

Archiving and Questioning Immateriality

Proceedings of the 5th Computer Art Congress

Edited by

Everardo Reyes-García

Pierre Châtel-Innocenti

Khaldoun Zreik

europia
productions

Archiving and Questioning Immateriality

Proceedings of the 5th Computer Art Congress

Auteurs / Editors : Everardo Reyes-Garcia, Pierre Châtel-Innocenti, Khaldoun Zreik

Edité par / Published by europia Productions

15, avenue de Ségur

75007 Paris, France

Email: info@europia.fr

<http://www.europia.fr>

<http://europia.org>

ISBN13 : 979-10-90094-23-9

© 2016 europia productions

Tous droits réservés. La reproduction de tout ou partie de cet ouvrage sur un support quel qu'il soit est formellement interdite sauf autorisation expresse de l'éditeur : Europia Productions.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior written permission of the publisher Europia Productions.

Table of contents

Presentation	9
Committees	11

Paper sessions

Art and materiality in post-media practice: toward an ontology of digital and its devices <i>Alessio Chierico</i>	15
OPTICKS, space travel and visual moonbounce <i>Daniela de Paulis</i>	34
Patterns of materiality/immateriality: dialectics in epistemology under the new scientific paradigm <i>Gabriel Pareyon</i>	57
Your Boy is You: new media art as a critical analysis of biometric surveillance... <i>Maciej Ożóg</i>	71
A personal media art archive based on the symbol of the fly <i>Christa Sommerer & Laurent Mignonneau</i>	87
Using images to analyze images. Semiotics meets Cultural Analytics <i>Maria Giulia Dondero</i>	91
Art and data: the aesthetic emergence of knowledge <i>Sandra Alvaro Sánchez</i>	108
Letting images speak for themselves <i>Pilar Rosado, Eva Figueras & Ferran Reverter</i>	126
Materializing depth in <i>Gravicells</i> : the potential of twenty-first-century media <i>Jung E. Choi</i>	138
What we talk about when we talk about online cultures <i>Annet Dekker</i>	147
Preserving born digital art : lessons from artists' practice <i>Conor McGarrigle</i>	164
At angle C: instability poetics. Participation aesthetics through the work of Julio Le Parc and the Groupe de Recherche d'Art Visuel (GRAV) <i>Andrea Sosa</i>	182
Konrad Zuse: enabler of computational arts? <i>Andrés Burbano & Esteban García Bravo</i>	190

The Latin American digital heritage: methods of digital art archive construction and the retrieval of immateriality <i>Reynaldo Thompson, Tirtha Prasad Mukhopadhyay & Frank Dufour</i>	204
Archiving, emulating and documenting the collection of CD-ROM artworks of LIMA, Amsterdam <i>Alexandre Michaan & Nina van Doren</i>	222
Vis. [Un]necessary force <i>Luz María Sánchez</i>	240
Composing the future <i>Melanie Hundley & Teri Holbrook</i>	260
Memory's death... or the desire of immortality <i>Ricardo Dal Farra</i>	269
Beyond place: monuments and museums after the intangible turn <i>Shelley Hornstein</i>	277
Imagining spatially in Computer-Based Art <i>Gemma Argüello Manresa</i>	286
Mirages de Ville <i>Gerry Kisel & Alan Dunning</i>	297
Quick and easy recipes for disaster <i>Thomas Storey</i>	319
FFF <i>Franck Soudan & Marc Veyrat</i>	336
We Bees: an immersive telematic object from project S.H.A.S.T. <i>Maria Luiza (Malu) Frago</i>	353
The expanding artwork <i>Luba Diduch</i>	366
Movement Systems from Motion Capture Data <i>A. Bill Miller & Jeremy Behreandt</i>	377
Effects of immediacy on the perception of interactive art <i>Kevin S Badni</i>	385
Central floorplans and digital strategies <i>Federico Garrido</i>	405

Projected illusions: space, light, and coordinates <i>Andrea Sosa</i>	419

Art Exhibition

Mirages de Ville – First Words Last Acts <i>Alan Dunning</i>	430

Dimensioning n.1 – from live architectures a VR experience thru google cardboard, 2016 <i>Chiara Passa</i>	434

24 Hour Social <i>Conor McGarrigle</i>	437

What do we know of time when all we can know for real is now? <i>Daniel Buzgo</i>	439

Transferring female reproductive labor and ephemeral and domestic forms of writing into the Archive: Remediating <i>Mamá Pina's</i> Cookbook <i>Gabriela Aceves Sepúlveda</i>	443

DEFOOOOOOOOOOOOOOOOOOOOOOOREST <i>Joana Moll</i>	449

MonkeyTURN <i>Naoyuki Tanaka</i>	452

“T[he]Issue”: a geospatial and mixed-locative colonisation document <i>Mez Breeze</i>	454

Metropolis <i>Paul Magee</i>	456

Signal <i>Paul Magee</i>	457

Organic <i>Ricardo Dal Farra</i>	458

Composting the net (2012) <i>Shu Lea Cheang</i>	462

Index	464

Presentation

The Computer Art Congress is an international gathering around art, science, technology, and design. Its first edition was celebrated in Paris (2002) -then traveled to Mexico City (2008), came back to Paris (2012), and recently was hosted in Rio de Janeiro (2014). In fourteen years, a community of artists, curators, researchers, scholars, scientists, designers, students, and professionals has contributed to the domain with artworks, papers, round tables, workshops and exhibitions, exploring questions such as “emerging forms of computer art”, “post-digital art”, and “computer art for all”.

