. In our view they miss the potential in combining situatedness with aesthetical and rhetoric knowledge of how to stage situations.

With *set design* the theatrical room, lighting and props create a dramatic dichotomy between physical space and the imagined place, making it possible for the audience to identify with a character in a situation far away and long ago. The stage is a *cross-media* place where light, music, visuals and movements help dramatise the situation. *Dramatical* effects and the *narration* create expectations [16, 2] of actions that the character will make, based on the audiences genre competence [9]. A relevant tradition is the *Forum* theatre that invites the audience to take active part living out ideas and emotions in singing, speech, movement and dance, whether it is in a play, therapy or educational situation. [3]

The interaction with computers can be designed and programmed to offer aesthetical qualities like pace, rhythm and resistance, to dynamically dramatise the situation [10, 6]. This is often used to create playability in computer games, products and interactive art.

These aesthetical qualities calls for a *poetics of the situation* that we find in Umberto Eco's term *Open work* [7]. Open work is a concept and aesthetical ideal from the 60ies which we find inspiring when working with interactive installations because of its programmable possibilities. Eco's examples of open works was avant-garde music by Henri Pousser and Pierre Boulez who's musical works partly was open for a kind of collaborative live staging done by musicians. They created systems of musical pieces that could be combined by the performers in real time. It is an aesthetics that welcomes *openness, ambiguity* and *interpretation* as important staging qualities for the creation of expectation and motivation [16].

2.3 How to stage a situation?
Sociologist Bruno Latour, who's studies concern use of physical and technical things [14, 13], has a theory of mediation in actor-networks that we use to describe the possibilities for staging [13, 12]. Based on dramatic models he describes how people create relations to things and how things mediate human actions and meanings. He shows how things can act, not only as neutral objects, but as active actors, with abilities to influence scientific results and everyday life.

Latour shows how spectators/users are motivated to identify with a person or an object and act in a situation by *shifting*. The term shifting comes from semiotics and explains how a reader is motivated to identify with the text's main character. The reader, or in our case the user, can shift from identifying with the main

character to a more peripheral character. Latour calls this actorial shifting [13]. The users can also be motivated by the story of the text, or in our case of the design, to shift position in space to another location and to another time. Like an old picture of Copenhagen can make us imagine walking down the cobbled streets in the old days, even if we are in Oslo in 2011. Latour calls this spatial and temporal shifting. These shifts changes our *expectation* in the situation. What Latour recognized was that when including interaction with physical artefacts, yet another type of shifting takes place, where the user of the artefact not only *thinks* about shifting. Instead the user *delegates* meaning and actions to the artefact by using it. In addition to Latour's time, space and actor/role shifts, we suggest adding a 4th, *genre shift*, where the shift of a person's cultural and aesthetical mind-set [9] potentially changes the user's expectations. For us who create interactive installations this represents a design potential that can be included in the installations as possible choices.

2.4 What qualities must an installation have?
Based on our discussion above, Eco's ideal of openness [7], Latour's theory of mediation [13], and our practice based research over the years; We suggest that an installations should offer openness in many dimensions to facilitate staging on diverse levels. In our cases later in this paper we will show how we designed to accomplish this goal of openness towards staging.

Genre choices. The experience and meaning the artist or designer want to communicate are in installation art expressed through the audience participation and interaction. [19]. Different audiences have different expectations based on their knowledge, cultural background, motivation and interpretation of the situation. If the installation can be exposed in several ways, spaces, institutions, events, to several types of audiences and *still communicate the artist intention* we call the installation open to several genre choices.

Temporal choices. Everyone is somewhere, just now. If one can move mentally to another time, or change the order in a sequence, one has the possibility to make temporal choices. If the installation is open to temporal choices, one can change the narrative design during setup, or use of the installation.

Spatial choices. If the artist/designer during setup, or the spectator/user during interaction, with the installation, can change the set design, lighting, sound and positioning of props, we call the installation open to spatial choices.

Actorial choices. If the installation offers the designer during setup, or the user during interaction, possibilities to change roles to take, the installation is open to actorial choices.

2.5 Staging and Staging levels
We define staging as dramatisation of the situation. Based on the discussion above, our understanding of situation and staging, we need to divide the staging process to gain a deeper understanding of the potentiality of staging. Thereby we can more consciously use the possibilities that lie in staging as a communicative strategy. We suggest to divide the staging process into four:

Potential Staging. This is the staging process one does when designing and creating the installation. How the artist/designer imagine and evaluate the different situations and make decisions related to genre, temporal, spatial and actorial possibilities. All in

order to create an installation open to dynamic and co-created staging.

Strategic Staging. This is the strategic staging process related to exhibiting the installation, what audiences to reach, what the installation will communicate in this actual institution and other strategic communication choices.

Tactical Staging. This is the staging process performed by the artist or designer when setting up the installation in a chosen institution and space. This staging process includes decisions about how to arrange the physical space, the lighting and sound mix to motivate the spectators to interact and co-create in the installation.

Dynamic Staging. This is the staging process performed by the spectator or user during interaction. It might include genre choices to change the experience, temporal choices to change the narrative experience, re-structuring the physical space or change roles.

3. STAGING CASES

3.1 Two open installations

In the following part we like to show how we have worked with staging on several levels when designing and exhibiting two interactive installations.

We will show how we have designed the installations to facilitate *many types* of staging, what we have called designing for *potential* staging. Further on, we will show how we in actual staging situations, have made concrete choices in a number of specific exhibition situations. How we performed the *strategic* and *tactical staging,* to communicate the installation's intentions and facilitate the audience participation, and *dynamic staging,* in the use situation.

3.2 Unfoldings

Unfoldings is an interactive audio-tactile installation created by MusicalFieldsForever [17]. It consists of 18 body sized sleeping-bag-shaped modules, or cushions (see Fig. 1).

Figure 1. Unfoldings modules in different formations.

Each module contains two digital and one analogue bend sensors that register when someone sits down, touches or move the cushion around. The thick part of the cushion is filled with bean bag filling pellets, offering volume that makes it possible to sit on without the risk to squash it flat. The thin part of the cushion is filled with polyester padding, so that the form bends when placed on its end (see Fig. 1). In this transition between soft and firmer padding we have placed the analogue bend sensor that registers how much the cushion is bent. Along its edge the cushion has a chain of lights that synchronise and change with the interaction and the music composition. Two of the cushions have microphones. When the audience is talking, singing, and in other ways make sound, Unfoldings translates by synthesising the sound into musically varying responses.

3.2.1 Designed for Potential staging

We have made a range of design choices to facilitate a series of different types of staging on different levels, on a potential, as well as a strategic, a tactical, and a dynamic user level.

On the potential level we have given the module a form, so that it is as ambiguous as possible, and at the same time has a strong and clear identity. For instance, the module has no up or down, front or back. The choice of filling makes it possible for a module to stand on its own and offer volume to sit on, at the same time as it bends in a natural way, and becomes almost like a body (see Fig. 1). The module is bright poppy-red on one side and dark wine-red on the other. We have attached hooks around the edge of the cushion, in order for it to be possible to tie several cushions together, in a shoe-lace manner. It makes it possible to join cushions together, so that they resemble other forms such as a flower, anemone, a chair, body parts, a playful ball pit, or a pile of bleeding, radiant bodies.

Designed for many genres and experiences. Unfoldings is designed to function as a modern, high-tech furniture, and as an organic sculpture, a physical argument in a design research discourse where it in a practical manner argue for the aesthetical potential of ambiguity (1, 11). The modularity of the cushions makes it possible to group them loosely or tie them into formations, depending on what is suitable for the specific stage.

Designed for many narrative paths. Unfoldings creates sound and musical answers based on real-time live sound recordings. Some music is created as direct answers to interaction with the bend sensors, and some as communicatively varying answers, delayed, as after having a moment of reflection. These choices are made to open up Unfoldings for spectators to take different roles.

Designed for many roles to takes. The spectator/user can choose to experience the installation as an organic, light and sound sculpture, or sit down and actively play on it as if it was a musical instrument, or take pleasure in the ambient music and intimate experience of warmth, colour and abstract dynamic graphics projected onto the wall. Or one can watch others interpret and act, and make one's own interpretation of what they do. If nobody has interacted for a while, Unfoldings takes initiative and tries to wake the audience interest to look, listen and interact. Also based on what the microphones continuously record, Unfoldings compose music from its interpretation of what happens in the room. Even the name, Unfoldings, is chosen to support this type of ambiguity. It is an invitation to the audience to unfold themselves bodily and creatively, as well as it is the sculpture /installation that unfolds, and the unfoldings of theoretical design arguments in an art discourse.

Above we have tried to show how we have designed to open up the installation for different types of staging; So it on a *strategic* level is possible to choose what type of experience the installation should offer a person, by selecting the relevant institution and event. That it on *a tactical level* is possible to set up the installation and the make the set design choices in the specific exhibition situation. And finally that the user *dynamically*, in the actual spectator and use situation, can change the staging.

In the part that follows we like to show how we in some actual situations have staged, that is, chosen and designed for these different levels in the Unfoldings installation.

3.2.2 From avant-garde sound art to interactive toy

Strategic Staging. Unfoldings was developed and exhibited for the very first time at the Stockholm New Music Festival at the House of Culture in 2003. The festival was one of the main events within experimental music in Sweden. We were asked to make an interactive installation for the festival, whose main activities took place on the 3 floor, in a traditional concert hall at the House of Culture. There were several dedicated exhibition rooms in the building that were isolated and closed off from the messiness of the public spaces. However, we choose the vestibule area with stairs and escalators, surrounded by glass walls only, to be a mediator between the different target groups and events taking place in this multicultural and multi-functional house, where people from different classes and ethnical backgrounds met. In this respect the House of Culture in Stockholm is a unique environment. By placing Unfoldings in the vestibule on the way into the festival's concert hall, Unfoldings could be part of different experiences, genre wise, depending on the audience background and expectations. The initiated group of music connoisseurs could experience it as an avant-garde musical piece and an introduction or entrance to the festival. For others, on their way to the café on the 5th floor, Unfoldings was a new piece of furniture for the foyer, sculpture, or something made especially for children, due to its soft, organic look.

We chose to put a big sign on the wall with the title and information that it was an interactive installation. Unfoldings was mentioned several times in the press, among all in the newspaper Metro that reported from Unfoldings where "the cushions could talk". The articles made many young people with a video gaming interest come to try out and experience the installation.

Figure 2. Mother and daughter interact in Unfoldings.

Tactical Staging. On a tactical, set design level, we chose to place the installation on both sides of a huge column, marking out, for the audience, a natural movement around the stairs. The two spaces, one on each side of the column created a public and a more private room well-defined by the glass wall façade. Thereby

the glass wall also created a relation to the activities taking place at the Sergel's square, Stockholm's famous central arena for protesters and demonstrators. We divided the installation in two parts with 9 modules in each. In one part we tied them together into a big anemone, in the other we let the modules be loose, as in a pile of lifeless bodies.

Dynamic Staging. The two installation parts therefore gave completely different interpretation possibilities. While the tied-up "glowing flower" was easy to sit down in, like in an armchair, the "body pile" was more problematic and ambiguous to relate to. A Kurdish woman, protesting against the war in Iraq began to cry when she saw the bodies and said that it looked like the war crime scene when Sadam Hussein had used poison gas weapons against the people in Halabja. Meanwhile small kids climbed and played with the loose modules as if they were in the ball pit at IKEA. For some, Unfoldings offered an intimate and peaceful place, in a stressful everyday. For others, Unfoldings was news about where technology might be heading, and therefore worth exploring for 5 minutes. For the security guards Unfoldings was a soothing and chatty friend at night that they visited to bid farewell on the very last day of the exhibition.

3.2.3 From sculpture to co-created concert

Strategic Staging. Later Unfoldings was selected to be exhibited at the Cybersonica International Festival of Music and Sound in London. Once again the exhibition space was oriented towards a limited avant-garde and experimental art music audience, although with a more international outlook and better knowledge about interactivity. The festival was arranged by the Cybersalon at Institute of Contemporary Art (ICA). Mainly, the audience that found their way to the gallery was art and music connoisseurs.

Tactical Staging. Our installation was placed in a white gallery together with the other sounding installations. All the others were square and machine-like boxes with control buttons, and compared to them Unfoldings was very different being interactive for many people, creating physically and visually sensing experiences. We tied all the modules loosely together, with enough distance to the wall for the audience to view the abstract video projection. The light from the projection and the glowing red modules created an intimate "circus under water" atmosphere in the "white cube" gallery (see Fig. 2).

Dynamic Staging. The curator at the gallery said that he never had experienced behaviour like this from his audience. Peopled stayed longer, interacted, smiled, took pleasure in being in the installation, explored it, in a way they normally never acted in an art installation. On Midsummer's eve we arranged a sleeping bag concerto for the festival participants (see Fig. 3). Professional musicians played laptops and acoustic instruments, placed behind the installation and directed towards the generative interactive video projection, with Unfoldings and audience before them. The audience improvised on the Unfoldings modules. Unfoldings answered and the professional musicians improvised in response. A crowd of audience was surrounding the ones interacting, watching what was happening. The audience had roles, both as spectators and as co-musicians. Everybody participated in the co-creation of the collective visual, tactile, and musical experience.

Figure 3. Musicans and audience improvise together in Unfoldings, ICA June 2003

3.3 Orfi

Also Orfi is an interactive audio-tactile installation created by MusicalFieldsForever [17]. It consists of 26 soft tetrahedron shaped modules in three different sizes from 30 to 90 centimetres. The modules are made in black textile. Most of the tetrahedrons have orange origami shaped "wings" mounted with an orange transparent light stick along one side. Every module contains a micro computer and a radio device, so they can communicate wirelessly with each other. The modules can be connected together in a Lego-like manner into large interactive landscapes. Or, the modules can be spread out in a radius of 100 meters. The "wings" contain bend sensors. By interacting with the wings the user creates changes in light, dynamic graphics and music. Some modules contain speakers, so one can experience the vibrations from the sound by sitting, or holding a module in one's lap. The installation contains 8 different music genres the audience can choose between. Two orange tetrahedrons contain microphones which in the Voxx-genre create live music based on the users own voice and environmental sound input.

Figure 4. ORFI modules hanging from the ceiling in front of the dynamic video projection.

3.3.1 Designed for Potential staging

Orfi is created after Unfoldings, and a great deal of the knowledge and experiences regarding designing for openness is developed further in Orfi. The shape, size and that it is wireless are important qualities that make Orfi more open to dynamic and co-created staging.

Orfi is designed to be a hybrid between furniture, an instrument and a toy, in order to motivate different interpretations and forms of interaction. One can sit down in the biggest module as in a chair or play on it as an instrument, resulting in immediate response to interaction. Or one can talk, sing and play with it, as with a friend or a co-musician, who answers with imitation and variation after a little thinking pause. The 8 different genres one can choose between, when setting up or using the installation make it open to many staging possibilities. Each musical genre has its own dedicated dynamic graphics projection, aesthetically different from other genres, that effects the whole expression of the installation [5]. Therefore choosing genre is a very efficient way to stage the installation. One can stage a dark red jazzy experience or a crazy pink techno session just by changing genre, by bending the wings of the genre module. The modules contains different components, input and output devices. So by moving or placing the modules one can change the staging dramatically. For instance, when placing the big modules containing speakers far away from the modules with wings, one changes the spatial experience because the musical answers comes far away from where the interaction takes place. This moves the focus from the interaction towards the sound and video response, and makes the shifting of space and time an important part of the staging experience. This space and time shift also changes the role of the module and installation. When listening to the immediate response to interaction, the module becomes a funny looking and amusing instrument, when focusing on the varying and shifted response in time and space the modules gets the role of a co-musician or answering actor. This shift in genre, time, space and roles makes Orfi open to many staging possibilities on several levels.

3.3.2 From art installation to ambience

Strategic Staging. We were invited to the exhibit Orfi at the Museum of Modern art in Stockholm during the celebration of Arts Birthday in February 2008. This is a yearly avant-garde art event, where the most of Stockholm's contemporary music and art audience participate. There were a few art installations in the exhibition hall outside the concert hall, where around 15 concerts were held and everything was broadcasted through the European radio network. By participating with Orfi on this avant-garde art event we defined Orfi as art, even if it was originally created as a communication medium for children with special needs.

Tactical Staging. We spread the Orfi modules on the floor in front of the big 4*3 meter video projection. We projected from the floor and up, which moved the focus in the room down towards the floor and on to the rhythmic glowing Orfi modules. Orfi's dynamic graphics and music created a disco like feeling in the room where partying people talked, drank beer and relaxed.

Dynamic Staging. In the Orfi area people begun to sit down by the modules and started play with them. They who experiences that Orfi answered to their interaction continued to play in different ways. Some started to throw the modules to each others. Others put the modules containing speaker onto their body to experience the sound vibrations. The interaction changed from conscious art audience that wanted to understand and interact in the right way in a process oriented art installations, to party minded people that made Orfi part of their ambient Arts Birthday party.

3.3.3 From instrument to band member

Strategic Staging. At the boat and new media scene Half Machine in the docks of Copenhagen we exhibited Orfi together with other interactive performance works in the summer 2008. The audience were young and shared a deep knowledge and experience of interactive art works.

Tactical Staging. We hang the Orfi modules on elastic ropes from the ceiling in front of the staircase, and thereby made Orfi a lighting mobile in Calder style. The video projection was the first the audience met when coming down the stairs to the ground floor. This made Orfi easy to see and interact with when entering the big hall down stairs. We decided to only show the Voxx genre, in order to invite the Half Machine audience to sing and create the sounds themselves.

Dynamic Staging. The audience was expecting interactive installations and had no difficulties to sing and interact with Orfi. Many interacted and co-created music and dynamic graphics together and had great fun. During concert sessions on the stage nobody used Orfi's microphones, but they listened to the music and heard that Orfi started imitating and playing by itself. Orfi became a band member in the performance group, and in doing so, changed the stage by expanding it to include Orfi. Some of the audience were inspired and started to interact with Orfi. It became a unique hybrid jam session between the concert on stage, the interacting audience and Orfi.

3.3.4 From art installation to therapy

Strategic Staging. In spring 2009 we were invited by national art society "Konstfrämjandet" together with other contemporary artist to create an installation in a room at the rehabilitation centre at Rosenlund hospital in Stockholm. Six artists had exhibited before us under the name "Art for all senses" to offer people with special needs a unique and accessible art experience.

Tactical Staging. We placed the projection screen onto the floor opposite the entrance door. On the floor we put a neutral carpet and all the Orfi modules. The room was approximately 4*5 meter so the projection, carpet, music and light created an intimate, ambient and sensoric feeling that reminded of the other multisensory rooms (Snoezelen rooms) at the Rosenlund rehabilitation centre.