In 2016, the 5th edition of the Computer Art Congress took place at Maison des sciences de l'homme Paris Nord, organized by the Citu-Paragraphe research team at Université de Paris 8 in partnership with the University of Michigan, the University of Hong Kong and the Universidade Federal do Rio de Janeiro. The selected topic for this edition is “archiving and questioning immateriality”.

CAC.5 called for contributions interested in reflecting on the artwork as a material object, but also invited to consider the complex processes that surround a work of art. In this respect, the artwork can be regarded from the emotional and intellectual effects that it triggers. Such effects can be deployed from small teams to the entire world via networked technologies and distributed exhibition spaces. However, the Internet and electronic devices have proven to be less stable and long-lasting than they seemed. How should we deal with artworks if we take into account their multidimensional nature: temporal, spatial, exploratory, communicational, collaborative?

CAC.5 believes that such entry points raise problematic issues that also demand to interrogate the “Material” supports that give form to an artwork; the archival methods that artists, curators, collectors and institutions employ in their practice; the remix and re-cataloging appropriations that common users and audiences put in place. We hoped these initial questions pushed our discussion towards speculative visions on archiving subjectivity, and creating obsolescence.

Committees

Local chairs: Everardo Reyes-Garcia & Khaldoun Zreik

Technical director: Pierre Châtel-Innocenti

Exhibition advisor and logistics: Cécile Martin

Poster graphic design: Dino Ahmad Ali

Volunteer staff coordination: Gabriel Bursztyn

Scientific partners

Maurice Benayoun, City University Hong Kong (Hong Kong)

Malu Fragoso, Universidade Federal do Rio de Janeiro (Brazil)

Gunalan Nadarajan, School of Art & Design, University of Michigan (USA)

Steering committee

Pau Alsina, Universitat Oberta de Catalunya (Spain)

Pierre Barboza, Université Paris 13 (France)

Clarisse Bardiot, Université de Valenciennes (France)

Pierre Boulanger, University of Alberta (Canada)

Annick Bureaud, Leonardo/Olats (France)

Ron Burnett, Emily Carr University of Art and Design (Canada)

Gustavo Crembil, Rensselaer Polytechnic Institute (USA)

Frank Dufour, University of Texas at Dallas (USA)

Alan Dunning, University of Calgary (Canada)

Tania Fraga, Instituto de Matemática e Arte de Sao Paulo (Brazil)

Malu Fragoso, Universidade Federal do Rio de Janeiro (Brazil)

Paula Gaetano Adi, Rhode Island School of Design (USA)

Oliver Grau, Danube University (Austria)

Shawn Greenlee, Rhode Island School of Design (USA)

Kerry Hagan, University of Limerick (Ireland)

Christian Jacquemin, Université Paris 11 (France)

Ioannis Kanellos, Telecom Bretagne (France)

Paul Magee, Independent Artist (England)

Roger Malina, University of Texas at Dallas (USA)

Lev Manovich, City University of New York (USA)

Nick Montfort, Massachusetts Institute of Technology (USA)

Gunalan Nadarajan, University of Michigan (USA)

Guto Nóbrega, Universidade Federal do Rio de Janeiro (Brazil)

Warren Sack, University of California, Santa Cruz (USA)

Luz María Sánchez Cardona, Universidad Autónoma Metropolitana / Lerma (Mexico)

Edward Shanken, Rhode Island School of Design (USA)
Christa Sommerer, University of Arts and Industrial Design (Austria)
Vicki Sowry, Australian Network for Art and Technology [ANAT] (Australia)
Jack Stenner, University of Florida (USA)
Nicolas Thély, Université de Rennes (France)
Victoria Vesna, University of California, Los Angeles (USA)
Marc Veyrat, Université Savoie Mont-Blanc (France)

Keynote speakers of CAC.5

Bernard Stiegler, IRI / Centre Pompidou (France)
Lev Manovich, City University of New York (USA)

Special thanks

Imad Saleh, director of Paragraph Lab., Université Paris 8 (France)
Maison des sciences de l'homme, Paris Nord



Papers sessions

Art and materiality in post-media practice: toward an ontology of digital and its devices

Alessio Chierico

Abstract

Recent artistic trends which involve New Media Art and contemporary art fields, demonstrate deep interest in the discussions that concern materiality in large sense. However, the relation between materials and art is often and wrongly connoted by modernist theories. Tracing an historical overview of the artistic experiences which focused on materials, and connecting them with current researches, this contribution aims to expose the possible ways which materiality can be related to art practice. Furthermore, it points to explore how the materialities of digital technologies can be used to investigate digital ontology from a post-media perspective.