Dynamic Staging. When the clients entered the room they were familiar with the expression of Orfi, even if they had not seen it before, because it reminded them of the other multisensory rooms. Some lay down to experience the ambient sensual feeling. Others interacted enthusiastic together with their assistant and therapist. Two genres were usually chosen and toggled between; one highly rhythmical, and one calmer. These choices gave them space to negotiate so they could shift roles, actions and activity level.

3.3.5 From instrument to health furniture

Strategic Staging. In 2010 we received funding from the Norwegian Research Council under the Verdikt-programme to develop musical tangibles for children with special needs. The goal is to improve health and well-being [20] by reducing passivity and isolation through use of musical tangibles. Haug school and resource centre outside Oslo is our partner with long experience in using art in their therapeutic practice. We have made tests in their small music room during spring 2011. The small music room is usually used by music therapist to play piano, sing and use other acoustic instruments, so the children expected musical activities when they entered the room.

Tactical Staging. We changed the music room dramatically to stage the events. First we moved all chairs, piano and other instruments. We blinded the windows and placed a full wall projection screen against the windows. Orfi's changing graphics created a living ambient expression in the room. We put a neutral thick carpet on the floor and placed the Orfi modules on the carpet, to make an intimate and soft stage for the action. We placed the large modules containing speakers in the corner, where it seemed most natural to sit, facing the projection without shadowing it. The small music room looked really different from what the children and their assistants were used to, with a dreamlike, soft and seductive expression.

Dynamic Staging. Some children sat in wheel chairs and we lifted them out and placed them on the big Orfi modules containing speakers. Some walked into the room themselves. The children felt the music and vibrations and their assistant helped them to bend the wings to create music, and shift to the genres they liked. During the many test sessions, the children played on the modules like instruments, threw the modules and changed the stage as in pillow fights and rested together on the vibrating and glowing modules as if they were furniture. They changed the staging dynamically, both spatially by changing the modules placed on the stage, temporally by creating their own narrative experience in the room and actorially, role wise, by giving Orfi and the assistant different roles.

4. CONCLUSION

In this paper we have discussed the creative and communicative potentiality of *staging* of interactive installations. We define staging as *dramatisation of the situation*. Further we have discussed the term situation in relation to relevant theories to develop a deeper understanding of the potentiality of staging. We have presented a model to understand and work with staging on several phases or levels. Staging during design of the installation, *Potential Staging*. Staging related to the strategic choices where and when to exhibit the installation, *Strategic Staging*. Staging when setting up and creating the actual set design, in a specific place, *Tactical Staging*. And finally the staging the spectator or user does during interaction with the installation, *Dynamic Staging*. We have presented four kinds of qualities an interactive installation should have in order to offer staging possibilities.

The installation should offer *Genre* choices to change the desired experience of the installation. *Temporal* choices to change the narrative design of the installation. *Spatial* choices to change the set design of the installation. And finally, *Actorial* choices to change the character and roles of the installation and thereby mutually the audience. These choices in all or several staging processes. When the spectator or user stages through interaction the staging is dynamically co-created.

Finally we have presented how we used the staging model for design and exhibition of two installations, staging them for different events, for different audiences.

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Sonic Dog Tags:
Expressive Algorithmic Composition from Parsed Department of Defense Casualty Notices

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ABSTRACT

In this paper, I present a computer program and compositional tool, Sonic Dog Tags [2], that retrieves biographical information of fallen service members from the Department of Defense RSS feed and maps this information to create memorial music. The aim is to discuss the methods and compositional mapping strategies for creating individual, expressive, musical works. Both information retrieval and mapping strategies are discussed, while an integrative system for future compositions is proposed.

Keywords

Python, Max/MSP/Jitter, Processing, RSS, Department of Defense, algorithmic composition, mapping

1. INTRODUCTION

RSS feeds are a type of web feed that publishes current updates from a blog or website, which are a relatively new media tool for online publishing [1]. The Department of Defenses publishes its own RSS feed [11], which is directly tied to its public news releases. Of the news releases published by the Department of Defense in the past few months, casualty notifications account for approximately twice the content [13]. Sonic Dog Tags was written as a way to sift through the influx of releases by the Department of Defense, capture the biographical information of service members fallen in Iraq and Afghanistan, and compose a work for each service member. Sonic Dog Tags offers a way to sonically identify each service member killed in action.

2. INFORMATION RETRIEVAL

In this section, I describe the process of searching for biographical information of fallen service members. I chose the Department of Defense RSS news feed [11] since the Department of Defense provides current, accurate, and primary source information of fallen service members. Existing methods for pattern recognition and pattern search [5] also helped to highlight the consistent structure of the Department of Defense RSS feed. The url of the Department of Defense RSS feed publishes formatted titles, and all released casualty notifications follow a standardized format: "Rank. Name, Age, Hometown, State." [12]

**Figure 1. Department of Defense casualty notice.**

2.1 Python string search

The Sonic Dog Tag parsing program, written in Python [9], follows three main procedural steps. First, the program searches the Department of Defense RSS xml document for titles containing the string literal "casualt." The straight-forward query approach ensures all single and multiple casualty notices will be returned. Each returned title contains a url link, which is subsequently appended into an array ($å$).

Next, each index of $å$ is parsed for service member information. The initial string query searches for the <div> element class containing the service member's biographical information. Although the information changes between every Department of Defense release, the string construction of each release follows the same format (see above) [12]. Accounting for discrepancies in the HTML, each url is searched against a variety of <div> classes and IDs, including singletons found throughout the process, in order to correctly parse the service member's information.

The program writes the parsed biographical information of each service member into a text file. Multiple service member casualty notices were taken into account, and the parsing program appends a new line in the text file for each service member found in a given release. The text files are saved onto the hard drive,

appearing in the same folder as the parsing program, and a reference list of all searched urls prints in the Python compiler. Text files create an informational record and serve as the compositional data set. Furthermore, text files can be read by various programming environments.
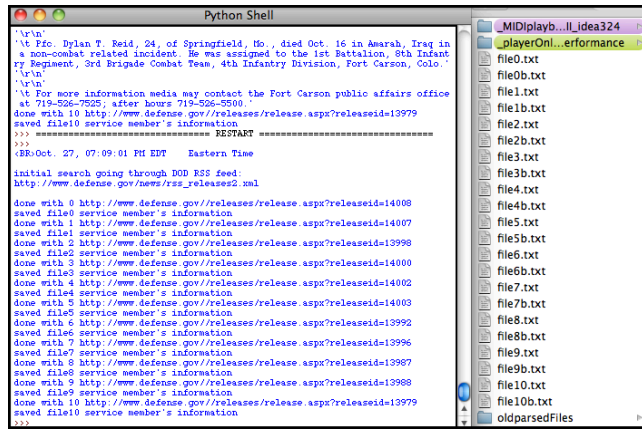
Figure 2. Parse taken on October 27th returned ten files. Printed urls are shown on the left and the corresponding text files are displayed in the Finder on the right.

3. TEXTUAL DATA SETS

Using parsed textual information for the creation of individualized sonic compositions raised issues of mapping. From mapping strategies and problems discussed in [8], I implemented a one-to-many mapping approach. Since each composition utilized similarly constructed data sets (strings containing a limited number of characters), it became necessary to control several parameters reusing the same set of values.

3.1 Max/MSP/Jitter

Because Max/MSP/Jitter [4] offered the ability to modify and map text files written by the parsing program in various ways; I chose the environment to execute the one-to-many mapping strategy. For mapping the text to musical parameters, each file was converted and stored into tables of ASCII values. The numbers of the ASCII values created similar patterns and sets of numeric values. Over a two week span in October 2010 (eighteen service member casualty notifications), the ASCII 32 (' ') appeared six–nine times for each service member, ASCII 44 (',') appeared three times, ASCII 46 ('.') appeared one–four times, ASCII values between 65–90 ('A-Z') appeared six–nine times, ASCII values 48-57 ('0-9') always appeared twice, and the ASCII values 97–122 ('a-z') appeared eighteen–forty-one times [12]. Mapping variance with similar data sets into each composition proved challenging. There is not enough space to highlight all modifications researched and implemented; however, attention will be paid to a select few.

3.2 Mapping Musical Parameters

Each data set underwent several modifications and was mapped to control one or more of the five characteristics of sound: pitch, amplitude, timbre, and duration, [7] and location.
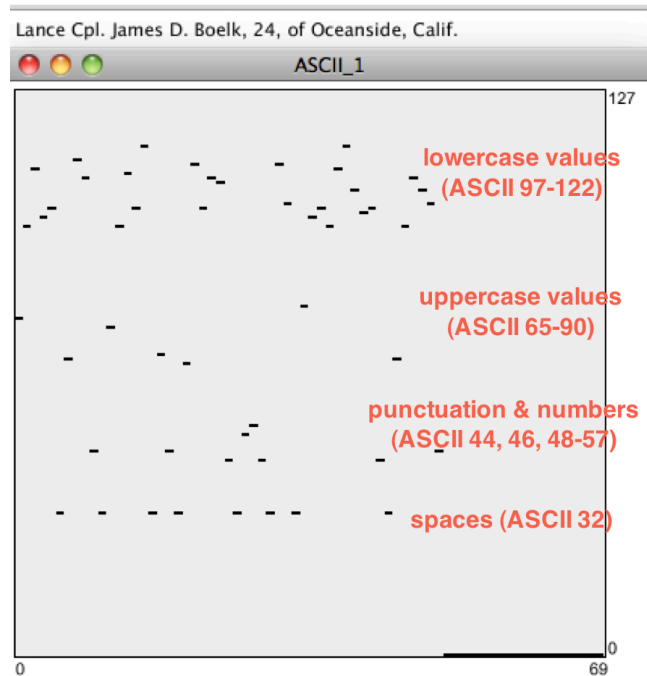
Figure 3. Text file and ASCII value table for Lance Cpl. James D. Boelk.

A pitch class set (mod 12) was generated based upon the capital letters (ASCII 65-90) of the casualty notice. Simultaneously, chords were built upon the corresponding MIDI nn values of the ASCII values. Chords included service member initials and age. Mapping ASCII values 65-90 directly to MIDI nn produced a musical range from e' to f#''', and ASCII values 48-57 produced a range from cº to aº. It is important to note that the maximum interval range for age can only be eight, a minor 6th. The age combinations '09' and '90' will never occur, yet '19' is a common age, representing 5.23% of Coalition service members killed in Iraq and Afghanistan [14].

Max/MSP read the ASCII value table sequentially in time, providing a durational framework for each work and a literal reading of service member's information. The full ASCII value range (32–122) was scaled to control note durations, with every ASCII value determining the duration of the following adjacent note. The prominence of ASCII 32 (space bar) was mapped to accent the piece with rests and articulated dynamics.

Amplitudes were linked to ASCII values controlling pitch, and timbres for each work were controlled by keeping compositions to a single instrument. While each work was recorded in stereo, no mappings to control pan were implemented.

3.3 Processing

Processing, a programming language and environment for creating and manipulating images [6], was used to visually integrate the service member's information with the sonic composition. Max/MSP sent function calls to Processing in order to visually render the casualty notice from the Department of Defense RSS feed. While not part of the original composition idea, displaying the casualty notice visually reinforced the sonic composition.

4.CONCLUSIONS

Due to the stylized format of the data sets, one mapping strategy alone did not solve the issue of sonic expressivity between service members. Mapping textual characters to several different musical parameters (i.e. pitch, duration, and amplitude) helped increase the individualism of each composition. In order to help further define each work sonically, reusing values from the dataset for mapping to other parameters is necessary. Additional integration of mapping values to complementary musical parameters is planned, especially to expand timbres and locations within the stereo field. Future compositions will also include casualty notices containing several service members.

Today, memorial music exists in many different forms. A year after 9/11, the Seattle Symphony organized "Rolling Requiem" [10], a collective performance of Mozart's Requiem where every hour on the hour in every time zone around the world, choirs performed the Requiem as part of the memorial. Memorial sound installations, like "Sound Memorial for the Veterans of the Vietnam War," [3] also redefines how listener's can engage with remembrance by individualizing the names of those killed. Through technology, "Sonic Dog Tags" synthesizes various programming languages and mapping strategies in order to shape new memorial compositions and processes of remembrance.

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Three-dimensional restitution of Renaissance pictorial scenes

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Abstract

The focus in this paper is the three-dimensional restitution of pictorial scenes. The main difficulty is that only one view of the scene in perspective is available[1]. Part of the information is thus inevitably and inexorably missing and hypotheses have to be formulated. After reminding the main principles of translating two-dimensional scenes into three-dimensional ones and to perform the reverse operation, we'll describe the semi-automatic 3D-restitution tool we've worked out. It allows, in a very short time, to obtain a relatively complex three-dimensional restitution of a painted architectural scene, human intervention being reduced to a strict minimum. Our software is accessible to anyone and needs no particular knowledge in the field of perspective, CAD or three-dimensional reconstruction.

Topic and Subject Descriptors

History of Art and Computer graphics.

Keywords

Geometry; History of art; Architecture; Three-dimensional reconstruction.

1. INTRODUCTION

Observing a painting and catching the message it carries, imply some prerequisites. Nowadays, average museum visitors may encounter difficulties in decoding ancient paintings and so lose interest in them. How to promote access to these works? Considering the evolution of computer technology and the growing interest in virtual reality, we opted for a feasibility study about the three-dimensional restitution of pictorial scenes. The present paper contains five stages. In the first one, we'll set out the problem we're confronted with. That will take us to part two, where we define the parameters that have to be laid down. Next we'll present the principles of projective geometry. Then the tool we've worked out will be described briefly and we'll end with the presentation of some results.

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[1] We assume that the analysed works were painted in accordance with the rules of one-point linear perspective. Our analysis is focused on Italian Renaissance paintings.

2. SETTING OUT THE PROBLEM

Figure 1 illustrates one-point linear perspective. Given π is the picture plane, α the ground plane, O the point representing the painter's eye and π_o a plane parallel to π and passing through O. The central projection (or perspective) with centre O on picture plane π can be defined as an application of the projective space R_3/π_0 in π, which associates point P_π, the intersection of the straight line OP in π, to point P_i. This straight line OP_i corresponds to the line of sight associated to P_i. The points belonging to plane π_o, the neutral or limit plane, have no image points by central projection. Let's notice that P_π corresponds to the perspective image of the set of points belonging to the line of sight OP_i. Intersection point P_α on the same line of sight OP_i in ground plane α is also projected onto picture plane π in point P_π. Point P_π can be found by constructing the projection $O_\alpha P_{i\alpha}$ of the line of sight OP_i in picture plane α. Point P_α, situated on $O_\alpha P_{i\alpha}$ and belonging to plane π, corresponds to the projection on ground plane α of the point P_α we are looking for. Figure 1 also allows us to set out the reverse problem of reconstruction. In this case it appears necessary, however, to start by determining the position of the observer's eye with respect to picture plane π. In order to do this, we must first find point O_π and then determine the distance OO_π. These elements allow us to define univocally the position of eye O. In order to locate ground plane α with respect to the eye's position O, we also have to determine the distance OO_α. The two distances OO_π and OO_α are the two hypotheses to be laid down.
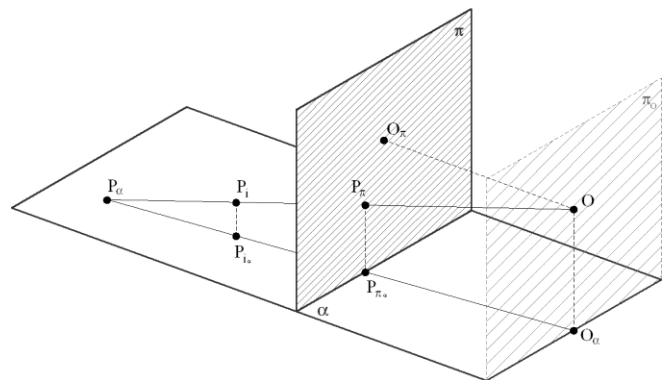

Figure 1. Setting out the problem.

3. HYPOTHESES

The distance OO_π allows us to determine the observation point to be adopted; it corresponds to the focal distance between eye O and picture plane π. Assuming the ground between the painter and the scene is horizontal, it is possible, once O_π is known, to define OO_α, which represents the height of the painter's eye with respect to ground plane α.

3.1 Distance OO_π

Figure 2 makes visible the influence of distance OO_π on the three-dimensional restitution of a square based pyramid. We can note that the reconstructed scenes greatly differ. It therefore turns out to be essential that the focal distance be determined accurately; otherwise the obtained three-dimensional restitution is not an exact copy of reality.
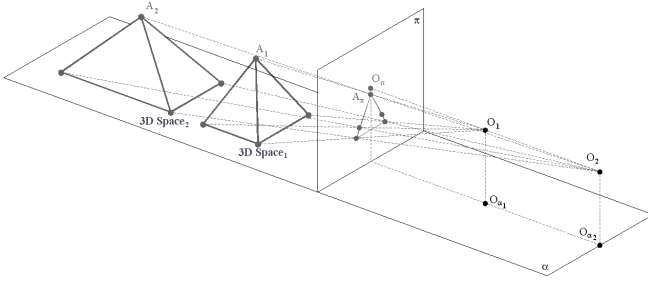

Figure 2. Influence of the distance OO_π.

First of all we have to locate O_π in the painting. In figure 3 we notice that point O_π is level with both the painter's eye and the horizon line. This horizon line corresponds to the straight line of intersection between picture plane π and the horizontal plane α' at the painter's eye level. Point O_π is usually called 'vanishing point' in terms of perspective construction [1]. In the painting it also corresponds to the point where the perspective projections of the lines of space R3, parallel to each other and perpendicular to picture plane π, converge (see figure 4).
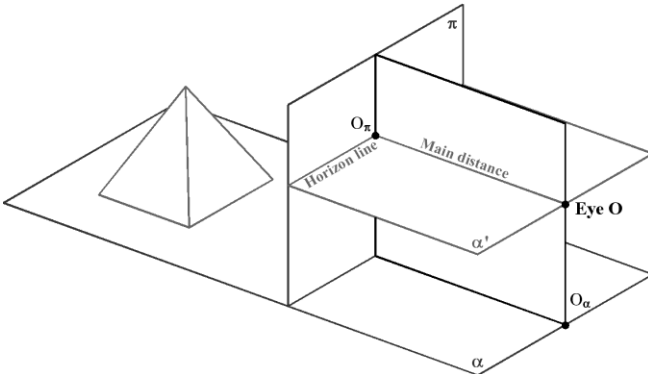

Figure 3. Vocabulary.