Keywords

Medium specificity, Post-media, Post-Internet, Media materiality, Digital ontology.

1. Introduction

The relation between New Media Art and contemporary art has been extensively debated in the latest decades. However, considering the recent expansion of New Media Art in various hybrid approaches, nowadays it is possible to observe some forms of integration between the two fields. In one side, the traditional institutions of art are increasing their attention toward the artistic experiences that belongs to New Media Art. On the other side, some of the manifold formalizations of these last ones, demonstrated a deeper understanding and usage of the languages of contemporary art.

One of the possible explanations about the historical separation and incommunicability between New Media Art and contemporary art, can be found on their diverging expectations. In 1996, with an ironic text, Lev Manovich expressed this issue defining as “Turing-land” the playground of the first, and “Duchamp-land” the territory of the second. In his opinion, the fracture which interposes the two sides are irreconcilable because Duchamp-land focus on contents and not in the research into new aesthetic possibilities of new media (Manovich, 1996). In this sense, the modernistic flavour of a research based on media aesthetics, is hardly compatible with the post-media theories that dominate contemporary art. However, several artistic practices that developed in the last two decades in the context of New Media Art, found the acceptance of contemporary art. For instance, Net Art was a phenomena

which was legitimized as distinctive occurrence in the timeline of art.¹ In fact, nowadays we can observe that many artistic experiences that flourished in the golden age of Net Art, acquired the languages which are proper of contemporary art, promoting possible integrations with the interests of New Media Art. Moreover, it is important to consider that, in general sense, the pervasivity of technologies in our current culture and social life, forced contemporary art critique to accept and encourage reflections about media.

In addition to the forms of integration which we just saw, it is important to stress out some others touching points, which deserve a particular attention. Currently, we are assisting to the emergence of new theoretical sensibilities, which embrace a large number of cultural fields, and that are fascinating very diverse artistic researches. Several recent philosophical directions like: Object-Oriented Ontology and New Materialism, are flirting with some artistic practices that comes from Contemporary Art in one side (Harman, 2014) and New Media Art from the other (Cubitt, 2013).

Enabling a discussion about materiality (in general sense), and media materiality, these theories perfectly expose the main issue which generates the basic incompatibility between this two artistic forms. Under certain perspectives, these theories rehabilitate some of the modernistic concerns about media. At first glance, this seems to linearly pander the original direction of New Media Art, seen as aesthetic exploration of the specific medium/material. Differently, our concern about the properties of media/materials, is not intended as research of the specificities of the artistic media. The idea itself of privileged media of artistic production is here rejected, thus, a research on the essential qualities of the artistic medium, seen as way to find a definition of art, it is not taken into account. Moreover, the current artistic reflections about materiality are rarely interested to survey the materials for aesthetic purpose. They are commonly involved in the investigation of the materials which surround our daily experience. In our special interest, we will focus on how this approach is often translated in the intent to regain a materialistic perspective over the supposed immateriality of media.

The discussion about materiality in art and in its practices is extremely large, and this text does not intend to treat exhaustively this argument. However, it is here believed that the topic of materiality can be used, in this context, as tool for fulfil three main purposes:

¹ In several occasions Net Art entered the literature which attempt to trace an historiography of contemporary art. For instance: “Pratiche artistiche in rete” (Mometti, 2009).

1. Rehabilitate the discussion about the achievements of the modernistic concern about medium specificity, acknowledging the accomplishments of post-media practice.
2. Observe the strategies and methods of the artistic practices which propose a reflection on materiality, from the neo-avant-gardes to post-internet.
3. Acknowledge how an enquiry on media materiality can express relevant insights in the understanding of digital ontology.

2. Materiality and immateriality in Modern Art and Post-media practice

The importance of materials in artistic practice has a long and obvious tradition. Modernist art theory has been strongly concerned about the materiality of the media which were favoured in art production. In the whole history of visual representation the materiality of the medium had a fundamental role, but in modernist period the definition of medium as tool, and vehicle of information, collided with the idea of artistic media: the privileged instruments of art.

2.1. Materials of art vs. materials for art

According to Modern Art theories, the essence of art could be achieved acknowledging the material and formal essence of the media devoted to art practice: painting, sculpture, etc. These theories are based in the influential definition of “medium specificity” promoted by Clement Greenberg since the beginning of the 1940s². According to this idea, the awareness of the specificity of the artistic medium, emancipate art from its classical role of mere visual representation. This direction, seen as an intent to avoid any romantic and illusory content, highlights the centrality of the medium, exploring its aesthetic potentials. According to Greenberg, “medium specificity” is a distinct attribute of Modern Art, that allows art to pursue its “purity”; that he defined as: “acceptance of the limitations of the medium of the specific art” (Greenberg 1985, p. 66). Accordingly, the medium becomes the only objective element, and the only subject that must be used to understand the essence of art.

Assuming this prospective, is it possible to see that “medium specificity” describes an art which is not used as ontological tool for media materiality. Oppositely, the materiality or artistic media is an ontological tool for art. Taking the example of the painting medium, all the physical elements which compose

² The essay written by Greenberg: “Towards a Newer Laocoön” was firstly published in 1940 (Greenberg, 1985).

it, like: the canvas flatness and the colours materiality, are the subjects that art must explore. In this sense, abstract painting is seen as a form of experimentation of the possibilities offered by the pictorial technique. Analysing the working method adopted by Jackson Pollock, among others, Greenberg acknowledge that in painting the convention established by the use of the easel is in crisis (Greenberg 1984, p. 157). Moving the canvas on the floor and performing his “dripping” with the intent of creating his compositions, Pollock refused to subsume his picture and practice, to the arbitrary influence of easel. This action is seen by Greenberg as an acquisition of control of the medium, in order to fully explore its limitations and aesthetic possibilities.

However, the art critic Rosalind Krauss observed that bypassing the convention that the easel imposes to the canvas and artist, Pollock did not took the control of the painting medium, with the necessity of finding its purity, but he invented a new medium. Posing his paintings in horizontal position, and activating the series of operations for his “drippings”, Pollock designed the series of conventions which allowed the works to take form. Evaluating the works of Jackson Pollock, Greenberg exposed his concept of medium specificity, seeing the Pollock's work as a form of gained awareness of the specificities of painting. This view is openly criticized by Krauss, who argues that the Pollock works are not a mere celebration of painting, but a reinvention a new practice. Accordingly, Krauss believe that: “The most serious issue of painting now was to understand not its objective features, such as the flatness of the material surface, but its specific mode of address, and to make this the source of a set of new conventions” (Krauss, 2000, p. 29)

Krauss is specially interested in the artistic practice, thus the medium must be consider as a subset of elements which defines the practice itself. Using her own words, she states that: “in order to sustain artistic practice, a medium must be a supporting structure, generative of a set of conventions, some of which, in assuming the medium itself as their subject, will be wholly “specific” to it, thus producing an experience of their own necessity” (Krauss 2000, p. 26).

2.2. Materiality in Neo-Advant-Gardes, between Modern and Post-Modern

The critiques that Rosalind Krauss moved toward Clement Greenberg's concept of “medium specificity”, are symptomatic of the opposition between the researches of modernism and the content-based methodology proposed by contemporary art. Acknowledging the advent of the post-medium condition“ (Krauss, 2000) of the current cultural production, any concern about the

specificity of the artistic media, as a research of a definition of art, become senseless. However, it is here believed that some achievements accomplished by modernism have been forgotten, and they must be recovered, in order to approach some aspects of the contemporary culture. In fact, a post-media practice: an artistic method based on the constitution of a set of conditions, does not exclude an investigation of media. In other words, a research on the specificity of a medium is possible and desirable, if sustained by a post-media practice (Chierico, 2016). It is here supported the idea that sees the creation of an artistic medium which has the agency to process and unfold the subject of an art practice, including a research on media specificities.

Pursuing its modernistic intents, the concept of “medium specificity” encouraged the research in the materiality of the media deputed to artistic production. Nevertheless, the advent of post-modern theories and neo-avant-gardes of the 1960s in art, replaced and minimized any interest toward materiality, promoting directions concerned about the methods of art practice. Materiality became often considered as an unnecessary aspect for the artistic enquiry and its intents. Since contemporary art does not recognize any privileged artistic media, there is no reason to analyse the specificity of their materials.

With the book: “Six Years: The Dematerialization of the Art Object from 1966 to 1972” Lucy Lippard (1997) reported the directions which are taken by the artistic tendencies of that period. Recognizing the intentions and practices of conceptual art, and some other influencing movements of the 1960's, Lippard stated that the art object become immaterial, or more precisely it is dematerialized. Aware of the fact that this dematerialization does not concerns the disappearance of the physical support of the artwork, she focused in the immaterial nature of the concept-based and practice-based art. (Lippard, 1997 p.5-6). The emergence of practices like the “happenings” and similar performative forms, legitimized the idea that art should not be relegated to the fetishism of its objects, but it can move in the immaterial space of concepts and processes.

The evolution of this trend motivated also the definition “Process Art” and the creation of influential exhibitions like: “Live in Your Head: When Attitudes Become Form (Works – Concepts – Processes – Situations – Information)” curated by Harald Szeemann and “Anti-illusion- Procedures/Materials” curated by Marcia Tucker and James Monte (Disch, 2009). These exhibitions results particularly significant, since they clearly denote a certain concern about the value of processuality in post-media practice, and a specific intent in the enquiry of the materials used in art. At this point it is important to notice that

in the 1960's, the highest moment of the neo-avant-gardes like: Fluxus, Conceptual Art, Gutai, Arte Povera, etc. the materiality is still a relevant argument in art theory and practice.

However, in comparison with the approach supported by modernist theories, there is a fundamental different perspective. These neo-avant-gardes promote an investigation which is emancipated by the material concerns about the artistic media. Because, materiality can be the subject treated by the artistic research, but it cannot be intended as subject for the definition of art. Functionally to this argumentation, it is important to watch back to few artistic examples. These can help us to see how the discussion about materiality was configured, in the period which the birth of neo-avant-gardes, collides with the latest manifestations of modernistic theories.