Once we have found point O_π, we can determine the distance OO_π. The latter can geometrically be defined with the help of $O\pi'$

and Oπ'', which correspond to the points of convergence of the perspective projections of the lines drawing 45° angles to picture plane π and belonging to a plane that is parallel to ground plane α. These points are located on the horizon line, equidistant from vanishing point $O\pi$. We also notice in figure 4 that the distances $\left|O'_\pi O_\pi\right|$, $\left|O''_\pi O_\pi\right|$ and $\left|OO_\pi\right|$ are equal and correspond to the radius of a cercle having its centre in $O\pi$. The distance points $O'\pi$ and $O''\pi$ can be located precisely, since artists as a rule use a checkerboard floor in their ground plane as a reference for their constructions. So it is possible to identify the diagonal line of one of these squares, chosen as large as possible.
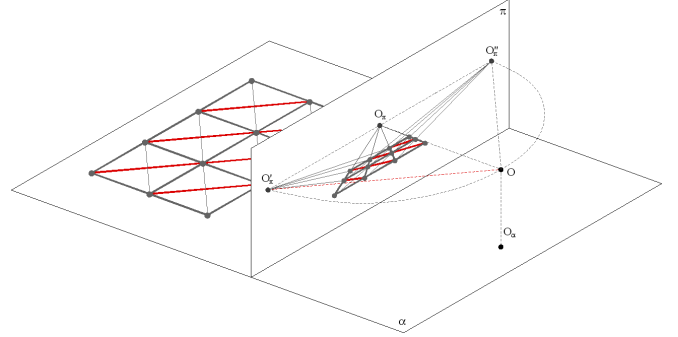

Figure 4. Vanishing and distance points.

3.2 Height OO_α

Figure 5 lets us visualize the influence of the painter's eye level on the three-dimensional restitution of a square-based pyramid. We see that the reconstructed scenes are proportional to each other. We can thus consider that, whatever the height of OO_α, the three-dimensional restitution we obtain will be correct, except for the scale factor. Now if we know the true height of one element of the plane perpendicular to the ground plane, this scale factor can be determined.
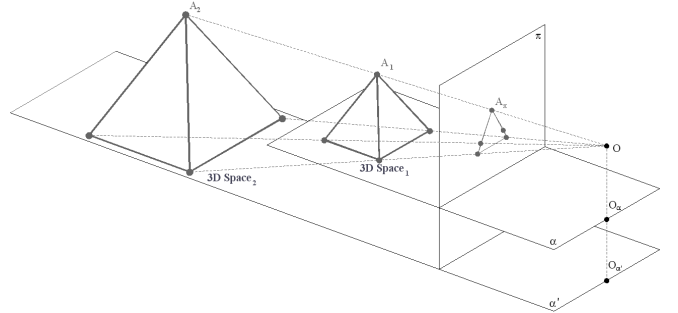
Figure 5. Influence of the distance OO_α.

In our application it seems difficult to know the dimension of the object with certainty, the represented scenes being partly real and partly imagined by the artist. That's why we decided to use as a reference the height of the figures in the scene. Basing ourselves on an analysis of the proportions of the human body by Vitruve [2], we have been able to isolate three configurations, corresponding to the three postures generally adopted by artists when painting (standing/sitting on a stool/sitting on the floor). It

will be possible to determine these postures in function of the position of the horizon line in comparison with the figures in the scene (see figure 6).
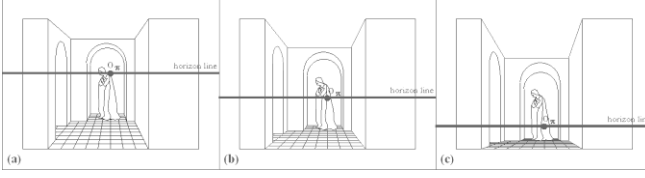

Figure 6. Horizon line and height OO_α.

4. FROM 2D TO 3D COORDINATES

The painter's eye level, the picture plane and the ground plane are now known and located in relation to each other. So we can find the three-dimensional coordinates of any point in the plane. The principles of projective geometry can now be applied [3, 4]. Two cases are to be distinguished (see figure 7): the case where the point P we are seeking is part of the ground plane and the case where it is not.
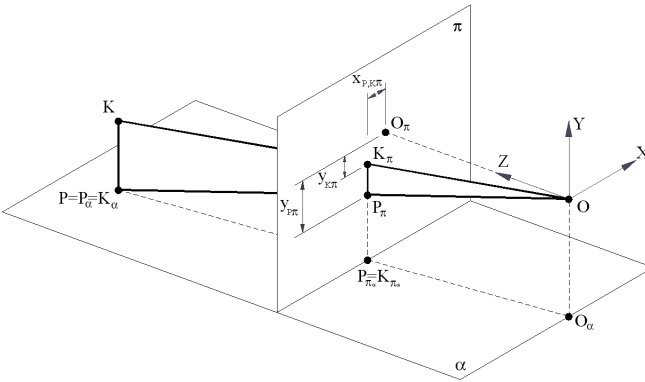

Figure 7. From 2D to 3D coordinates.

Using the homogeneous coordinates in a matrix, it will be possible to find de three-dimensional coordinates of the points P and K by applying the following formulas:

$$\begin{bmatrix} x \\ y \\ z \\ 1 \end{bmatrix} = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & \frac{1}{H} & 0 & 0 \end{pmatrix} \begin{bmatrix} x_{P\pi} \\ y_{P\pi} \\ D \\ 1 \end{bmatrix} \qquad \begin{bmatrix} x \\ y \\ z \\ 1 \end{bmatrix} = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & \frac{y_{P\pi}}{H} \end{pmatrix} \begin{bmatrix} x_{K\pi} \\ y_{K\pi} \\ D \\ 1 \end{bmatrix}$$
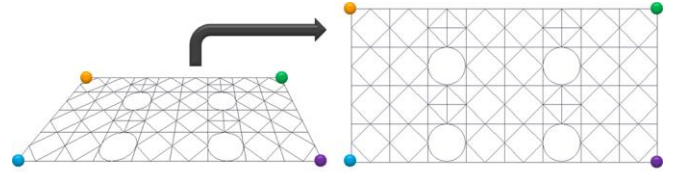
These matrix equalities are defined "except for the product by a multiplication factor" and the matrix is a homographic matrix determined except for the (cross) ratio.

5. THE DEVELOPED TOOL

We have developed a tool which, on the basis of the hypotheses laid down in section 3, allows the semi-automatic restitution of pictorial scenes. We have allowed different types of elements to be resituated: planes / simple volumes / architectural elements.

5.1 Reconstruction of planes

In projective geometry, the knowledge of the image coordinates of four non-aligned points of the plane is enough to define the homographic matrix (see figure 8) in a univocal manner.

Figure 8. 3D reconstruction of planes.

As a matter of fact, only two points (the blue and the green vertices, for instance) have to be located in order to render the textures of all the characteristic planes in three dimensions. We have allowed the restitution of three types of planes: planes parallel with the picture plane / planes parallel with the ground plane / planes perpendicular to the ground plane and to the picture plane.

5.2 Reconstructions of simple volumes

Here we have allowed restitution of cylinders and rectangular parallelepipeds. Locating two or three points allows the user to resituate these simple volumes.

5.3 Data base of architectural elements

A typological study of about forty paintings enabled us to identify the architectural elements most frequently met in Italian Renaissance paintings. The most frequent elements are pedestals, columns, archways, walls with openings and entablatures. Each of them has been the subject of a study of proportions and for each of them we have defined the parameters to be left to the initiative of the users. We have made a distinction between elements encountered one single time and architectural compositions. As concerns the latter, the user will have to specify the number of repeated elements and he will have to specify their location or their lay-out.

6. RESULTS

The tool we have developed is accessible to anyone; that means that the user needn't master CAD software in order to use our programme. With this tool, one can obtain three-dimensional restitutions of rather complex scenes in a very short period of time, human intervention being limited to a strict minimum.

These restitutions provide us with the actual dimensions of the represented scene. Unexpected details will sometimes be discovered. The three-dimensional restitution of *The flagellation*

of Christ by Piero della Francesca makes us discover an unexpected rose in the pattern of the inlaid floor, the repetition of the square and a circle inscribed right beneath Christ, square and circle having a symbolic meaning (see figure 9).
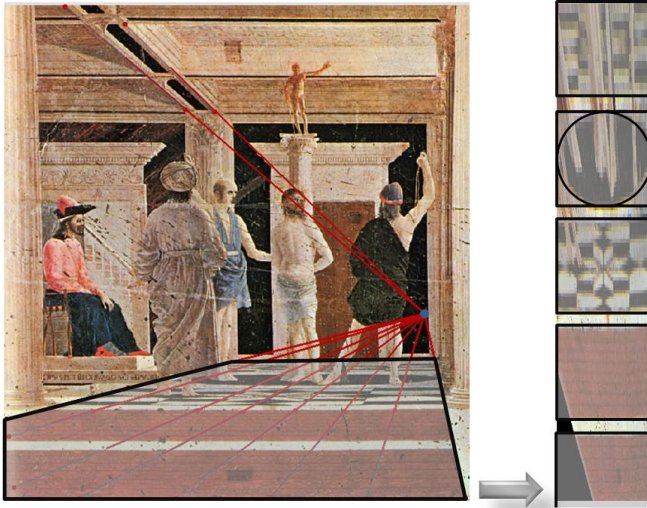
Figure 9. Piero della Francesca, Flagellation, v. 1455-1460

The three-dimensional restitution of the panel *Annunciation* by Domenico Veneziano shows that the door in the background is really far away (see figure 10).

In our opinion, this tool proves of great interest for museums. The pictorial restitutions might attract a new public and incline people to look at works from the XIVth, XVth and XVIth centuries in a new way and from a new point of view.
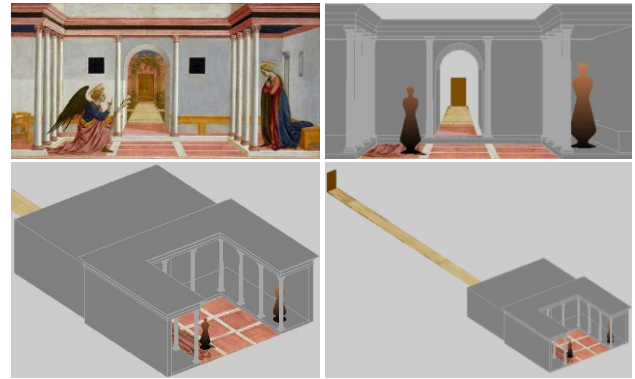
Figure 10. Domenico Veneziano, Annunciation, v. 1445

On the other hand, the pictorial scenes represented may be considered a not insignificant source of information. The restitutions might prove useful in various domains such as archaeology, history of art and architecture.

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AFFECT AND GESTURE IN MULTI-TOUCH INTERACTION CASE: AT HAND

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ABSTRACT
In the next few years we are likely to see interactive touch screens embedded in urban architectures. Interactive installation At Hand anticipates these developments by investigating the city space as the space for affect and gesture. How do we articulate our embodied being in urban spaces? And how are these observations translated into an interactive experience at the touch screen interface? Our paper describes the process by which the conceptual thinking for an interactive installation is translated into the technical implementation of the pilot, which was installed in a public place in August 2010.

Topic and Subject Descriptors
D.3.3 [**Interactive Multimedia Installations**]: Design for multi-touch interaction – *politics of affect and gestures, embodied interaction, MultiTouch technology.*

Keywords
Gesture, affect, multi-touch, touch screen, interactive installation, urban space.

1. INTRODUCTION
1.1 Urban screens
In the last few years, public screens have become embedded in urban architectures. While the majority of the content on these screens relates to commercial or informational interests, there is also a growing number of urban screens related projects, which explore public screen for artistic purposes. [1] As touch screens are now rapidly creating new interaction paradigms in the personal use of information and communication technologies, we may anticipate the emergence of public touch screens in the very near future. Our installation project investigates the possibilities of touch screen interaction in public places. It approaches urban space from the point of view of affect by focusing on the micro-gestures of various groups of people and by perceiving them as the visible traces of affects.

1.2 At Hand
At Hand is an interactive installation, which addresses urban gestures, micro spaces of the street and the possibility of encountering otherness. European flow of migrations is its starting point, especially the recent appearance of beggars in European city spaces. It questions whether we are experiencing a loss in our ability to relate to the other as a unique human being. How should we struggle against such a loss?

The project explores the experiential and expressive possibilities of multi-user touch interaction via an orchestration of intimate close-ups of gesturing hands and the dynamics of the touch interface. In the first stage of the project, a pilot was designed for the MultiTouch screen technology on the CityWall interactive touch screen at Lasipalatsi in the city centre of Helsinki. Our paper describes the process by which the conceptual thinking for an interactive installation is translated into the technical implementation of the pilot, which was installed at the Lasipalatsi square as part of the Media Facades Festival Europe 2010 between 27.8.-24.9.2010. [2]

2. THE AFFECTIVE MICRO SPACES OF THE CITY
2.1 Urban micro gestures

2.1.1 Spatial politics of the city
The conceptual beginning for At Hand was the realization that new kinds of micro spaces of gestures had emerged in the city space. After the year 2007 when Romania and Bulgaria became members of the European Union, we began to see Romanian beggars in the streets of European cities. The mobility of the Romans poses challenging questions to the European integration policies. But their presence and its vulnerability also make visible the processes of privatization in public spaces. What kinds of social realities or behavior are being tolerated in the contemporary European cities? Have the limits changed without our noticing it? Whose side are we taking in the spatial politics of the city when we look away from the gestures of solicitation?

2.1.2 Micro gestures
The installation is based on the observations on how people take their place, how they construct their private spaces when in public. Often this place-taking seems to happen in the form of semi-autonomous micro gestures associated with the situations of waiting. In fact, quite a bit of waiting takes place in urban spaces and in different social contexts as some wait for service while others wait for a coin. These micro gestures, which are only partially conscious, can be conceived as the visible trajectories of affects, which arise in the encounters within the increasingly controlled, and densely textured social spaces of the city.

2.2 Affect

2.2.1 Relational affect

The conceptualization of affect, which perceives it as an integral aspect of a spatial, social, technical and embodied configuration is central to the idea of the installation. The concept of affect, seen in this way draws on the work of Baruch Spinoza, who perceives affect as part of the structure of an encounter. In the philosophical outline of affect by Spinoza, the focus is on the relation between individuals, who have the capacity to affect or be affected. In other words, even if affects have a relation to the emotions of an individual, they are not identical to them. Rather than individual, affects are relational and emergent. [3]

2.2.2 Affect- engineering

As Nigel Thrift has remarked, there is a growing tendency towards engineering affects, to make use of them politically. According to Thrift, the power-knowledges of affects are fragmented, heterogenous, and extensive. One of the strategies of affect-engineering is the conceptualization of the body in terms of "micro-geographies" or "body-languages". The formalizations of these languages can, and are increasingly fed back into the design of the urban spaces. [4] The concept development of the installation began with the question: How to re-configure affective technologies?

3. INTERACTION DESIGN

3.1 The absence of embodied touch

Conceptually At Hand thematizes touch both as the relation to the other and as an embodied experience mediated through multi-touch technology. It is important to raise the question of how touch is understood in touch screen technologies, as the emerging conventions in touch screen interaction seem to aim at immediacy, which tend to overlook touch as a sensual embodied experience. The conventional multi-touch gestures, for instance, appear to draw on the practices of managing objects, merging together onscreen practices to those of the material world.

As long as multi-touch gestures are directly related to operations of managing documents, opening or closing them for instance, there is very little space left for conceptualizing touch in terms of one's phenomenological relation to the other. With At Hand we wanted to explore an experiential space in which the narrative would center on the philosophical imperative of acknowledging the other, while the interaction design would investigate ways for introducing this subtext to the screen space of the multi-touch technology.

3.2 Affective touch

The most central research and development question was to consider how representational, audiovisual means as well as gestural interaction patterns could be brought to bear on existing multi-touch interaction models in order to introduce the idea of relational, sensual touch. Touching a touch screen is not a particularly sensual experience to begin with. The aim was not to simulate an embodied experience of touch, but to consider how touch screen interaction could be made affective within the heterogenous space of images, gestural patterns and multi-touch screen technologies.

For interaction design, the stroking of a hand constitutes the main metaphor. By stroking, the spectator makes his or her presence known for the imaginary other, and by stroking, one is able to explore the hand of this other. However, for the pilot we anticipated a number of spectators with very little experience with touch screens. Therefore the beginning of interaction was made more ambiguous so that almost any gesture of touch brought the spectator into contact with the hands of the other on the screen.

4. PARTICIPATORY PERFORMANCES

4.1 Script

The pilot consists of a small narrative event, in which four pairs of anonymous hands appear against a darkened background on the public touch screen. If the spectator touches any pair of hands, they open up and reveal a photographic close-up of the hand, the details of which the spectator is able to explore on skin level by stroking the screen.

4.2 Performance

For the pilot, people representing different social realities were invited to perform in front of the camera. The process of participatory filming also involved collaboration with a group of Romani people, who were looking for livelihood in Helsinki back then. One of the sites for filming was the autonomous Social Center Satama, which has been active in pursuing the politics of social responsibility and the support for the Romani people in Finland.

The participants were asked to imagine themselves in the situation of waiting, as waiting is one of those idle operations through which we perform our embodied presence in the city space. Each participant performed in his or her particular way the "script" which consisted of three parts: first imagining oneself in the landscape of one's everyday being, second opening one's hands towards the presence of the other and third, offering one's hand for the photographic close-up. Together these visual elements were choreographed into the narrative event in which the spectator encounters the hands of an anonymous other through series of gestures.

4.3 The archive of gestures

The materials filmed constitute an archive of audiovisual materials, which document, by the means of participatory performance, how people representing different social realities imagine their embodied being in the city space. The CityWall touch screen provided an experiential touch screen interface for this archive. On it, the hands of four participants appeared at the time. The juxtaposition of different hands was randomly determined.

5. TECHNICAL IMPLEMENTATION

5.1 Installation interface

The installation interface, the CityWall, is a 2,4 meter wide and 1 meter tall touch screen, that is horizontally split into four evenly sized interaction areas. The resolution of the screen is 2000 by 760 pixels. The touch screen display uses a two video projector, rear projection setup on a window glass surface with infra-red lighting and infra-red cameras for the finger tracking. The technical setup was built by MultiTouch Ltd, which offers sophisticated tools for multi-user touch tracking in terms of both

hardware and software solutions. The MultiTouch system does not only track points of contact, but actually recognizes user's entire hand and its orientation. [5]

5.2 Installation software

The installation software was programmed using ActionScript 3 and the MultiTouch Cornerstone SDK, which includes the necessary ActionScript libraries for communicating with the MultiTouch software. The MultiTouch Cornerstone SDK also supports the use of C++ programming language. ActionScript was chosen for this project, because of its easy-to-use video player functionalities. The Cornerstone SDK provides a more extensive set of tools for C++ developers e.g. providing more attributes about the orientation of the user's hands. However, since the implementation of the installation only required basic finger tracking the use of C++ was not necessary. [6]

As the installation hardware was not available for the development team in the beginning of the production, software mouse emulator was used for the initial development. With simplified software tests the mouse emulator seemed to perform reliably, but as more features were added to the application, it became apparent that the behavior of the emulator differed from that of the real hardware. In addition, the structure of the ActionScript code needed optimization to overcome performance issues. For these reasons the final software development took place in the facilities of MultiTouch with the kind assistance of their software development staff.