First of all, in this context it is useful to repropose the example of Jackson Pollock. Attempting an extreme simplification, it is possible to say that the famous works made by “drippings”, were obtained by placing the canvas on the floor, and throwing pure paint above it. This procedure, based on the artist gesture, is seen by Greenberg as deep exploration of the specificities of the pictorial medium. (Krauss, 2000 p. 27-29) A practice which exposes the dimensionality of the canvas and the materiality of paint. However, as we already discussed, according to Krauss, the work of Pollock must be considered as a whole artistic practice, and the choices of his methodology (Krauss, 2000 p. 26). The resulting picture of his gesture, is just a materialization of a process: the most valuable aspect of his work.

Explaining her idea of “Post-medium condition”, Rosalind Krauss relates, among others, Pollock, Richard Serra, and Structural Film movement. From our prospective it is now relevant to underline that all these practices, which span from the 1940's until the 1970's, have as common ground, a conscious manipulation and emphasis on materials. Similarly to Pollock, the video artist and sculptor Richard Serra, with his “splashes” proposed a practice based on gesture. Pouring liquid metal in the exhibition space, in a way to compose various kind of unmodeled shapes, Serra exposes the materiality of metal, as result of his action. Accordingly to Krauss: “Serra experienced and articulated the medium in which he saw himself to be working as aggregative and thus distinct from the material properties of a merely physical objectlike support; and, nonetheless, he viewed himself as modernist” (Krauss p. 27).

The artistic research of Serra moved also in the territories of the earlier experiences of video art, reiterating the approach he expressed with his “sculptures”. His video works are often associated to the research of Structural

Film. This artistic movement, emerged from experimental cinema, deeply enquired the technical nature of cinema. The works inspired by Structural Film were concerned about the various elements which composed the cinematic illusion. The physicality of film, the cinematographer, lens, and the language of montage, were all subjects of this movement. In fact, part of Structural Film, was named Materialist Film (Gidal, 1978 p. 2-3), in order to represent its specific interest in expressing the materiality of the medium. This approach perpetuate the modernistic interest in reaching the purity of medium, acknowledging its materials. In this sense Peter Gidal clarify the anti-illusory concern behind these practices:

“The dialectic of the film is established in that space of tension between materialist flatness, grain, light, movement, and the supposed reality that is represented. Consequently a continual attempt to destroy the illusion is necessary. In Structural/ Materialist film, the in/film (not in/frame) and film/viewer material relations, and the relations of the film's structure, are primary to any representational content” (Gidal, 1978 p. 1).

However, even if Structural Film demonstrates a modernistic flavour, according to Rosalind Krauss it never accommodates the concept of “medium specificity”. Because its intent of exposing the technology behind cinematographic medium, took into account the context and the situation in which the audience was involved. It considered the apparatus and the fiction it produces, as a whole thing. Accordingly to Krauss, there must be a signifying layer, between the simple object, and the reception of its properties: this is where artistic practice must unfold (Krauss 2000 p. 25-6).

3. Post-digital: a meeting point between New Media Art and contemporary art

Previously we saw that the development of the neo-avant-gardes, even conserving some concerns about materials, led toward conceptions of immateriality of the art object (Lippard, 1997 p.5-6), and mainly, they prefigure the immateriality/processuality as artistic medium. Moreover, it is important to notice that in recent times all the media of our contemporary production, moved increasingly toward very radical changes. The same concept that regards the dematerialization of the art object follows the same process of dematerialization that regards artefacts, technologies, economic value, and many other cultural aspects.

3.1. The immaterial value in art and culture

In contemporary art the most emblematic example about immateriality can be observed in the practice of Tino Sehgal, an artist who has background in economics and dance. Similarly to the experiences of Situationist International, and the “happenings” proposed by Fluxus, this artist constructs ephemeral “situations” in which the spectator is actively involved. As well as a movie director, he instructs some performers to act precise scripts, giving an authentic and unique experience to the audience. Excluding the contents and specific meanings of his works, for our concerns, the most interesting aspects of his practice, are the uncommon “strategies” which he uses to promote, sell, and communicate his art. First of all, he forbids any kind of video recording and photographic documentation of his works. Secondly, he just sells his works with verbal contracts, in the presence of a notary. In practical sense, he refuses to leave any physical, material trace of his activity, selling his idea and the right to enact it, according to specific requirements.³

The works of Sehgal manifest a clear rejection of the art object, thus, his statement is strictly bound to a research of the immaterial value. His aversion toward the excess of materials and materiality is perfectly expressed by Sehgal with the following statement: “I felt like our generation has a real issue: There’s all this material, these things which we might not really need, which may even be harmful, but we don’t know what else to do because we have to make them to generate an income” (Sehgal in Stein 2009).