5.3 Multi-touch interaction

5.3.1 Display of hand movements

When an interaction area is in its idle state, it shows an FLV video loop of the performer's hands waiting. Each video is looped twice after which the idle video is swapped. The new video is randomly chosen from the media library. Each of the four media players always check that the chosen footage is not being played simultaneously by any of the other three media players. Otherwise the interaction areas function completely independently of each other.

5.3.2 The structure of the encounter

In each of the four interaction areas, in the approximate area of the video loop, there is an invisible circular tracking area waiting for input. When this area is touched, the video player advances to the next interactive section, the video of the gradually opening hands of the performer. Any gesture of touching the tracking area advances the video forward bit-by-bit. For the user this appears as if his or her touch affected the opening of the hands on screen.

5.3.3 Skin contact with a close-up

Once the video of the gradually opening pair of hands has played to the end, the application opens the close- up still image of the performer's hand so that the image and the tracking area now fill the entire interaction area. The resolution of the photograph is four times the size of the interaction area, so only a part of the close-up photograph can be visible at any given time. The user can explore the details of it by dragging it along the x- and y-axis. This functionality was implemented using the built-in interaction widgets that are a part of the Cornerstone SDK's flash library. The widgets provide basic functionality for moving, scaling and rotating any content object. However, in the pilot, the interaction

with the close-up photograph was limited to the moving of the image within the frame of the CityWall interaction area.

5.3.4 Continuity

Each of the interaction areas continuously monitor the continuity of the interaction. If interaction in any one area ceases for more than 7 seconds, it returns to the idle state. A new pair of hands is randomly chosen from the media library.

6. AFTERTHOUGHTS

6.1 Imaginary encounter

It is our impression that the orchestration of the visual material and the choreography of the interactive gestures produce the experience of an imaginary encounter. An important factor for the production of this experience is the immediate response of the MultiTouch screen technology to the user input. However, and perhaps even more importantly, the metaphor of stroking constitutes a double-bind between the narrative concept and the interaction design. On this double-bind hinges both the meaning of the installation and the affective experience of the encounter. Interestingly, it turned out that the small rhythmic adjustments in the timing of each individual "encounter" were essential for creating this experience.

6.2 The politics of reconfiguration

At Hand in an attempt to construct a site, which would give a second chance for a missed encounter - the one that does not take place in the reality of the contemporary Helsinki. The reconstructed encounter is not real in more than one way. It is a disembodied gesture, which is mediated across the temporalities of audiovisual production and across the polarized social realities of the participants. It is a re-configured gesture of touch, which openly articulates its constructedness. With our installation we want to suggest, that this re-configuration could be something, that opens our being in the city towards a different relation to the other - and this relation, through becoming affective, could become real.

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Fashioning Digital Arts

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ABSTRACT
This paper discusses how digital arts are taken up within luxury fashion branding as a means to communicate an insider relationship to the art world and to communicate a brand's role as a cultural actor. Digital art and technologies are linked to innovation and to the Avant-garde, and this relation is articulated via mediations of art, architecture, and interior design that link 'brandscapes' to digital innovation in fashion branding. Drawing on social semiotics, from insights on digital art and architecture, as well as theory on branding, this paper unpacks relations between digital arts, architecture and luxury fashion branding. In sum it argues that digital arts play an important role in fashion branding as art and in artful branding.

Topic and Subject Descriptors
D.3.3 [**Mobile Experience Design**]: Artistic, cultural, and social impact of interactive media art.

Keywords
Branding, fashion, retail, architecture, electronic art, interior design.

1. INTRODUCTION
Branding is now an almost all-encompassing phenomenon (e.g. Klein 2000). Within the domain of fashion it is increasingly linked to what Klingmann (2007: 1) refers to as 'brandscapes', where "… notions of place and market, expanding information technologies, local authenticity, and global consumer culture have intersected to create a nexus of complex relationships." It is the role of digital art as part of such a relationship within fashion branding that is the concern of this paper. How digital art and fashion branding intersect as part of a negotiation of the relationship between art and commerce is discussed with reference to three fashion brands. These are: Maison Martin Margiela,(MMM), Dior, as well as the high street brand Acne. The paper draws on multimodally oriented textual analysis of selected aspects of these brands' websites, as well as critique of promotional publications in the format of coffee table books and magazines. In her seminal book on branding, Klein (2000:5) distinguishes between branding and advertising and observes that "Though the words are often used interchangeably, branding and advertising are not the same process. Advertising any given product is only on part of branding's grand plan, as are sponsorship and logo licensing. Think of the brand as the core

meaning of the modern corporation, and of the advertisement as one vehicle used to convey that meaning to the world". I refer to fashion branding as the multimodally mediated output of a medley of promotional communicational processes that aims to strengthen the symbolic and economical value of a fashion label.

2. ART, ACHITECTURE AND FASHION
The relationship between fashion and the arts is complex. These domains are interrelated to a range of scholarly fields as well as to domains of practice - such as architecture, interior design, advertising, branding, and publishing (e.g. Cairns 2010, Ryan 2007, Klingmann 2007). As Steiner (2000) puts it, writing on promotional architecture, "As they all conflate into promotional architecture, cultural monuments, galleries and department stores are becoming indistinguishable." In such a conflation of traditional distinctions between culture and commerce, digital art is one area of art that carries with it connotations to the avant-garde and to what is new and 'cutting edge' even though the hype that surrounded digital art is now less prevalent. However, as the role of art and architecture in fashion branding begins to receive scholarly attention, the relationship between digital arts and fashion branding is not widely discussed. As part of expressing luxury fashion brands' innovative and edgy identity, digital art installations appear not only in gallery spaces, but also in the stores of luxury fashion brands. As fashion and art is interrelated in numerous ways, Valerie Steele (2008) has carried out a historically grounded discussion of the rise of the fashion exhibition, pointing to how museums have become increasingly important sites for fashion. Investigating such an interrelation, Sun Bok Kim (1998) has investigated whether fashion may be seen as an art form. However, not much is said about the role of digital art in fashion branding. Given these developments, in this paper I examine how digital art is incorporated in luxury fashion branding. How is the 'aura' of art, to paraphrase Walter Benjamin, literally being projected onto retail spaces and the brands? What role too does digital art play in the aestheticisation and marketing of fashion branding?

3. SOCIAL SEMIOTICS AND MULTIMODAL COMPOSITION IN DECIPHERING BRANDING TECHNIQUES

Social semiotics offers a theoretical apparatus for understanding mediated communication that go across modes and media, that is, multimodal communication (e.g. Kress and van Leeuwen, 2001). For van Leeuwen (2005:xi), social semiotics provides a means for investigating how semiotic modes "…can be integrated in multimodal artefacts and events". Multimodality is now being closely linked with studies of composition. From an interdisciplinary design perspective, the notion of multimodal composition is explored by Morrison (2010) who argues that composition in and as digital design is a matter of multimodally mediated communication. The relation between multimodal composition, branding and aesthetic practices within various design domains, and what traditionally has been labelled "high culture", such as for example art and architecture, is increasingly taken up in research on branding (Klingmann 2007, Cairns 2010, Ryan 2007). Analysis of multimodal mediation of the online identity of modern- and contemporary art museums, focusing on digital representations of contemporary architecture as part of place branding has been addressed by Pierroux and Skjulstad (2011 in press). However, less focus is given to art that is digital, and its application as part of practices of brand building. Venkatesh and Meamber (2006:11) have inquired into the notion of cultural production within the context of marketing, arguing that "… aesthetic meanings associated with cultural practices are related to the way in which individuals and organizations negotiate commerce and consumer culture". These authors (Ibid: 12) define cultural production as "… the process by which cultural products (including goods, artifacts, visual and experiential objects, services, and art forms) are created, transformed, and diffused in the constitution of consumer culture." As the examples presented in the remainder of this text show, within the domain of luxury fashion branding, works of digital art now form a central part in the ongoing negotiation of the relationship between "high" culture and consumer culture.

4. TRANSUBSTANTIATION AND BACKGROUNDING

The incorporation of digital artworks into fashion branding moves the focus away from the actual commodities and plays a seminal role in transferring aesthetic value from the artful context and onto the brand. It is through what Ryan (200:11), writing on the brand Prada and its role as an a corporate art patron, refers to as a process of symbolic 'transubstantiation', that the application of the designer logo causes the manufactured garment to be transformed into a couture creation. The term 'transubstantiation' is rooted in Catholicism, and by eating host bread and drinking sacred wine, one is consuming the blood and body of Christ. The bread is conceived of as transformed into the body of Christ, as opposed to a representation (Wegenstein 2010). If not religious, the relationship between art, fashion, and architecture is deeply rooted in such a trope of transubstantiation, and it has received scholarly attention for years. For instance, Taylor (2005:448) discusses the ongoing negotiation between art and commerce, as relating to fashion's popular appeal and status, stating that the relationship between art and fashion is of a dually beneficial nature: "As fashion seeks to attach itself to the value system of art, so art seeks to remove the stigma of such associations." As part of fashion branding being subject to scholarly debate, in 2000 the journal *Architectural Design* launched a special issue on the relationship between fashion and architecture, setting the increasing role of promotional architecture within the field of fashion on the research agenda. The practice of developing surprising, challenging and even at times baffling retail interiors that resembles art galleries and that caters to all the senses is discussed by Cairns (2010) in terms of the concept of "backgrounding". The alluring experience of visiting a lavishly decorated shop filled with art objects is put in the foreground; the actual transaction of products, that is the actual shopping, is placed in the background.

5. DIGITAL ART AND FASHION SPACES

5.1 Backgrounding shopping

According to Steiner (2000:21), "Museums, by virtue of their architectonic consciousness have become places where lifestyles are staged. This potential has been extended from the field of the arts and the museum to the field of fashion and advertising. Thus, it is now becoming difficult to differentiate between a museum and a department store." We might hold a less binary view than this. However, where the relationship between fashion and architecture is gaining attention, the role of electronic art within fashion branding as part of "backgrounding" the actual shopping is still in need of further scrutiny. When Gluckman Mayer Architects' shop for the fashion brand Helmut Lang in New York's SoHo district opened in 1997, it blended fashion retail interior with works of digital art. The acclaimed artist Jenny Holzer was responsible for digital art installations, where the work of Holzer featured columns with alternating written messages. Digital art is not only present in designer stores, but has also found its' way to the catwalk as part of the spectacle of fashion shows. The spring 1999 show by the now deceased designer Alexander McQueen, featured a now iconic fashion moment that involved a set of robots designed for the painting of cars on the stage on which his collection was shown. Accompanied by classical music, the white dress of the mannequin, the former ballet dancer, now model Shalom Harlow was robotically sprayed with black and signal yellow paint while she swirled around on a revolving part of the stage, juxtaposing and reversing the roles of the organic and the non-organic (Evans 2000). Not only related to on-stage spectacle, digital art and technology is now to be found in luxury fashion stores in numerous forms.

5.2 Art patronage in a culture of shopping

Fashion brands have increasingly taken on the role as a patron of architecture and art. As part of her analysis of the fashion brand Pradas' relationship to art and architecture, Ryan (2007: 7) discusses how star architect and theorist Rem Koolhaas and the architectural firm AMO/OMA has through many years been central in building the Prada brand. Prada is portrayed as a brand that displays expertise in "…corporate appropriation of "avant-garde" positions within the parameters of the market." Drawing on Bourdieu, she sees the work of architects and artists as production of symbolic capital for the brand. As Cairns points out, (2010: 5) "Key to each of his three Prada buildings (New York City, Los Angeles and San Fransisco) was the use of new technology, the notion of the 'brand experience' and the conversion of the store into a tourist destination". As the stores of luxury fashion brands look more and more like gallery spaces, these spaces are not only filled with branded retail products, but are also spaces for the display of digital art, alongside with ties, dresses and leather goods. Rem Koolhaas (2001: unnumbered

pages), lists a range of key concepts in his book *Projects for Prada*, where the concept *Non-Commercial* refers to slogans like "the introduction of non-commercial typologies such as 'Cultural events could be hosted in stores" and "Activities other than shopping can take place after store hours". When in broad terms, shopping is redefined to denote a cultural activity, and the store is re-conceptualized as a gallery, there is also room for a patron of the arts. The role of patron affords cultural kudos to bleed onto the brand, as does taking an active role in the conceptual debates on the role of fashion in society, as for example taken on by the designer Hussein Chalayan who links fashion to architecture, art and technology. According to Taylor (2005: 449), such explorations are key for fashion, and she sees commodified production of goods as secondary to the more creative practices that drives the field.

6. DIGITAL ARTS IN MAISON MARTIN MARGIELA

The Belgian fashion label Maison Martin Margiela (MMM) has put its deconstructivist aesthetic to play also on the Web, multimodally mediating the brands' identity via a nostalgic homage to the early Internet and the Web.

6.1 Web aesthetics and digital arts

When visiting the website of the fashion brand Maison Martin Margiela (MMM), the first thing one notices is a sense of an insider knowledge of early Internet art and technology. MMM engages in an overt intertextual play, implicitly referencing the early days of the Internet, as well as the much celebrated net art site jodi.org. In the late 1990s, the designers/artists of jodi.org developed a web-based artwork that (Greene 2004) sees as parodying mainstream computational styles and visuals and as offering a meta-comment to the entire Web medium by showing the website "inside out". By drawing images and diagrams in HTML code, only accessible if viewing the source code, jodi.org presented a medium aesthetic approach to computer code. Such an anarchistic style of communication seems to have inspired the designers of the website of the fashion brand MMM. This site plays on visitors initial confusion, showing them the web 'fabric' inside out so to say.
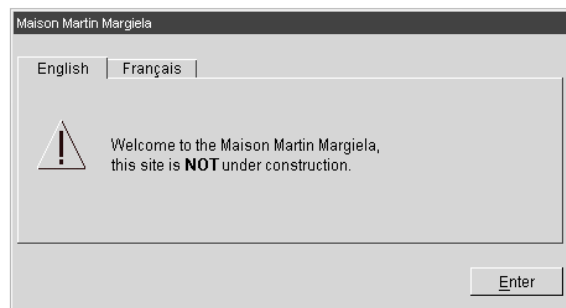

Figure 1. Screenshot of opening screen of the website of MMM.

As is seen in Figure 1, an old style dialogue box shows a triangular sign with an exclamation mark, as well as the text "Welcome to the Maison Martin Margiela, this site is NOT under construction". The box allows users to choose between English and French as well as entering the site by pressing a button

labelled "Enter". The inclusion of such an ironic insider joke into the website shows how the label addresses those who can read such a play on badly designed Web communication, and how it is incorporated into the digital style of the label.

6.2 A conceptual approach to fashion reflected

The garments designed by MMM typically show stitches, exposed hems, and are widely regarded as "deconstructivist" in their exposure of the techniques applied. Writing on Derrida's notion of the "trace", Loscialpo (2010) investigates how designers such as MMM, Hussein Chalayan, Rei Kawabuko, and others work with notions of trace and patina manifesting itself through some kind of organic alteration of the garment. For instance, Loscialpo discusses how in MMMs' first personal exhibition, at Museum Bojimans van Beuningen in Rotterdam in 1997, the garments for display had been exposed to different strains of bacteria and mould, and had been kept in vacuum so as to develop different textures and colours, taking on a distinct performative character. Loscialpo refers to such artistic practice within fashion design as blending past and present and as ultimately discussing the "impurity" of fashion. Loscialpo (2010, online) states that "Indeed, within contemporary fashion past and present promiscuously fuse and morph into the experimentations of designers, who paint a landscape constituted by an endless interweaving of references within other references". If continuing into the website of MMM we are bombarded with references to artworks. In Figure 2, we see a screenshot from the opening screen of the site. In this video, which is a celebration of the new year of 2011, we see a short video that paraphrases the 1987 art film *Der Lauf der Dinge* (The Way Things Go) by the Swiss artist duo Peter Fischli and David Weiss.
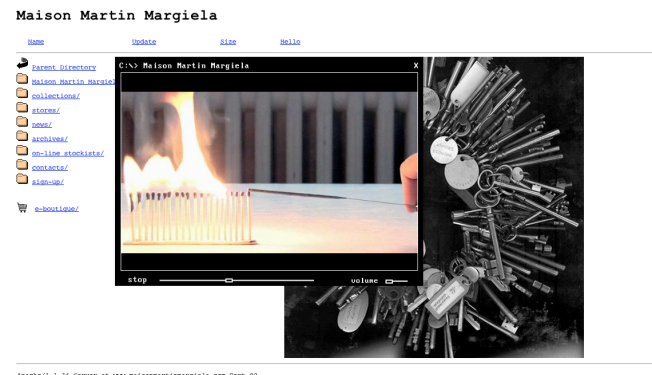
Figure 2. Screenshot showing the website of MMM where a short video indirectly referencing Fischli and Weiss's film *Der Lauf der Dinge*.

Their film shows a long chain of causal effects caused by everyday things, such as balloons, candles etc. In the video shown in the webpage (see Figure 2) we are shown a sheet of paper, where '2010' is typed. The paper is set on fire, and ignites a row of 2010 matchsticks, which again ignite a sparkler, which then again bursts so as to reveal a bottle of champagne labelled 'Bon Anne´, with this then poured into three glasses marked 2011. Behind the video window is an image of the original key ring for the Rue Saint Mare, Paris offices of MMM. The menus in the website of MMM are designed to look as the parent directory, as the 'inside out' of a web page, with a list of folders. The

organisation of the site mimics and references the early Internet art exhibitions, for example the online exhibition *Desktop IS,* organised by Alexei Shulgin in 1997. Greene (2004) refers to this exhibition as having as its' subject the computer desktop, being the first online desktop exhibition of digital Internet art. The website of MMM conveys an aesthetic of nostalgia and a range of references to early Internet art as well as to other art works. The aesthetics of the website as well as the coffee table book reflect the deconstructivist approach to fashion that characterises the work of MMM.