It is possible to speculate that the practice of Sehgal seems to be influenced by his background in economics. The running process of financialization of economy, is based on a proceeding dematerialization of assets and their value (Marazzi, 2014 pp. 167-70). It is not a case that one of the most relevant events, enacted by neoliberal politics, was an act of disengagement of the value from a material. The so-called Nixon Shock: the abolishment of the international agreement that tied the exchange rate of a currency to gold stocks, opened an era in which the value became irrespective of materials. More precisely, we should not conceive this process as a disappearance of materials, but as a conversion of specific materials, to the materials of symbols. This is what Joshua Simon defined as Neo-Materialism (Simon, 2011).

Symbols are the basic units of language, and the basic units of computational logic of binary systems, which are constituted by various hidden forms of materiality. From this perspective it is possible to see more correctly the process of digitalization of cultural production. It is not a progressive

³ For instance, with the intent to avoid that his pieces can be seen as theatrical events, he does not allow to exhibit his works for less than six weeks. (Stein, 2009).

dematerialization of media and contents, but a translation from certain kind of materialities to the materiality of symbols; the physic phenomena which drive them, and the materiality of the devices that support their activity. As found by Jean-François Blanchette (2011 pp. 1042), the rise and spread of digital technologies in the last decades, brought several influential theoreticians to agree in the supposed immateriality of digital and its manifestations. In this way the digital, the software, become conceived as immaterial substance, a soul which animates computational devices. The idea of cyberspace, appeared first in the novel *Neuromancer* by William Gibson (1986), is a clear example of this conception of immateriality, and of an imaginative and non-physical space.

Digital can be seen as “the medium” par excellence, as element which substitute the materiality and the specificities of all media, with the physics of electrons, and the logic of mathematics. According to Peter Weibel the digital essence of computational systems, reduce the common base of all media in a unique substance. In this sense, the ubiquity of digital media determined the advent of what he called “post-media condition”: the fact that any medium is essentially indistinguishable, consequently “all art is post-media art” (Weibel 2012). However, this vision reiterate the logic of an art defined and classified by the media used for its production. In order to avoid any confusion in the reading of this whole argumentation, from this point, it is necessary to entertain a point of view which consider media in their connotation of information vehicle and support, instead then deputed tools of artistic production.

3.2. Post-Internet as proliferation of digital materialities and imaginaries

According to what we saw in the previous chapter, the theories about contemporary art practice in one side, and the idea of a supposed immateriality of digital artefacts in the other side, provoked a large gap. A misconception of the possibilities of an art practice that reflects upon a materiality, rejecting the modernistic idea of artistic media, yet interested in media of communication and technologies.

Nowadays the traditional institutions of art are increasing their attention toward the arguments that belongs to the tradition of New Media Art. For instance, this is the case of new tendencies defined as “post-digital art” and “post-internet art”. As found by Christiane Paul, the emphasis on immateriality of digital is fading out, in favor of new artistic sensibilities which acknowledge and propose the technological discussion in the material world. In this sense, it is possible to state that concepts like “post-digital” and “post-internet”, express a fundamental role in the argument that concerns art and materiality in post-

media practice. In fact, proposing her notion of “neomateriality”⁴, Christiane Paul states that: “The terms [post-digital] attempt to describe a condition of artworks and “objects” that are conceptually and physically shaped by the Internet and digital processes – taking their language for granted – yet manifest in the material form of objects such as paintings, sculptures, or photographs” (Paul, 2015 pp. 1).

This tendency sees New Media Art projects moving from monitor-based representations, to more common forms of objectuality. It is here believed that this is a response of experimental practices which needs to accommodate the necessities and languages of contemporary art system. The artistic media of the modernist dream become ironically the instruments that materialize a post-media practice based on digital subjects. This give us a practical example of a contemporary art practice which research the specificity of a medium, irrespectively of the instruments it uses. The aspect just mentioned, is clearly shared by the intentions behind post-internet art.

Accordingly to the art critic Gene McHugh: “No matter what your deal was/is as an artist, you had/have to deal with the Internet - not necessarily as a medium in the sense of formal aesthetics (glitch art, .gifs, etc), but as a distribution platform, a machine for altering and re-channeling work” (McHugh, 2011 pp. 6). Post-internet art is a definition which focuses on materialization of Internet phenomena, that proposes forms of dialogical relation between the physical space and the proliferation of digital contents, including the imaginary they unfold. Several pioneers of New Media Art, expressed a certain interest about these topics, since long period. Nowadays the maturation of this kind of practice, which bridges the gap between New Media Art and contemporary art, seems to acquire special relevance.

Cory Arcangel, is an American artist which mixes pop culture and digital media. Usually known for his appropriations and modifications of video-games, he made a large variety of works. Some of these can be used as example for express the idea of post-digital and post-internet. In particular his series “Photoshop Gradient Demonstrations”, is formed by colourful and large carpets that cover the exhibition space, which reproduce customized gradient tool of the software Photoshop. The long names of the works that compose this series, describe in detail the procedure that create that specific gradient.⁵

⁴ The term “neomateriality” by Christiane Paul (2015) should not be confused with the term “Neo-Materialism by Joshua Simon (2011).

⁵ Cory Arcangel, “Photoshop Gradient Demonstrations”
<http://www.coryarcangel.com/things-i-made/2014-152-photoshop-cs>

The artist Elisa Giardina Papa, with the installation “Brush Stroke” (Fig. 1) , places an iconic representation of image editing, inside the exhibition space. Shaped like a brush stroke, this work reproduces the typical texture used by image editing software, to symbolize transparency.⁶



Figure 1. Elisa Giardina Papa, "Brush Stroke", 2012. Digital print on laser cut PVC. Courtesy of the artist.



Figure 2. Eva and Franco Mattes, "Internet image search result for "guest"", 2014. Print on lamp, book, pillowcase, mug. Postmasters Gallery. Collection of Alain Servais.. Courtesy of the artist, photo by Jason Mandella.

The series “Image Search Result” (Fig. 2) by net art pioneers Eva and Franco Mattes, consists in custom prints made on various objects by online services. The pictures come from a research result of specific keywords on search

⁶ Elisa Giardina Papa, “Brush Stroke”
<http://www.elisagiardinapapa.com/EGPbrushstroke.html>

engines. Once printed, these objects are directly shipped by the producer to where the exhibition take place.⁷

“Wrapped terracotta neck-amphora (storage jar)” (Fig. 3) is a work made in 2014 by Clement Valla. It consists in a 3D scan of an ancient Greek amphora, which texture is printed on fabric, and used to wrap a physical reproduction of the same shape of the amphora.⁸



Figure 3. Clement Valla, "Wrapped terracotta neck-amphora (storage jar)", 2014. Inkjet on belgian linen over CNC milled foam sculptures. XPO Gallery. Courtesy of the artist.

“Abstract Browsing” (Fig. 4), a series of tapestries made by Rafaël Rozendaal, are representations of graphic structures of web sites scanned on the net.

⁷ Eva and Franco Mattes, “Image Search Result” <http://0100101110101101.org/image-search-result/>

⁸ Clement Valla, “Wrapped terracotta neck-amphora (storage jar)” <http://clementvalla.com/work/wrapped-terracotta-neck-amphora-storage-jar/>

Generated with a browser plug-in made by the artist, this project relates web interfaces with the tradition of abstract painting.⁹



*Figure 4. Rafaël Rozendaal, "15 05 11 Pinterest", 2015. Jacquard weaving
. Courtesy of the artist.*

The examples here exposed, demonstrate various attempts to connect the reflections over technological culture with the languages and expectations of contemporary art. In the same time, these approaches manifest a functional dialogue between the researches of New Media Art, and the post-media practices promoted by contemporary art. According to the artist Artie Vierkant, New Media Art is too often concerned about working with the specificities of novel technologies, forgetting to account the cultural shifts that they provoke. In his opinion, the practice behind concept-based art is concentrated in the “methods of disseminating the artwork as idea, image, context, or instruction” (Vierkant, 2010 p. 3). With this argumentation, he states that post-internet art place itself in the middle of these two approaches, underlining that: “Post-Internet objects and images are developed with concern to their particular materiality as well as their vast variety of methods of presentation and dissemination” (Vierkant, 2010 p. 3).

The discussion about materiality assumes a central role in determining the differences and touching points among New Media Art and contemporary art practice. For this reason, it is considered necessary to acknowledge several implications that connect materiality to current cultural production, and its related speculations.

⁹ Rafaël Rozendaal, “Abstract Browsing” <http://www.newrafael.com/abstract-browsing-at-steve-turner-los-angeles/>

4. Media materiality for digital ontology and its politics

The understanding of materiality in modernism, neo-avant-gardes and post-internet reveals slightly different perspectives that must be acknowledged. To sum up, we saw that modernism account materiality as element for searching the specificities of artistic media. Neo-avant-gardes, coming from the theoretical background of modernism, maintain a deep interest in enquiry materiality. However, abandoning the traditional artistic media, their activity focused on the methodologies of post-media practice. In this sense, materiality become a pure subject of the artistic research, emancipating itself from the necessity of expressing the specificities of the medium it shapes. Post-internet and post-digital art, perpetuate the achievements of neo-avant-gardes, thus, post-media practice, and it proposes a double concern about materiality. In one side, several works of this artistic approach presents a physical representation of digital objects and processes. In the other side, they express and criticize the materiality of digital, questioning its ontologies.

4.1. The materials of media/objects

With the intent of relate digital to its materialities, at this point, it is important to acknowledge two different perspectives. First of all, digital is an element which can be considered as an “object”, with its wide meaning. Differently, it can be seen as “medium”, in terms of communicational properties and as voluntary or involuntary vehicle of information. According to the point of view that come to be privileged, a theoretical speculation which involves digital artefacts, should be based on this generic understanding: media can be seen as objects and objects can be seen as media. The former prospective is determined by a design theory evoked by media studies. In the other hand, the last concept emerges when media studies are evoked by design theory.