6.3 Branding via anti-branding

In a recently published large coffee table book by MMM, Susannah Frankel describes the single most significant idea driving the brand is '…its' anti-marketing stance.' (no page numbers, leaflet btw p 40 and 41). In the book, contemporary performance/documentary artist Vanessa Beecroft comments on the clothes of MMM, stating that "When you wear an MMM, you become part of the resistance to the vulgarization of costume, the branding, the opulence, the ignorance of the new rich. MMM avoids celebration, buckles, gold and logos but conveys humour, substance, new ideas, abstraction, social provocation, happiness and beauty." MMM does not include large logos, gold buckles or any overt symbols of corporate branding into its designs. However, the public image of the brand is articulated as an opposition to traditional forms of luxury branding. However, what is communicated by MMM is still part of the branding of the fashion house, such as the large coffee table book, the website, the various artistic projects and exhibitions initiated by the brand. What complicates a discussion of luxury fashion branding and art is that it would be reductive to conceive of the various artistic projects that MMM is involved in as mere branding. This is because various forms of artistic practice are an inherent part of the creative work of a fashion designer. MMM is not involved as an art patron, but as a 'maison' has to be understood in terms of insightful referencing, through its close collaborations with artists, and through its conceptual approach to fashion.

7. DIGITAL DIOR

The fashion house Dior, named after the French couturier Christian Dior, is now a part of the world leading luxury brand holding company LVMH (Moët Hennessy-Louis Vuitton S.A.). Drawing on the heritage and prestige of its original founder, Dior is now one of the globally distributed luxury brands that have taken on the role as a patron of the arts. For example, to celebrate Dior's sixtieth anniversary an art exhibition featuring a range of Chinese contemporary artists was commissioned. This exhibition and art centred branding and provided Dior with an artful approach to the Chinese market. The flamboyant creations of the equally flamboyant (and now sacked) artistic director John Galliano were the focus of an art spectacle that took place in Beiljng, China. The exhibition 'Christian Dior and Chinese artists' ran from 2008 to 2009 at Beijing's Ullens Center for Contemporary Art (UCCA). The curator of the exhibition was UCCA's director Jerôme Sans.

7.1 Dior and Chinese video art

In the UCCA exhibition, a series of works of twenty Chinese contemporary artists were commissioned as artistic interpretations of the fashion house. In the website of UCCA, which presents the

exhibition[i], it is described as symbolizing "… the opening of a dialogue between two different means of expression, contemporary art and fashion". The piece *Synchronization*, by Wang Gongxin, is a video projection work that consists of two rows of projected images that mirror each other as a corridor of luminous images of live-sized women (see Figure 4). Gongxin is an acknowledged Chinese artist, and has extensively explored the theme of the interface between east and west in a range of media (Bergquist 2003). The piece is made up of twenty screens controlled by ten projectors. The images on the one side of the corridor show professional models dressed in Dior couture, the other depicts Chinese women with female bodies that differ significantly from the corporal ideals prevalent in the fashion industry.

Figure 4. Screenshot of the website of Chinese video artist Wang Gongxin, showing the installation work *Synchronization.*

The Chinese women pose like fashion models. They are dressed in paper copies of Dior garments, mimicking the posing style of professional models. This stance exposes a discrepancy between the preferred bodies and garments of the fashion world and that of average Chinese women, thus offering both a critique of, and homage to the imaginary and the unrealistic aspects of fashion. As noted by Ryan (2007:21), luxury fashion brands are making a clever move by supporting works of art that also offer a critique of branding, consumer culture and luxury. This is achieved because the brand appears as an enlightened, liberal and "edgy" patron. In the website of the Dior exhibition, the glamour of fashion with it's celebrities and glitz is looped back into the art museum, providing means for publicity and glam for the museum as part of museum branding[ii]: "The world of Christian Dior Couture and Chinese Contemporary Art stepped hands in hands at this night of celebration, fashion and Chinese Contemporary Art to mark the beginning of The 'Christian Dior and Chinese Artists' exhibition".

8. DIGITAL ARTS IN ACNE

Acne is a Swedish high street fashion brand that has a clear identity built on communicating a close relation to the art and design world. The name itself, Acne, sets the brand apart when searching google, and 'pops up' between dermatologist and skin care retailers. Acne is an acronym for *Ambition to Create New Expressions*, and is an interesting case when it comes to branding fashion via cultural enterprise. Acne publishes a print magazine on arts and culture bi-annually called *Acne paper*. The magazine works as a vehicle for positioning the brand amidst the cultural elite, by focusing on art, design, poetry and culture and by toning down their own clothes products, yet carefully slipping in an Acne

garment here and there among Chanel and Givency outfits in their fashion photo series, thus placing their own product in exclusive company. As opposed to MMM and Dior, Acne is a high street brand, but does however apply many branding techniques as luxury brands. The publication of *Acne Paper,* and various collaborations with artists help communicate the brand as in touch with art and "high" culture.

8.1 Projecting the arts onto Acne

One way of securing the brand's role as an actor in the domain of culture is by collaborating with artists. In the blog-like section of Acne's website, under 'projects' one meets a video showing a work of the artist Katerina Jebb. This video art work titled 'crystallized, is housed in the Acne website. It is also shown as part of Acne's professional and popular cultural presence on *YouTube*. Here the brand has incorporated the video installation into its presentation of the spring/summer 2010 collection shown at the Curve Gallery, at the Barbican Centre, in London in 2009. By presenting the collections at a gallery, another connection to the art world is established. In a similar fashion the Prada epicentre (as Prada call them as opposed to flagship stores) in SoHo, New York is located in the former gallery space for the Guggenheim SoHo branch. Prada initiated collaboration with the Guggenheim for a joint venture at the site in SoHo, one that eventually did not take place. However, in the book "Projects for Prada" Koolhaas (no page numbers) displays the sketches for the combined logos of Prada and the SoHo Guggenheim. This suggests the importance for the luxury brand to be in close touch with the bastion of high culture, the gallery. The video piece by Jebb is shown on *YouTube* as an integrated part of the Acne runway performance of models clad in garments from the collection. The work of Jebb is generated by projection of a single Swarovski crystal. The theme of the collection was spirituality, and Acne collaborated with the crystal company Swarovski. Their sparkling stones were placed on the garments so as to reflect acupuncture pressure points. The luminosity of the video installation encapsulates the mannequins, bleeding over on the garments they wear, thereby blending the garments and the art into a unified whole.

Figure 3. Screenshot from YouTube, that shows a video of the Acne's presentation of its summer/spring 2010 collection and a video installation by Katerina Jebb.

9.   PROJECTING THE ARTS?

9.1   A definitional shift

According to Klingmann (2007), there is a definitional shift going on in terms of what is considered "high" and popular culture, where popular culture finds its' way into the bastions of "high" culture, such as galleries and museums. As part of such as shift, conceptually laden elite culture finds its way into popular cultural arenas such as retail spaces. For Klingmann (2007:24), "A new cultural landscape has emerged in which "serious artists show their work at Kmart and critical architecture practices design progressive fashion boutiques for Prada". The commercial aspects of fashion retail, as pointed out by Cairns (2010), tends to often be placed in background of a larger and more "elevated" project than mere profit. This is stated explicitly in the introductory text in the book on Prada. In this book, Prada presents the various creative projects carried out by the brand in this 2010 luxury edition. Prada is one fashion brand that ventured into both high and poplar culture, spanning from an online promotional manga drawing competition to fine art and architecture. These activities all feed into the image of the brand as a cultural agent. In the several kilos that constitute the large black publication on Prada mentioned above, the many ad campaigns, architectural projects, art projects etc, are presented. In the introductory text to the book, the focus of Prada is explicitly articulated as being communication, thus also backgrounding the commercial interests of the brand:

> The purpose of this book is to retrace and represent the multivalent aspects of Prada: from fashion to communication, from the pursuit of excellence to technological advancement, from architecture to art. All these qualities work together to compose Pradas' engagement in the world of ideas and innovation, as it has always considered fashion, luxury, ad style as an overarching project beyond the continuous production of clothes, shoes and bags. (Prada, 2010:7).

Communication, technological advancement and art are what Prada is really about, according to this text. The continuous production of clothes, shoes and bags appears as routine activity that is necessary for the business but not part of the grand overarching project of the brand. The definitional shift described by Klingmann (2007), and the confusion it entails is also articulated by Steiner, who (2000:21) describes the "… the boutique as a chapel of consumerism; fashion as an object of worship; the museum as a department store: definitions are beginning to shift and functions are changing". However, in most cases it is still possible to recognise the retail spaces for luxury clothing. However, it is harder to define the status of the works of art that are part of luxury fashion branding. Here what is made apparent aesthetically and yet also marketed artistically is a duality of fashion branding, which is its aestheticissation via and as art.

9.2   A duality in artful branding

This duality is especially present in the works of art that are clearly part of a branding regime that serves to increase a brands' symbolic and cultural prestige and value, but nevertheless are art pieces in their own right. As pointed out by Cairns (2010) and Ryan (2007), in many cases, however, the works of art themselves play on such a duality, as is for example the case with Elmgren and Dragseths Prada Marfa store, a tiny Prada shop remotely sited in Marfa, Texas. This franchise, installation and fashion brand identifier carries a range of references to the tradition of site-specific woks of art, represented by among others Donald Judd in

Marfa. When works of art are commissioned by a fashion brand, such as for example Synchronization, by Wang Gonxin, the work is both a piece of art as well as a sophisticated vehicle of branding, and a form of branding that aims to make the brand part of "high" culture.

9.3 Co-branding and cultural transgression

Fashion, and especially fashion that operates in the luxury segment of the market, has always had an artistic element, as for example taken to the extremes by the designers Victor & Rolf who design garments that is never intended for being worn. These designers, according to Taylor (2005), have a presence in both high and popular culture and transverse both commerce and art. Here Taylor points to an ongoing cultural dialogue of previously opposing cultural contexts. A different duality at play is the role of co-branding. Luxury branding may offer artists a wider audience than would be provided by gallery spaces. Regarding architecture, Cairms (2010) and Klingmann (2007) point to luxury brands as being responsible for commissioning multimillion projects by "star" architects, where the architects also gain publicity and the economic means with which to create spectacular buildings. However, as pointed out by Ryan, large-scale engagement in corporate branding entails a risk of being conceived of as "selling out".

9.4 Embracing critical commentary

Luxury fashion branding is simultaneously skilful and deliberate as well as ambiguity: aspects are accessible as art and in so doing may erase potential criticism. As discussed by Ryan (2007:21), patrons such as Prada feed consumers with relevant cultural capital and "...demonstrate their mastery of a code that enables them to decipher a work of art and this affirms their cultural status". She argues that the embrace of critical artistic voices make visible the brand's membership in a culture where the possession of the right cultural codes is key for communicating a position as an enlightened and liberal patron of the arts. As a consequence, this move annihilates possible criticism, rendering it harmless. On the other hand, branding dressed up as culture speaks to our desires and needs yet is simultaneously shifted to an aesthetic plane. While from an ordinary consumer and viewer perspective we may all sense these bidirectional turns and tales, little research has yet stitched them together. In conclusion, as the selected examples above have shown, works of mediated aesthetics are realised via a variety of techniques and strategy. This is designed to achieve additional cultural - and ultimately pecuniary - purchase for fashion branding. The artful sale of fashion is branded.

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Prototyping for Participatory Democracy:
Fine Arts as Means for the Study of Multi-modal Communication in Public Decision Making

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ABSTRACT

We present a thematic art project in a suburb of Stockholm as a means to generate problem areas in focus for a research project on *multimodal communication and democratic decision-making*. Through art we play with different techniques and ideas about democracy in a particular location in order to obtain a better understanding of the citizens and their environments. Artists' actions, installations and mediations create a direct confrontation with the place and its inhabitants, and explore the dynamic relationships that constitute its context. The common denominator for the invited artists is that they work with situation-specific emancipatory art that in various ways relates to the physical and mediated public sphere. The art project *Performing Structure* is a collaborative process where the artists develop the project and take part in the contextualization in collaboration with researchers. This is achieved partly through a shared memory work on the theme of power / powerlessness. From this feminist research practice notions of democracy is examined in order to investigate, expose, enhance and / or remodel relations of the site. The aim with the art project is to put the site and the individual in a web of geographical, social and economic contexts. The aim is also to contribute to a debate on artistic research by showing how art can be viewed as a qualitative method. Through the practice of the memory work method we contribute to the development of this methodology, and map out a space for art in the field of science.

Keywords

E-government, Artistic Research, Interactive Media Art, Urban Art, Memory Work, Transdisciplinary Practice

1. BACKGROUND

Kista-Rinkeby is one of Stockholm's more expansive suburbs. Here local democracy meets great challenges in the form of global politics and a new kind of network economics. The location illustrates the new divisions created by globalization, where diverse socio-economic worlds are wrapped in each other [1]. Here, technology has not decreased but increased disparities, as the importance of social and cultural capital has increased in the networked economy, and the state's ability to balance differences has declined [2]. The inhabitants of the suburb are separated and united by the invisible but palpable borders. The area is home to over 45 000 people. Almost as many commute daily to the place to work. Rinkeby was created as part of the so called million program in the late 1960s, in which one million apartment were built in 10 years, and is today associated with a high degree of immigration, unemployment and low education. Located next to Rinkeby is Kista, being a result of the hope in the relatively new IT industry and is called "Sweden's Silicon Valley", but even here there are great social and economic problems [3]. The location is also home to the Department of Computer and Systems Science (DSV) at Stockholm University, where several research projects on IT and democracy are carried out. In some of these projects, the research aim to study how new multi-modal forms of communication can enhance democratic decision-making at different levels, ranging from local to international, and facilitate communication between citizens, stakeholders, and governments. The focus here is not so much on the transfer of information, but rather to strengthen the basis for democratic participation through the use of different types of social media and languages beyond the use of conventional texts and images.

Previous research on utilizing ICT support for public decision making, such as decision support systems and e-participation platforms, has mainly been focused on finding procedures for sharing and communication of decision data between citizens and governments, as well as on the incorporation of this decision data in decision making processes within, e.g., environmental management, urban planning, and policy analysis. Less work has been done on providing means for the public to provide decision makers with rich information in various forms, enhancing the decision makers' possibility to understand stakeholders' views, values, and opinions and thus take this into account in public decision making.

2. MULTI-MODAL COMMUNICATION AND PUBLIC DECISION-MAKING

The rationale for the research project "Multi-modal Communication for Participatory Decision Making" is that there is a great need for further research focusing on how to offer means for general stakeholders (such as the public and NGOs) to provide their views, concerns, and opinions; not only to provide well-informed decision-makers but to actually take part in the decision making process in creative ways. However, there is currently little to offer besides web-based platforms based upon a conventional usage of images and text. Although such techniques contain the means allowing for interaction, they are to a great extent locked into traditional ways of using computer-based text and images, severely reducing the capacities for communicating on controversial and difficult societal issues. These tools are also often locked in an instrumental attitude towards democracy as a mean of transferring information from citizen/client to governmental institutions, rather then looking at the citizen as an active and creative participant in a continuous process of democratic governance. Therefore, it is of great interest to investigate techniques and develop tools enabling the enrichment of the forms and content of the communicated between decision makers, various stakeholders, and the general public.

Here, the use of multi-modal interaction is not only an exciting opportunity but rather a key component since e-government must be ready for the mobile web, uninterrupted services, as well as accessible to people with different kinds of disabilities. Access to services will require a set of solutions, including multi-modal access and open source solutions, among others like citizen-relations-management, user-driven information management, and multi-lingual issues. Therefore, in the context of public decision-making and in particular for urban planning, multi-modal communication will be studied using a variety of techniques and tools for the mediation of preferences, opinions, and expressions.

With respect to e-democracy and e-participation, process models, democratic decision making methods, and accompanied tools and means for structured participation have previously been investigated in, e.g. [4]. This includes tools such as web-based platforms supporting public and transparent decision-making processes in an informative and participatory manner, such as the acclaimed open source web platform Gov2demOSS [5]. Other tools include computer software supporting the structuring and evaluation of decision alternatives under multiple objectives and stakeholders, commonly referred to as tools for multi-criteria decision-making. The objective of these tools combined is to enable the use of a process model for public decision making, specifically aimed at the inclusion of the general public, many stakeholders and possibly also many decision-makers and based upon the information and knowledge obtained in this process provide a flexible but formalized structure of a decision issue. For instance, such a process model with accompanied tools and methods has been developed and applied [6][7][8]. To execute the decision steps appropriately, a structuring and evaluation procedure has been developed as an extension to a decision analytic method and tools [9]. The elicitation of decision information such as preferences and priorities from decision makers has recently been further enhanced by studying how groups of political decision-makers desire to express values and priorities [10][11]. This prototyping will thus elaborate current e-democracy decision support systems with means for multi-modal

communication, focusing on the communication between stakeholders, citizens and governments. Although the research community has solved many issues concerning collaborative decision making, as above, and the use of various methods for decision support in public decision making, a main concern has arisen in how to involve the public on a much broader scale, not least groups that normally are alienated from democratic processes or have limited capabilities to explore and use available information in its usual shape. We are therefore in a process for formulating a generic method for the incorporation and encompassment of public expressions and opinions in public decision-making.

In this context, arts is one of several ways to explore forms of multimodal mediated participation, and thematic art projects works as a way of prototyping for participatory democracy. Here, prototyping generally refers to the evaluation of design ideas and as a means for communicating ideas to an audience, but it is also a way of exploring new design ideas and to understand the existing user experience and environment[12]. In the art project of concern in this paper, artists study different techniques and ideas about democracy in a particular location and thus aid in obtaining a wider understanding of the citizens in this area, their environment, and as active participants in a participative democratic system. Artists' actions, installations, and role-playing create a direct confrontation with the place and its inhabitants, exploring the dynamic relationships that constitute its context.

3. ART ON THE THEME PARTICIPATION AND DEMOCRACY

Art exhibitions thematizing democracy most often focus on broad principles such as free speech. Looking at major exhibitions, such as *Documenta* in the 90s, the discourse emphasizes the post-Soviet situation, globalization, and terrorism [13][14]. Art and art exhibitions directly talking about local democratic processes are more difficult to take out of context and into the white cube. Here, the context is important for implementation and understanding. Khoj International Artists' Association [15] in Delhi is such an example where artists work in dialogue with space around with different types of community art. La Bomba [16] in Romania is another place where the art serves as an actor for social change. A project that takes place in the Kista-Rinkeby area is Elin Strand Ruin's *Knitting House* where the collaborative creation of an apartment by knitting became a focal point for further discussion of participation and belonging among citizens of Husby [17]. Thomas Liljenberg's and Bo Samuelsson's community-based work in Kista [18], and Thomas Liljenberg, Anders Krüger & Erik Stenbergs work in Vårby gård is also great examples of how art is used to highlight and change the identity of a place[19].

When discussing artists working with issues of democracy, one of the more important references is the work of Group Material in New York where the artist group used the exhibition as a place to discuss AIDS and other current subjects [20]. Austrian WochenKlausur is another artist group that uses art as a platform for social activism [21]. In the exhibition *Public opinion* in Stockholm during the election period they used the exhibition space and its surroundings in downtown Stockholm to demonstrate an alternative way of voting, showing how important the structure of the representative system is for the result. Swedish artist Måns Wranges' work *The Average Citizen* [23] is another attempt to create an alternative to the system, where an average

person is chosen to represent all the citizen in Sweden. Superflex [23] is a Danish artist collective that uses art as a political instrument; they have for example re-created the town of Karlskrona on the web as a way of discussing its organization [24]. In Sweden, Jörgen Svensson [25] often uses art as a way to talk about social and political phenomena, as in Public Safety where international artists were working in the public domain in the small town Skoghall. Interesting current projects include *CHISINAU - Art, Research in the Public Sphere* in Moldovia organized by Stefan Rusu where artists examines post-Soviet identity politics [26]. A current project in Huddinge, Stockholm is *A radical change of scenery* where artists created a "black box" for discussion about the development of the city[27][28].

Another aspect of the theme is how technology can (or can not) demonstrate and change social structures and thus operate in an emancipatory direction and to broaden democratic participation. Johanna Gustafsson Fürst and Rebecca Forsberg are some of the artists who explore communication technology applications related to location. In *I'm Your Body* they are using mobile GPS technology to create a parallel public place within Kista-Rinkeby [29][30]. Another artist who uses mobile technology to transform the perception of the local site is Christian Nold [31]that has been visualizing people's emotions in different places and recreating maps using the emotional information. Ashok Sukumaran [32] uses media technology to break up habitual ways of looking at a place spatial and social relationship. This can be done in a low-tech way using mirrors as a way of redirecting the light to certain aspects of the surroundings. Sometimes more complex arrangement is used as in *Glow Positioning System* where the citizens of Mumbai were given the tools to "scroll" the landscape interacting with the lights on the buildings surrounding a square.

Mass-distributed collaborative processes such as crowd-sourcing and open source are also an aspect of the technology that is interesting from a democratic participatory perspective. Harrell Fletcher & Miranda July [33] and Aaron Koblin[34] are some well-known artists who use the Internet as a way to involve many participants directly in the creative process. To name a few references from the contemporary art scene that has been important in the development of the project.

4. ART AS REFLECTIONS ON THE CONSTRUCTION OF MEANING

Within the framework of the arts organisation Association for Temporary Art [a: t] (Åsa Andersson Broms and Nils Claesson et al), Karin Hansson previously carried out a series of thematic art projects an exhibitions related to information society and changing conditions for democracy: *Best before - on the Information Society*, Tensta Konsthall [35], *The Art of Organizing*, Gallery Enkehuset [36], *Money - a commentary on the new economy* [37] and *Public Opinion* [38]. Several of the involved artists have been working with different types of media art, but the work has never been technology driven. Rather, art has been a means to critically examine technology-driven processes and technological determinism. Above all, they have seen technology as a way to Do It Yourself, to create own institutions for art. Central for the work has thus been the collaboration between artists. The ambition has been a joint development of themes in which the group exhibition works as a special form of knowledge building. This has similarities with Frigga Haug and others method memory work, a feminist qualitative method that uses memories of individuals to investigate norms and social structures. In this prototyping project, we take note of similarities between the memory work approach and the thematic group exhibition and create our own method of collective knowledge production.

There are several qualitative methods that are interesting to compare with the reflexive artistic knowledge process. Such as life-course studies by its focus on the individual construction of identity and creation of meaning, and the processes which link the individual to the structural [39]. Other methods, that like memory work is about researching the self is narrative, autobiography, auto-ethnography and life histories. What distinguishes the memory work method from other methods for researching on oneself is that memory work is not about actual memories, but focuses more on the construction of meaning and identity that takes place in the discussions of memories [40]. What is also important in memory work is that it is liberating. Liberating research is not so much about "giving informants vote " in a focus group or in an interview where the 'voices' then are interpreted by the researcher / expert, instead the aim is to create processes in which the participants themselves participates in the analysis [41]. The method is based on a social constructionist approach to knowledge, where the only thing we can know is how people create and understand reality and their own conduct in this [42]. The focus is not on how "it really was" but on how we interpret our recollection of something [43]. How we understand ourselves through our memory stories. Through an analysis of personal experiences, an understanding of general phenomena is reached. The memory work method emphasizes the importance of social relationships for identity formation and the power hierarchies in these relationships [42]. The memory work method derives mainly from two theoretical traditions within the interpretative paradigm: hermeneutics, by requiring an interactive constructive process of knowledge, and phenomenology by stressing the importance of perceived experience in knowledge performance [40]. To understand the world hermeneutically is an on-going process of interpreting data in relation to our own experience [44]. The use of experience as a tool for academic analysis is based on Husserl's systematic attempt to examine the subjective unconsciously [40]. Husserl argues that we can reach a general understanding of a phenomenon by understanding the individual's experiences. But to get to the underlying experience one must see through cultural norms and behaviour patterns. The memory work method is specifically intended to reach to the underlying experience. To achieve this, one begins by describing the individual's own conscious memories. The collective analysis of each memory is then intended to find the underlying conflicts and to detect the cultural norms and behaviours involved, the very reason that the memory has become a memory.

The artist's subjective basis of knowledge production can be seen as an antithesis to the researcher's aim to be as objective as possible. But the sociology of science shows that the researcher's body is the subjective point of departure in science as well [45]. One of the differences is that the researcher's motives are rarely taken under the microscope (although this is now becoming an important part in qualitative methodology), unlike the visual arts where the own subjective experience of the world always is in focus. One of the main objects of investigation in art is the artist. Visual art practice involves several methods to examine this object. Conventional art education can be said to be a mixture of perception exercises and therapy. The aim is an understanding of

how vision is affected by perceptive and cognitive processes, and to find ones own focus on the field of art by talking to senior artists. Thus the artist can be seen as an expert on self-reflection. Self-reflection is reinforced to ensure the quality of qualitative methodology such as Grounded Theory [45]. Bourdieu [47] suggests that the researcher brings her self into the investigation as part of the empiric materials, as the researcher's body is an important part of knowledge making. What distinguishes the artist and researcher in this perspective is documentation. The artist rarely uses memos describing the process in forms that fits in an academic context.

Except for the lack of documentation, the work with a thematic art exhibition has many similarities with the qualitative research method of memory work. The artist most often departs from his or her subjective experience of the theme and focuses on the elements that he/she thinks are interesting. What is interesting most often means some form of unresolved conflict that chafe at the individual or societal level. Art is to a great extent to express the subjective experience/interest on a structural level where others can read it. The collective process in a group exhibition where artists share their ideas and reflections with each other, at best, works as a collective "memory work" where the discussion of ideas creates an understanding of underlying conflicts and detects the involved cultural norms and behaviours, the very reason that art has become art.

5. PROJECT OUTLINE

A main concern in the research project *Multi-modal Communication in Participatory Democracy* is how to involve the public participation on a much broader scale. Based on the idea that the art exhibition can be used as a qualitative research method, and from the viewpoint of prototyping as a way to explore design conditions, we employ an art exhibition in the public space as a way to better understand the condition for participatory democracy at a certain location. Starting from a designated place, the suburb of Kista-Rinkeby, and inviting artists with different perspectives to shed light on the place and the theme participatory democracy, problems and areas of focus are generated for the main research project. To avoid locking into just one perspective, the invited artists approach the subject from a multitude of angles: community art, urban installation art, street art, activist art, artists using locative and interactive media, as well as role playing games. The art genre is not important here; the common denominator is that the artists work with situation-specific emancipatory art that in various ways relates to the physical and the mediated public sphere. In common seminars with artists and researchers these artistic perspectives are discussed from the aspect of participatory democracy and research on multimodal communication.

The aim with the art project *Performing Structure* [48] is to put the site and the individual in a web of geographical, social and economic contexts. For the art project to developed internally, within the group of artists, and develop in a collective process the artists explores the memory work method in a common memory on the theme of power / powerlessness.

This project contributes to the discussion of artistic research by showing how art can be viewed as a qualitative method; Art as a way to highlight and explore discursive practices. Through the practice of the memory work method we contribute to the development of this methodology, and map out a space for art in the field of science.

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Xsens Performance: Playing Music by the Rules

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ABSTRACT
Recent studies suggest that current interactive music results could be improved by structuring its practice. This paper explores the impact of standardized Motion Capture and software architecture on knowledge transfer and efficiency, by illustrating with a computer based musical performance where sounds are controlled by sensors on the dancer's body. It concludes that these factors help refocus the attention to the artistic mission and improve the communication between users.

Topic and Subject Descriptors
H.5.5 [**Interfaces for Dance and Physical Expression**]: Sound and Music Computing – *methodologies and techniques, signal analysis, synthesis and processing*.

Keywords
Motion Capture, Sonic Interaction, Xsens, Jamoma, Music Performance, Musical Controller

1. INTRODUCTION
Motion Capture (MoCap) is commonly defined as the process of recording human motion in a digital format. The most common MoCap technologies applied in entertainment are *optical*, relying in computer vision techniques, *mechanical*, flex sensors on limb joints, and *magnetic*, magnetic receivers positioned on the subject's body. However, applications are mostly limited to the film industry, army and medicine [1-3].

Marshall and Wanderlay [4] surveyed the MoCap interfaces for computer music submitted between 2001 and 2004 to the New Interfaces for Musical Expression (NIME) conference which seeks to design alternative interfaces for musical performance. They found that the most popular sensors were accelerometers and force sensing resistors.

The above papers expose a gap between MoCap methods practiced by the entertainment industry, and those by academia and artists. The former employ industry standards while the latter develop idiosyncratic interfaces [5].

Lack of standardization is also apparent in the software architecture used for most computer based life performances. Max/MSP is a visual programming language that has become a popular performance tool for artists [6]. However, there are no regulations on how patches (i.e. programs) should be internally structured; making is difficult to share high-level patches [7, 8].

This paper proposes a musical performance that explores implementing two standardized systems: The Xsens MVN MoCap technology, and the Jamoma framework. Together they provide real time information of a dancer's movements and trigger a broad range of musical events.

2. METHODOLOGY
2.1 Motion Capture
Xsens MVN is a commercial 3D motion tracking product that is used mainly by the army, industry, medicine and films. It consists of 17 inertial sensors and an application for recording and exporting data from the sensors. Each sensor encapsulated an accelerometer, gyroscope and magnetometer. When worn by the dancer, they provide a detailed 3D virtual representation of the body as well as orientation [9]. The advantages of this system over other MoCap are: 1) relatively lightweight and portable (suit: 1.9 kg, full system: 11 kg); 2) quick setup time (5-15 min); 3) communication with 3rd party programs (UDP protocol); and 4) Wireless (Bluetooth).

The network stream from the Xsens suit sends information about 23 body segments at a rate of 120Hz, a total of 138 floating point numbers per frame. Furthermore, data can be computed over time to get other properties such as jerk, acceleration, velocity and quantity of motion. To this end a dedicated C++ Real Time Motion Capture Toolbox software was developed to transform these numbers into usable values.

Body poses, thresholds, and continuous movement were the three types of data used to trigger and manipulate sound. Body poses were described by the following Xsens parameters: Left hand height, left arm angle, right hand height and right arm angle. Whenever these relative values matched a body pose description in the Real Time Motion Capture Toolbox, it got sent to Max/MSP. By approximation, the software was always matching the current pose with stored ones. Thus we constantly got stored body pose identifiers that best described the current body pose of the subject. These poses, 8 in total, were used to trigger musical events and transition between sections in the song.

2.2 Interaction Platform

Jamoma is an open-source modular framework for patching in Max/MSP. It enforces consistency in the patch without placing strong restrictions on developers. This project developed three new Jamoma modules—cues, mappings and transitions, borrowed from the finite-state machine. As illustrated in Figure 1, a performance sequences beforehand different scripts; short thematic compositions that in turn harbour various cues. Each cue determines: 1) Mappings, links between Xsens data and sound parameters; and 2) transition, what is required to change to the next cue.
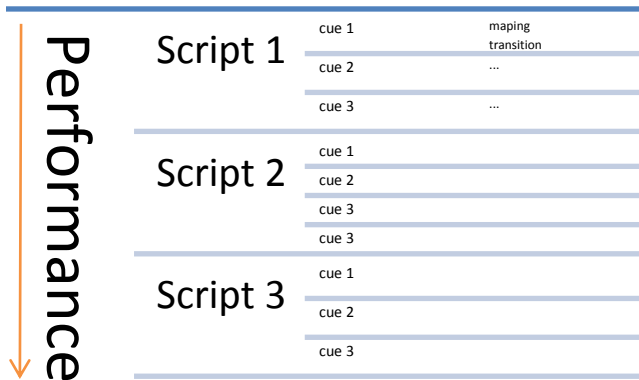

Figure 1. Performance setup

2.3 Sound Manipulation

Sounds for the piece encompassed music compositions and sound effects. The audio engines used were Ableton Live 8 and Reason 4 due to their easy MIDI mapping and robust live performance capabilities. These audio software had the task of following instructions (i.e. MIDI messages) from Max. Instructions could be notes, continuous control values (e.g. to alter the filter frequencies) or triggers (e.g. audio clips). These messages were sent through LoopBe30, a software that made it possible to exchange MIDI between programs. MIDI notes were sent to Reason 4 synthesizers and samplers, and Ableton Live 8 to start and stop sound clips. Control values were used to turn on/off tracks in Ableton Live 8 and manipulate faders. In order to provide a solid and reliable performance, the sonic piece was through-composed, that is no cues or sections were repeated.

3. RESULTS

The performance has been staged five times in Oslo, Norway and Porto, Portugal between September 2010 and April 2011 in stages ranging from formal concerts to night clubs. The overall reaction has been positive. All performances presented no problems except for the third which had some communication drops because of the distance between the Xsens and the Bluetooth receiver. However, the audience did not perceive any issues.

4. DISCUSSION

The aim of this project was to examine how the use of a commercial MoCap systems and a standardized modular framework affected interactive musical performances. Controller interfaces and software design differ hugely across computer based arts, but to our knowledge, this is the first study in the field of interactive musical performances to implement a commercial full body inertial MoCap technology and standardized software architecture.

There is evidence in literature regarding the limited application of standard MoCap technologies, and the inconsistency in Max/MSP patches in academia and the performative arts. The consequences of not implementing standards are twofold: 1) low exchange of high-level knowledge and techniques between users; 2) excessive focus on sensor development. These two issues might partially explain why interactive music work has remained out of reach from the general public [5, 10, 11].

5. CONCLUSION

Our exploratory musical performance suggests that using standardized MoCap methods and software architecture help build strong development communities and enable more time to be spent on artistic decisions. However, further work is need to extend and replicate these findings, and to understand how standardization can help usher interactive music into main stream entertainment.

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WOODEN WORLDS - An Audiovisual Performance with Multimedia Interaction in Real-time

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ABSTRACT

Wooden Worlds is an audiovisual performance by Claudia Robles Angel and Javier Alejandro Garavaglia. The piece, of variable length (conceived however to be about an hour long), is a complex multimedia performance, in which a viola live on stage, video, photography, live-electronics and live sound-processing, all interact with each other in real time. This paper describes the technical aspects of the work as much as its aesthetical approach and intention.

General Terms

Multimodal Interaction and Interactive Sonification, Gestures and music.

Keywords

Haptic image, live-electronics, multimodal interaction, video.

1. INTRODUCTION

Wooden Worlds is a multimedia performance developed from several different sound and visual layers, all of which interact with each other in real-time. Together they create an atmospheric constellation.

The attention of the audience is challenged by the audiovisual elements of the piece, which, in most of the cases are not recognizable at first sight. The live viola acts as an element of accretion and mergence between the elements with musical passages, some of which were composed in detail and some other, which are freely improvised during the performance.

The real-time interaction (sound processing, viola live-electronics and viola real-time manipulation of video) is produced by two laptops running MAX/MSP/Jitter, which are connected via Ethernet.

The main idea for this interactive multimedia piece is to work with a world of sound and image, which is directly or indirectly connected to wood. Wood is meant herewith as it appears in nature, mostly in the form of trees or tree surfaces (cortex). However, the idea is not to show wood in its naked reality (i.e. a simple image of a tree), but to use images of particular forms and characteristics, which, even though they are made of wood, are not immediately recognised as such. One of the techniques utilised herewith is that of the close-up, which consists of the shooting of surfaces at an extreme proximity, which results in pictures showing those surfaces in an extremely detailed manner. We quote the following definition, as the closest found that describes our aim for this composition: '*In film, television, still photography and the comic strip medium a close-up tightly frames a person or an object. Close-ups are one of the standard shots used regularly with medium shots and long shots. Close-ups display the most detail, but they do not include the broader scene. Moving in to a close-up or away from a close-up is a common type of zooming.*' [1] These images are normally shot by zooming or, most likely, by the usage of macro lens. In *Wooden Worlds*, this technique is utilised to show extremely close details of wood surfaces, which, in many cases, are not recognisable as such at first sight (or even after a long period of contemplation). The intention is to produce a *haptic* [2] image, in which the observed object can be de-contextualised, allowing a rather free and open interpretation by the audience, who can have the feeling of 'touching' the images with their eyes. The word *haptic* has its root in the Greek word HAPTOS [3], which is always related to the action of touching or relative to tactfulness. This type of visual conception is a fundamental aesthetical position of one of the two authors of *Wooden Worlds*, Claudia Robles Angel, who seeks to transport the tactile sensation to the photographic image, approaching the object as much as possible, hence inviting spectators to use their eyes to feel and not only to watch the image. According to this aesthetical position, a *haptic image* could be found in painting (for example, an oil canvas), where the traces of oil paste give a tactile dimension to the picture, thus enhancing the sensation of 'touching with the eyes'. This usage of the word *haptic* in visual arts (image and moving image) has its roots in Deleuze, who, in the following passage, puts this interpretation into perspective: '*Where there is close vision, space is not visual, or rather the eye itself has a haptic, non-optical function: no line separates earth from sky, which are of the same substance; there is neither horizon nor background nor perspective nor limit nor outline or form nor center; there is no intermediary distance, or all distance is intermediary.*' [1]

As it can be seen by Deleuze's interpretation formerly mentioned, the term *haptic* is not used in *Wooden Worlds* in the same sense as in *haptic* interaction [2], which is the type of interaction produced by touching devices. The usage of the term in this performance is implied aesthetically, with no reference whether to the interaction itself nor to the interfaces. As it is described in section 5, none of all the kinds of interaction in this piece occur by touching devices or interfaces.

By making possible to 'perceive the imperceptible' through *haptic images*, the audience is immersed in a virtual space of images and surround sound, in which the material 'wood' is constantly present or alluded to.

The piece was world premiered on 25.09.2010 during the *Kölner Musiknacht 2010* at the Kunst Station Sankt Peter (Cologne – Germany). It was also performed at the Re-new

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[1] http://en.wikipedia.org/wiki/Close-up (site accessed 04.01.2011)

[2] Haptic: 1: relating to or based on the sense of touch. http://www.merriam-webster.com/dictionary/haptic. (site accessed 04.01.2011)

[3] From Greek ἅπτω (hapto, "touch, fasten"). http://en.wiktionary.org/wiki/hapto-(site accessed 04.01.2011)

2011 Festival, May 2011, at the Studio 2 of the Danish Radio.

2. SOUND

Sound in *Wooden Worlds* has two main sources: pre-recorded sounds and a live viola. For the latter, some sections in the piece were fully composed whilst some other sections were left free for improvisation.

All of the pre-recorded sounds were obtained in several nightly recordings in a tropical part of South America, in the Colombian town of Girardot and at the Amazon rainforest (Colombian side). As usual in tropical areas, this is a place that emanates life during the entire day, manifesting itself in a rich and varied palette of sounds, mostly during the night. Average temperatures in Girardot are normally around thirty degrees Celsius, with very warm nights (around twenty-eight degrees) and days with thirty-five or more degrees. This constant heat, together with a rather high degree of air humidity -in some parts of the Amazonas, air humidity is around 94%- allows for a concert of insects' sounds as well as of other types of lives, particularly intense and loud during the night, up to the point of disturbing the sleep. As all of these creatures live in trees and plants, they are part of the world of wood in this tropical Colombian rainforest. For the sound production of *Wooden Worlds*, the richness of this nightly soundscape[4] was paramount to the general sound conception, as it can help the listener to become part of the immersive virtual environment of the performance. This is technically aided by the octophonic sound, which surrounds the audience in darkness. The recordings were registered with a *TASCAM* digital recorder DR-1. The sound was recorded only in stereo, but if it were not for the difficulties involved, a multichannel recording would have been more appropriate, due to the incredible natural nightly surround-sound of the rainforest. This feeling/sensation of natural sound-dome inspired the acoustical space in *Wooden Worlds*. Even though following the generic descriptions of the term *soundscape* by Truax [3], the immersive environment is created during the live performance by transforming those sounds in real time and not, as Truax defines it, as *a musical composition* in itself or a *tape montage*. The nightly soundscape of a rainforest in *Wooden Worlds* is only a part of the whole, but not the entire composition.

The second sound element, the live viola, has a pivotal function across the entire piece, not only because it interacts with all other audiovisual materials of the performance, but also, because the instrument itself is mainly made of wood. Due to this fact, at certain points of the performance, the violist is required to knock onto the wooden surface of the viola and the sounds from this action are then processed with reverberation and/or delays and diffused in surround. Most importantly though, is the twofold interaction role of the viola in the piece: on the one hand, interacting with the pre-recorded sounds from the rainforest (through typical DSP functions for live-electronics processes); on the other hand, with the video. Both types of interaction are explained in detail in section 4 later in the paper. The first type of interaction, purely based on sound,

has the intention of imitating and interacting with the pre-recorded environmental sounds (which are mainly sounds made by insects in the rainforest). Therefore, the music composed for this interaction is that of short instrument sonic gestures (many of which are of undetermined pitch), such as, for example, the bow scratching the strings, several harmonics/flageolet tones or different sounds obtained by knocking the instrument, most of which are of improvisatory nature.

The second type of interaction required a much more careful planning and therefore, were fully composed. The reason for this is that, given the fact that the viola must take control of different video parameters, some of which need to have a rather fixed duration (due to the general conception of the work, explained in section 5 below), the violist must play these sections very accurately. As the parameters read from the viola by the computer for these particular moments are pitch and amplitude, the music had to be carefully composed to obtain the overall desired result. A clear example is the 'Elegy', which starts in the score at SMPTE time 00:12:15:00 (see figure 1 below). The image here is a post-produced video of the picture of a tree, which resembles a crucified woman. The 'Elegy' is composed with this image in sight, with the video starting with a *haptic* image of a tree cortex, which fades slowly into a close-up image of the 'woman' tree. Very slowly, the 'camera' moves away from the close-up shot of 'woman' tree, until the complete form is revealed. This slow revelation of the figure is acted upon the interaction of the viola, which controls both the speed in which the video is played and also the colour temperature of the entire picture. Although the video for this part is merely about three minutes in length, the music for the viola was composed in such a way, that it controls the duration to make it last as much as eight full minutes.
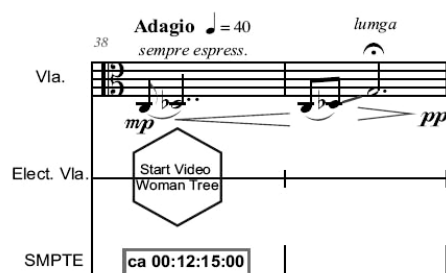

Figure 1. Start of the viola/video interaction.

In a further section of the performance (close to its climax), the amplitude and pitch of the viola control other video parameters, such as the colour temperature (via the viola's pitches) and a feedback of the original image combined with a zoom (also via the viola's pitches) added to a rotation effect (controlled by the viola's amplitude), all of which create a repetition and multiplication illusion of the image within the screen, provoking a tense and chaotic visual result. This section is not controlled in the same way as the former one, as music and image are mostly improvised by both performers within a fixed and planned timeline.

3. VISUAL ASPECTS

The principal technique utilised for the entire visual conception of *Wooden Worlds* is that of the close-up, with several of the pictures shot with extreme zooming. The main type of image is that of the cortex of several and different trees. They all belong to an assemblage of images of diverse tree-cortex surfaces, collected in the last ten years from many different types of vegetations, (mostly Europe and the rainforest in South America) by both authors. Other pictures stem from complete and isolated trees in nature, shot in diverse regions of Europe.

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[4] '*A soundscape is an environment of sound (or sonic environment) with emphasis on the way it is perceived and understood by the individual, or by a society. It thus depends on the relationship between the individual and any such environment. The term may refer to actual environments, or to abstract constructions such as musical compositions and tape montages, particularly when considered as an artificial environment.*' [3]

With regard to the close-ups of tree-cortex surfaces, their main intention is to resemble surface areas, which do not seem to have any borders, as, due to the closeness of the shots, there is almost no perspective aforehand. In this way, the diverse surfaces become eternal territories in which they lose their attributes, transforming themselves from object to landscape. Figures 2 and 3 are clear examples of these close-ups. In this way, *Wooden Worlds* invites the members of the audience to immerse themselves in a visual territory created by wooden textures that are mixed with different types of trees with the most diverse forms, in a similar manner to the sounds, as referred to in section 2.

All of the images were stored in a library in a MAX/MSP/Jitter patch and most of them are selected randomly during the performance. Some other, however, were pre-selected, such as, for example, the beginning of the performance. At some moments, these surfaces appear without any further visual effect; at some others, however, effects are applied, such as, for example, colour changes and heat, all programmed in *Jitter*. As an example, in the first minutes (start until ca. 6:30), the performance begins in complete darkness and only with nightly sounds of insects, suggesting a typical new moon night in the rainforest; very gradually, the ambiance light is increased by little grains populating the screen using the *noise* object in MAX/MSP/Jitter. After a while these grains are transformed into a *haptic image* of tree cortices opening an abstract wood-landscape.

Figure 2. Close-up of a tree cortex in *Wooden Worlds*. [5]
© 2010 by Claudia Robles Angel

Figure 3. A further example of a close-up of a tree cortex.[6]
© 2010 by Claudia Robles Angel.

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[5] Photo by Claudia Robles Angel.
[6] IBID

Apart from these images, there is one post-produced video, which was created with the software *After Effects*. The video begins with a close-up of a tree cortex fading into an extreme detailed close-up of a tree, which slowly zooms out revealing an entire tree, whose structure resembles a woman stretching the arms as if crucified. As previously explained in section 2, the video was produced to interact with the viola by modifying its speed (via amplitude), controlling in this way the duration and creating a tension controlled by the viola, which will decide at the end when the woman-tree image will be fully revealed.

4. INTERACTION

Interaction in *Wooden Worlds* was programmed in several dimensions: (a) live-electronics, (b) video interaction with the viola, and (c) interaction between both computers required for the performance, which run the software MAX/MSP/Jitter. The basic set-up requires the two laptops to be connected to each other via Ethernet using the MAX object *udpsend*[7]. The first computer, -to which the viola is also connected, via an audio interface-[8] is the master, generating a Time-Code (SMPTE), which is then transmitted to the second computer for synchronisation purposes. The master is in charge of several DSP functions for the live-electronics of the viola, which interacts either with itself or with the pre-recorded sounds (which are received from the second computer). The second computer has stored both all of the pre-recorded sounds and also all of the images (photos and videos). The interaction of this computer with the pre-recorded sounds happens through the usage of a MIDI controller, which is also in charge of the manipulation of the images. Both computers have a display programmed in MAX/MSP for the SMPTE times, in order for both performers to see at each and every moment of the performance the current time.

Figure 4. Main MAX/MSP patch, first computer (viola).

Figure 5. View of the main MAX/MSP/Jitter patch, second computer (sound and video).

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[7] For this purpose, both computers need a fixed IP address, exclusively created for the project.
[8] In this case, a MOTU Traveler.

Figures 4 and 5 above show the main MAX/MSP patches on each computer.

Full automation of the live electronics, as described in Garavaglia, 2010 [4], had to be used up to some extent herewith, mainly because of the extreme complexity of the performance. Full automation is partially used in the video interaction too, mostly in those passages in which both the pre-recorded sounds and the visual part need manipulation. It proved extremely difficult to manage the totality of these processes without some degree of full automation. However, and given the partially improvised character of some sections, it was decided not to fully automatise the totality of the performance; instead, only those passages requiring a great amount of manipulation of the interactivity needed full automation.

Each of the computers is connected via Firewire to an audio interface, with a quadrophonic output for each computer. This division allows for a clear and separated space for each of the sound sources (pre-recorded natural sounds with their DSP processing and the viola, also with its own DSP live-electronics). The second computer containing all of the pre-recorded sounds is diffused by channels one, two, three and four, whilst the viola's live-electronics from the first computer, are diffused by channels five, six, seven and eight.[9] This disposition of the loudspeakers, normally called a diamond set-up, is shown in full description in figure 6.
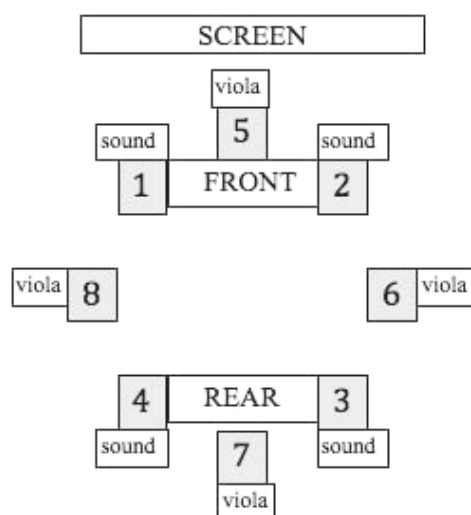
Figure 6. Octophonic distribution of sound in *Wooden Worlds*.

As mentioned before, the interaction between viola and video works basically with only two parameters from the viola: pitch and amplitude. To read them, the first computer uses an algorithm to perform on the one hand, a recognition of the pitch of each sound produced by the viola, and, on the other hand, another algorithm simultaneously measures their amplitudes. The actual values of these parameters proved to be rather

inconvenient for the mapping process needed on the second computer, in order to manipulate, among other processes, the entire video production of the piece. Therefore, after some trials and research, pitch needed to be multiplied by factor 10 before being sent to the second computer, and the amplitude was multiplied by factor 10000. Such high numbers allowed for a rather smooth interpolation of values of the diverse video parameters, without any noticeable rough changes in the video effects occurring. In this way, the values of the viola's amplitudes were always scaled from 500 (a number that proved to be quite efficient in avoiding unnecessary soft amplitude data) to a maximum of 10000. These figures were mapped to 0.1 – 50.0 in the second computer for the Theta parameter (rotation angle measured in radians) of the *jit.rota* object for rotation effects. The frequencies were mapped from 1300 (130Hz) and 50000 (5000 Hz) to 1.0 and 0.0 for the zoom parameter (horizontal and vertical). The images are faded with the resulted rotated image with the *jit.xfade* object in order to create feedback, (which continuously changes by zooming, horizontally and vertically) and by the Theta parameter. This feedback effect creates a visual and chaotic multiplicity that is reinforced by the rotation parameter, which can be slow or rather fast, according to the music played by the viola.

One of the most relevant interaction moments in the piece is the 'Elegy', which begins at minute 12:15 and ends ate 20:00 (SMPTE times in the score for the 40 minutes version). Here the amplitude values of the viola are mapped to modify the temperature colour of the images in MAX/MSP/Jitter, while the frequency data (130 to 5000 Hz) is mapped between 0.45 and 0.1 to control the duration of the video via the speed of the player (lower frequencies equal slower playing time and vice-versa, which creates a slow zooming out of the close-up view to the entire picture of the woman-tree image).

With regard to the live-electronics processes, they are divided in two: those in the computer for the viola and those in the second computer for the pre-recorded sounds and further live-sounds (live wooden sounds).[10] The viola live electronics include the following DSP functions:

4.1 Ring Modulation of two sources via two Comb filters: this is a simple convolution in the time domain of the viola input and of the sounds coming from the second computer, which firstly are separately comb-filtered using the *comb~* MAX/MSP object. The richness in amplitude that the comb filters add to each sound is afterwards ring-modulated, a process that enriches the spectrum once more.

4.2 Delays and reverb: the particularity of these, mainly of the delays, is that they happen with randomised delay times across the four loudspeakers assigned to the viola live-electronics

4.3 Convolution: the multiplication of the FFT analysis of two sources and their re-synthesis (using IFFT). In this case, the sources are the viola from the first computer and the pre-recorded rainforest sounds from the second.

4.4 Granular Synthesis: granular synthesis is used here in several ways. On the one hand, to stretch sounds from the viola (recorded live during the performance) in time, making them slower; on the other hand, to create a polyphony of those sound by generating upper voices (in the same way a

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[9] If no octophonic set-up is available, then a quadraphonic set can be used, in which channel five to eight are routed to one to four. This is not desirable though, as it eliminates the clear distinction intended of pre-recorded sounds and viola sounds in space.

[10] The inclusion of additional *live wooden sounds* may or may not be included in the performance, depending on the duration of each performance and on the type of venue where the piece is presented.

harmonizer would do); other uses are random granulation of the recorded viola sounds or the granulation of a very small part of the sample, which gives a quasi static sound.

4.5 Recorder and player: as the granulation needs a pre-recorded sound from the viola, its sounds are recorded at several moments and kept in a buffer (memory) until they are needed. The sample player also is in a position to transpose the sounds during the performance.

4.6 Spatialisator: the sounds from the output of the ring modulator, from the convolution and from the sample player are sent to a spatialiser, which creates a dynamic, (circular or localised) surround sound (4.1) for those outputs.

Another set of live-electronics was programmed in the second computer, which works mainly with insect sounds from the rainforest; it includes the following DSP functions:

4.7 Spectral extraction: many of original audio files with insect sounds were filtered by extracting frequencies from the entire spectrum using the software *Izotope RX,* as shown in figures 7 and 8. The filtered results were played (randomly or rigorously planned) from the main MAX patch.
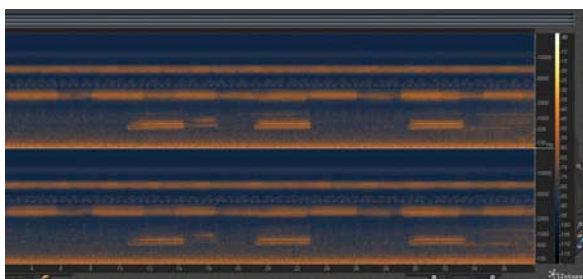
Figure 7. Audio file showing the entire spectrum of insect sounds before spectral extraction with *Izotope RX.*
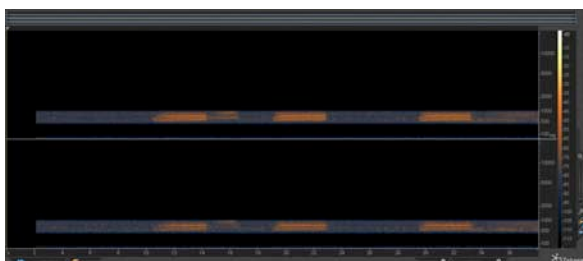
Figure 8. Same audio file as in Fig. 7, showing the remaining frequencies after spectral extraction.

4.8 Several DSP functions: these include comb filters, pitch shifting, chorus (for pitch or voices transformations) and granular synthesis, the latter used in a similar manner as described above in 4.4.

4.9 Spatialisation in 4.1: for these audio files, there are two types of spatialisation in the MAX patch: on the one hand, there is a circular movement, whose velocity increases or decreases during the performance at the will of the performer, with the intention of creating at certain moments an intense feeling of rotation. On the other hand, there is a second type of spatialisation, which is more localised. Both types are combined during the performance creating a surround sound that involves the audience with a jungle-like atmosphere.

5. FORM

Because the main idea of the performance is to work with sources, which can be found in nature, the form of *Wooden Worlds* was conceived as an arch, with a climax exactly at its golden mean or ratio, recreating the biological process of day and night. The usage of the golden mean implies the existence of two different quantities, namely 'a' and 'b' in such a relationship, that the ratio of the sum of the quantities to the larger quantity is equal to the ratio of a larger quantity to the smaller one, it will mean that the larger quantity 'a' is 1.6180339887.. times bigger than the smaller quantity 'b'. Said in other terms, 'a' is approximately 2/3 of the addition 'a+b'. This is displayed in figures 9 and 10 below.

$$\varphi = \frac{1+\sqrt{5}}{2} \approx 1.61803\,39887\dots$$

Figure 9. Calculation of the golden ratio.[11]
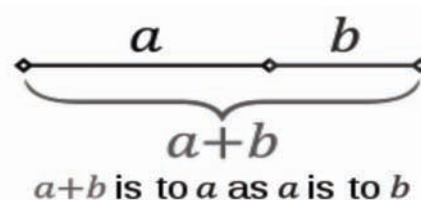
Figure 10. Example of the golden mean.[12]

The usage of the golden mean in *Wooden Worlds* creates the impression of a quasi-biological cycle, which begins in complete darkness and silence before introducing slowly insect sounds; it then evolves during the performance toward a climax, in which all forces formerly described interact, fading out gradually in the last third of the piece again to complete darkness and silence.

6. TECHNICAL REQUIREMENTS

The following equipment is needed for the performance of *Wooden Worlds.* This is added herewith with the only purpose of clarity for the reader with regard to the technology involved in the performance of the piece.
- 1x viola
- 1x big screen (6m x 4m or bigger) and a room in absolute darkness.
- 1x video projector
- Octophonic diffusion plus subwoofer (8.1). The minimal configuration is quadraphonic with subwoofer (4.1.), but this minimal configuration is an emergency set up, not the original intention.
- Audio mixing desk (8x inputs – 8x outputs, plus 1x out for the subwoofer)
- 2x audio interfaces
- 2x laptops with the software MAX/MSP/Jitter
- 3x microphones (connected directly to the audio interfaces, not to the mixing desk). At least one of these must be a contact microphone (for the viola).

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[11] Figure taken from: http://en.wikipedia.org/wiki/Golden_ratio (site accessed 12.12.2010)
[12] IBID.

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Narrative and Cross-Embedding in Interactive Media Art: Sally Pryor's *Postcard from Tunis*

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ABSTRACT

The topic of this paper is the relationship between interactivity and meaning-making. Australian media artist Sally Pryor's interactive work *Postcard from Tunis* will constitute the fulcrum of an exploration of how interactivity in media art can facilitate other kinds of narrative, related to, but also different from those of older narrative media. Accordingly, the theoretical part of the paper will revolve around the concepts of interactivity, remediation and narrative.

Topic and Subject Descriptors

Narrative in Interaction, Strategies for Meaning-Making.

Keywords

interactivity, cross-cultural interaction, narrative, remediation, cross-embedded media, user engagement, Integrationism

1. INTRODUCTION

How can the introduction of interactivity into the reader's – or rather the reader-user's – engagement with the work transform the patterns of storytelling? This is the overall question of this paper. It focuses on the reciprocal relationship between navigation and interactivity, on the one hand, and meaning-making, narrative and comprehension, on the other. Turning to Australian media artist Sally Pryor's award-winning *Postcard from Tunis* (v. 1 for Mac 1997, v. 2 for PC 1999) for a significant example, I wish to explore how interactivity in media art can facilitate other kinds of narrative clearly related to but also profoundly different from those of older narrative media like the novel or fiction film. In terms of medium, *Postcard from Tunis* could be described as a remediation of the postcard by the digital medium of the CD-ROM or, better, as a cross-embedding of postcard and computer. They are both means of communication with a potential to transmit information and experiences over great distances as well as to enable cross-cultural understanding, i.e. an understanding

based on interaction and exchange with people from foreign cultures, their specific concepts and modes of perception, thinking, feeling and acting.

Before exploring Pryor's work from a narrative perspective, I will briefly introduce the three theoretical concepts that my argument turns upon: interactivity, narrative and remediation. I will use philosopher Dominic McIver Lopes' definition of interactivity as the general basis of my argument, include media theorists Jay David Bolter and Richard Grusin's definition of remediation, expanding it with media historian Norman M. Klein's designation of cross-embedded media, and then turn to literary scholar and media theorist Marie-Laure Ryan for an adequate notion of narration.

2. INTERACTIVITY

The characteristic most commonly attributed to digital media art is probably 'interactivity'. As Christiane Paul has pointed out, any experience of an artwork is interactive in the sense that it relies on "a complex interplay between contexts and productions of meaning at the recipient's end" (Paul 2003: 67). However, it is not all digital art that is interactive in the sense that it goes beyond this mental activity to allow different forms of navigating, assembling or contributing to an artwork. Thus, instead of regarding interactivity as an inherent generic feature of media art, we should regard it as a typical feature that manifests itself in many but not all kinds of media art.

This is not the place to enter into a long discussion of the concept of interactivity. I will confine myself to introducing Dominic McIver Lopes' useful idea of interactivity in computer art. Lopes' understanding of interactivity is based on a distinction between, on the one hand, the large category of art made digitally, like digital photographs printed on paper and presented off-screen, and on the other, proper computer art made for digital display. Computer art is interactive only when the work requires that "the actions of its users help generate its display" (Lopes: 37). A *display* is a visual, verbal, auditive or multimedial structure that results from the creativity of the artist and changes due to the actions of the display's users. Accordingly, a display is characterised by *variability*, a variability that often results from either repeating multiple versions or from variation in the succession of states that make up the one event (Lopes: 37-38). As we shall see, the variability of display in Sally Prior's *Postcard from Tunis* is primarily of the kind that results from variation in the succession of states.

According to Lopes, "a work of art is interactive to the degree that the actions of its users help generate its display (in prescribed ways)" (Lopes: 37). The point is that different users are likely to generate different displays but not different works. Interactive

works prescribe that we act to impact and change the work's display, in contradistinction to the active appreciation of, e.g. a painting, which does not change the shapes and colours on the surface of the canvas.

Having clarified the question of the receiver's impact on the work, we can move on to the question of the role of the receiver. As Lopes formulates it, "a person plays the role of user in generating a display of a work only if he or she (1) generates the display, (2) exploring the work, so that (3) an audience attends to the work partly by attending to his or her doing (1) and (2)" (Lopes: 82).

In other words, computer art generates *two different subject positions*: firstly, the position of the user who interacts with the work by generating displays, and who is a precondition for the work's performance of displays and hence its realisation as a work of art; secondly, the position of the audience who attends to the work, including the user who "attends to the work partly by attending to herself." (Lopes: 83). The receiver therefore plays a double role of reader and user or viewer and user, depending on the character of the work. This double role profoundly alters the way the audience appreciates interactive works as *art.* According to Lopes, "e appreciate works of computer art primarily by generating displays of them, understanding that these displays vary a great deal, and that the work itself is to be appreciated through this variety. We also understand that our own actions generate these displays, so that we ourselves become objects of attention" (Lopes: 84). To sum up, interactive works of art produce *a different kind of art appreciation or aesthetic sensibility* that is self-reflexive and relational in the sense that it is attentive to the user's own transformative agency and generative process of interactivity.

3. REMEDIATION & CROSS-EMBEDDING

As regards the transformative agency of the *medium*, Richard Grusin and Jay David Bolter has argued that, like all media introduced in the last two centuries, digital media depended for their cultural meaning on the context of older media forms from which they have emerged (Bolter: 196-97). Their influential book *Remediation: Understanding New Media* explains how a new medium can 'refashion' a predecessor in the sense that it 'reforms' and 'improves' a predecessor on the level of content as well as form, while still being marked by the presence of the older medium in either acknowledged or unacknowledged ways.

As Bolter and Grusin point out, their theory of remediation is "a genealogy of affiliations, not a linear history, and in this genealogy, older media can also remediate newer ones" (Bolter and Grusin: 55). The last observation is part of an argument that eventually turns the authors' idea of remediation in digital media into a general idea about all media. Thus, Bolter and Grusin assert that "*all* mediation is remediation" (Bolter and Grusin: 55). Despite their awareness that older media can also remediate newer ones, Bolter and Grusin's theory of remediation is primarily a narrative of progress that explores how the invention of new digital media overcomes the limitations of older media. Although their concept of remediation is a useful tool of transmedial analysis, the relationship between digital media and their predecessors should perhaps be regarded as *a two-way process* instead of a one-way development in which a new digital medium refashions and overrules an older medium.

Media historian Norman M. Klein has proposed a more subtle relational approach to the question of how one medium is folded, or embedded, into another. Klein emphasises that embedded media is always "a two-way street. It is always cross-embedding" (Klein: 83). It is not only the computer that is embedding itself into another medium or space, for instance the body, architecture or photography, improving it by updating it technically; the older medium or space is also embedding itself into the digital system of the computer (Klein: 84). Such an attentiveness to the reciprocal relationship between media is useful when dealing with storytelling in media art.

Of course cross-embedding is not a new thing. For centuries books have combined storytelling in writing with images. In the modern period television and cinema have combined speech, pictures and sound with storytelling. What is new is that multimedia digital displays are generated on one machine, which Lopes has aptly described as "an all-purpose representation device that deals with information in a common digital code" (Lopes: 8). So, the questions are: How are we to conceive of narrative when an older narrative medium is embedded into the "all-purpose representation device" of the computer? How do its technical possibilities affect existing presentational and narrative techniques?

4. NARRATIVE

As Marie-Laure Ryan has observed, narrative is not a genre or mode of expression exclusively reserved for narrative fiction, theatre or film, i.e. the media commonly associated with narrative. A narrative potential is inherent in many different media. Thus, narrative is not a specialised cultural genre; it is rather an analytical category (Ryan: 6).

In her introduction to the anthology *Narrative across Media: the Languages of Storytelling*, Ryan remarks that "different media filter different aspects of narrative meaning" (Ryan: 17). To analyse narratives in different media and genres, Ryan introduces a distinction between two different modalities of narrative: Firstly, narrative is a textual act of *representation*, i.e. a text that encodes a specific kind of meaning. The term text is used here in a broad semiotic sense which does not specify what type of signs are used. Secondly, narrative is a mental image, *a cognitive construct* created by the interpreter as a response to the text. Ryan makes a distinction between *being a narrative* and *possessing narrativity* in order to differentiate between the two, i.e. the artifacts produced with the intention of evoking a narrative script and the interpreter's ability to evoke such a script (Ryan: 9).

Synthesising the observations of Bolter and Grusin with those of Klein and Ryan, one could say that remediation entails cross-embedding, and cross-embedding transforms the particular narrative configuration of the media in question. As a result, it also "affects in a crucial way the construction of the receiver's mental image" (Ryan: 17), i.e. the property of possessing narrativity. Put differently, cross-embedding affects the way a reader-user evokes a particular kind of narrative script when generating a display of an interactive work of art like Sally Pryor's *Postcard from Tunis.*

5. *POSTCARD FROM TUNIS*

The postcard is a form of written communication that became popular in the 19th century when printed pictures were merged with plain postal cards. Originally the text and the picture had to be on the same side of the card, leaving the other side for the address and stamp. The postcard was first conceived as a medium of art; nevertheless, in the early days it was feared that postcards

would erode the art of letter writing. Thus, postcards first caused the same concerns about the changes to literacy as computers do today when fears are expressed that fugitive media like twitter, email and web 'postcards' may oust postcards and letter writing altogether (Pryor: 42-43).

Sally Pryor's *Postcard from Tunis* shares some of the characteristics of a postcard. Its small screen space echoes the format of the standard postcard, and the series of thirty-five different screens in the work parallels the postcard wallet's montage of different images on a folded strip. Its style is poetic, personal and local but also international as it communicates experiences of travel and cultural encounter. It is primarily addressed to people for whom Tunesian culture and Arabic would represent an encounter with a foreign environment and language (Pryor: 46-47, 51-52). *Postcard from Tunis* is about the experience of cultural as well as linguistic translation. It constructs a multilingual space consisting of Pryor's native language English as well as Arabic and French – the second language of Tunisia. The work communicates her experience of the hospitality of her Tunesian friends and family, of picking up bits and pieces of Arabic by deducing the meaning of words from everyday situations (Pryor: 66), of the Arabic alphabet, and of gradually acquiring an understanding of Tunesian culture, albeit the intercultural understanding of a foreigner. It picks up on the popular tradition of the postcard as well as the tradition of mail art as an art form (Pryor: 444), embedding both in the digital medium of an interactive CD-ROM send by airmail to the addressee. Hence, Pryor's digital postcards are not addressed to a named receiver, but are intended for a general art audience.

The cross-embedding of postcard and CD-ROM has provided the artist with a kit of new tools. They influence, or perhaps even prescribe, how she can communicate her 'story' about her engagement with a foreign place, people and language; how reader-users can enter its cross-cultural universe; and how they can operate mentally inside it. In what follows, I would like to substantiate my proposition that the insertion of the postcard in the computer changes the way the postcard communicates.More than anything, it changes the way Sally Pryor conveys her experience with cultural translation on an everyday basis.

Technically, the user 'reads' the postcards by navigating between interactive screens, clicking on hyperlinks embedded in each screen. Pryor has made extensive use of rollover technics where the user triggers events, especially sounds and animations of signs, simply by moving the mouse over hot spots. When Pryor started making *Postcard from Tunis* in 1994, rollovers were not widely used whereas the rollover is now a well established website feature.In terms of rollover techniques, the work is thus somewhat ahead of its time. The user is intended to search for the hyperlinks in a random and labyrinthine way that feels like roaming the streets of an unknown city without a map, regularly returning to locations previously visited; still, busy users can also click a globe icon that takes you to a global map of all screens where users can choose which ones to visit. Moreover, the ambience of the work is aesthetically enhanced by lush colours and a rich audio track with traditional melodies and 'authentic' soundscapes from Tunis, which add an 'exotic' atmosphere to the postcards.

In her PhD Thesis *Extending Integrationist theory through the creation and analysis of a multimedia work of art:* Postcard from Tunis (Sydney 2003), Sally Pryor has pointed out that she primarily thinks of her work as a kind of portrait and an exploration of the nature and interconnection of signs – pictorial, scriptorial and auditory.[1] Pryor's encounter with a North-African culture while living in Tunis in 1992 encouraged her to reconsider her understanding of writing and how people decode signs, as did her her exposure to ancients scripts and written Arabic. She found theoretical support for her growing intuition that the meaning of signs is produced by the context in which they appear, not predefined by codes in the Integrationist theory of communication developed by British linguist Roy Harris.

Integrationism was the name given to a poststructuralist semiology of communication by a group of linguists at the University of Oxford in the 1980s (Pryor: 24ff., 29). According to Integrationism, an act of communication cannot presuppose fixed languages or codes from which we simply select when communicating. Hence, Integrationism rejects the conventional semiological model of communication that assumes that 'a message' is simply transmitted from the sender who has encoded the message through a neutral medium/language to a receiver who will decode the message. According to Integrationism, the meaning of language is produced by the *integration of activities* performed in the very act of communication. This act is always impacted by the circumstances in which it is performed. According to Integrationism meaning is therefore not conveyed in *addition* to other activities. An act of communication and meaning-making is an act of integration;consequently, there can be no fixed boundaries between the lingustic and the non-linguistic or betweeen speech, writing and images.

The integrationist model of communication is relevant to studies of multimedia because it offers a model of the sign as an integration of many different human activities, and it understands integration to be the very mechanism that produces meaning. Or, as Roy Harris has put it: "the meaning of a sign is its integrational function – not a capacity to represent anything else" (Harris, quoted in Pryor: 28). *Postcard from Tunis*could therefore be seen as an artistic demonstration of the integrationist workings of communication in general. Itdemonstrates how human communication is performed through the contextualised integration of human activities by means of signs understood as a complex of which differents facets may be activated, depending on the context. In addition, it can also be seen as an educational exploration of the particular integrationist potential of interactive, digital multimedia.

Postcard from Tunis is designed so that users might pick up a few spoken words and perhaps learn to recognise them in written Arabic. Users also get a rough impression of the geography, history and sound of the city. Take the 'fish screen' as an example. It depicts the fish as a contemporary sign with ancient roots and as an everyday object. The screen combines a photo of a plate with fish, an ancient Roman stone engraving, a symbol of three intertwined fish drawn from traditional Tunisian jewellery, and the word 'fish' written in Arabic. There is another Tunisian-style image of a fish next to the subtitle, which explains that the ancient graphic signs of the fish and the hand are believed to posses the power to protect against the evil eye. There is also a soundtrack of the artist's Tunisian family and friends talking, playing drums, singing, "ululating" and laughing (Pryor: 73).

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[1] Pryor's dissertation is available online on her website www.sallypryor.com together with a demo of *Postcard from Tunis*.

When the curser is rolled over the subtitle, it switches from English to French. When it is rolled over the word written in Arabic, it is pronounced in Arabic. When rolling the curser over the dish with fish, a woman says, "I like fish" in Arabic. The meaning is understandable to non-Arabic speakers because translations into French and English appear next to the plate. If the user rolls the curser over the stone engraving, a child's voice is heard saying a sentence in Arabic from which one can pick out the word fish but not understand the rest. The user is therefore positioned in a liminal and transformative space between understanding and non-understanding while he or she is trying to deduce the meaning of the screen by integrating visual, oral and written signs and coordinating the acts of clicking, rolling, seeing, reading and listening.

6. ART AS CULTURAL TRANSLATION

I do not wish to argue against the artist's convincing and elucidating exegesis of her work as materialising an Integrationist understanding of language and writing. In stead, I would like to extend it by proposing that the postcard, as an image and text based medium, is transformed into a multimedia narrative when it is embedded into an interactive CD-ROM that actively engages the user in a performative production of coherence and meaning. As a result, the form of storytelling and the narrative experience is also shaped differently.

When a user explores a series of interactive screens, a kind of narrative is produced. Although the user may not put it explicitly, there will be an implicit understanding that the succession of states that constitutes an exploration of *Postcard from Tunis* draws up an itinerary. The itinerary traces a journey which has modified the traveller's boudaries to another culture; it traces the story of the *experiential process* of cross-cultural learning, albeit only on a small scale. Because the work is interactive, this is not only the story of the artist's life experience of acculturation but also the story of the reader-user's *mediated* experience of acculturation. Needless to say, the varied displays generated from the non-narrative palimpsest of Pryor's work do not qualify as narratives in the strong sense of the word. The work's mode of narrative is rather the mode that Marie-Laure Ryan calls *possessing narrativity* as it enables the interpreter to make connections and construct a narrative image of the hidden story of acculturation that ties the pieces of the rather fragmented 'text' together.

Ryan makes a distinction between *diegetic* and *mimetic* narration, which can shed further light on *Postcard from Tunis*. A diegetic narration is a verbal storytelling performed by a narrator, and by definition it presupposes either oral or written language. It is the typical mode of the novel, conversational storytelling and news reports. A mimetic narration is an act of showing through which an authorial consciousness guides the recipient, but it has no "narratorial figure" to tell the story. It is well known from filmic montage in narrative cinema and dramatic arts like theatre and opera. The narration of *Postcard from Tunis* is mimetic, closer to montage than the brief, minimalist narrative of an ordinary postcard. However, the display or itinerary that the user creates is *unintentional,* as opposed to the film director's intentional montage. The user's mode of navigation therefore seems closer to the situationist idea of *dérive*, i.e. an apparently aimless wandering or 'drift' in which one lets go of one's usual rational, goal-orientated behaviour and allows oneself to be drawn by the attractions of the city and the chance encounters occurring in urban spaces. *Postcard from Tunis* is thus a rare blend of exploratory art and deliberate instruction: it is a kind of "educational art" (Pryor: 76) that aims at improving cross-cultural understanding. As Sally Pryor has explained:

> I had found that Westerners sometimes think that written Arabic is impossibly difficult to understand, and, by extension, they suspect the same to be true of Arabic culture. Thus in *Postcard* I offer a technical solution to a cultural issue. I designed the work so that users might pick up some Arabic without even intending it and the Arabic script might start to seem less *other*. (Pryor: 78)

Although Pryor's CD-ROM is modelled on the postcard, it filters different aspects of narrative meaning than an ordinary postcard. It does so primarily because interactivity invites reader-users to take centre stage. Unlike a turist postcard, *Postcard from Tunis* does not contain the writer's account of her personal experience of a foreign land; on the contrary, it enables reader-users to construct a narrative image of their own mediated process of acquiring a bit of cross-cultural understanding.

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