Commonly, digital is considered as an attribute of “media” and of their communicative connotations, but it is important to underline that when we refer to them, we should also take into account their objectual nature. Conversely, objects have embedded communicational properties that must be taken into account. With his research on media materiality, Jussi Parikka bases his recent theories in a similar assumption. In his opinion: “media is not merely about mediation but involves issues of technologies of knowledge, as well as for example recently, the infrastructures in which media become understood as objects” (Parikka and Richterich, 2015, p. 220). However, an understanding of media in general sense, and digital materiality, is not an argument that exclusively belongs to design theory and media studies.

Nowadays, the rise of Object Oriented Ontology in philosophy, and the consequent rise of New Materialism in several other disciplines, brought new attention toward materiality, and the study of the object/thing as active agent. This “material turn”, which affected art as well as humanities and social sciences, proposes a non-anthropocentric outlook, which has the ability to express political forms that inhabit the objects (Mukerji, 2015 pp. 1-2). For this reason, an enquiry of media materiality, of the digital itself and its devices, is necessary to acknowledge a large part of the cultural processes of our contemporaneity. In fact, according to Bill Brown:

“one can imagine some ideal materialism that displays the multiple orders of materiality — or the order of materialities — between a phenomenological account of the interface between user and technology, an archaeological account of the physical infrastructure of the medium, and a sociological account of the cultural and economic forces that continue to shape both the technology itself and our interactions with it” (Brown, 2010 pp. 59-60).

From this point we can envision the ethical/political potentials that relate the production of media objects and its economical necessities. Media materiality can be used as an instrument that helps to reveal the invisible power relations in the production and consumption of artefacts. Following this approach that acknowledges media materiality, Jussi Parikka proposes that: “we need to be able to find concepts that help the nonhuman elements contributing to capitalism to become more visible, grasped, and understood as part of surplus creation as well as the related practices of exploitation” (Parikka 2015 p. 20).

4.2. Digital materiality for digital ontology

Media materiality should not be seen exclusively in reference to the physicality of computational devices. Another specific mode to address this argument, regards more directly the recognition of the materiality of digital, in order to find its ontology. This discussion must acknowledge the media analysis proposed by Friedrich Kittler, who stressed out the material essence of media, according to the basic principle that every act of communication has its physical phenomenology. Kittler underlines that even handwriting, conserve the footprints of the action determined by the bodily engagement with the materiality of pen and paper (Kittler, 1990 pp. 83-4). It is not a casuality that for juridical or investigative purpose of finding “truths”, the forensic analysis takes into account all these material aspects of media, in the production of their contents. According to the previous example, we can consider, for instance, the handwriting forensic.

Recognizing the importance of this methodology, Matthew Kirschenbaum proposes to assume a “forensic imagination” for understand and analyses digital. According to his theories, the forensic analysis used to find traces of digital presence in computational systems, exposes the deep material nature of digital, which unfold in form of electric impulses, in the grooves of optical disks or in magnetic recordings, etc. (Kirschenbaum, 2008 pp. 2-3). This view suggests to renegotiate the supposed immateriality of digital. Certainly, the flexibility of digital derives from its logical computability, but this should not hide its dependence on physics. Accordingly, “the foundation of a digital ontology linked to a belief that mathematical code storage is equal to itself, is a truth that is based on identity irrespective of material embodiment” (Drucker, 2001 p. 143).

The understanding of digital as immaterial substance, imposes a specific ontology, which determines the emergence of certain issues. As defined by Johanna Drucker: “Ontologies are ideologies, through and through, as naming, ordering, and parameterizing are interpretative acts that enact their view of knowledge, reality, and experience and give it form” (Drucker, 2013). The fluidity of digital allows producers, to build any kind of ontology and meaning embedded into the objects. This is done in order to support the ideologies/visions of the industries, by producing signifiers as products.

5. Conclusions

This paper presented a series of aspects that belongs to an ongoing research that bridges past and current artistic methodologies, stressing out the role of New Media Art in the contemporaneity. Following this intent, materiality is seen as emerging concern for cultural studies, which cross two fundamental points. First of all, we saw that, from different points of view, art has often demonstrates a certain interest in materiality. This gave us the possibility to see how diversified approaches on this topic, manifested diverse methods and expectations, highlighting the issues that opposes modernism and post-media practice.

Secondly, materiality indicates a path to explore the ontology of digital from both artistic and theoretical perspectives. It has been acknowledged that digital can be considered as abstract and immaterial, recognizing its computational mathematical essence. However, digital is fundamentally constituted by material and physical elements (electric impulses, magnetic or optical recordings), thus it is subject to the its physical constraints, and the physical constraints of the devices that process it.

In this context, the ontology of digital is not just a philosophical speculation, but a central argument to reach the ground zero, where are built the hidden meanings and intents of digital artefacts. In this sense, with a sort of reverse engineering, is possible to discover the politics embedded in these objects, and the ideologies diffused in the cultural production. In other words, digital ontology and media materiality can help us to explore the political and hierarchical displacement of power, in physical and unphysical infrastructures.

Every system has its own hidden infrastructure, that materializes forms of control. Adam Rothstein clarified this aspect arguing that: “vision is power, and infrastructure is built for and by a world that believes in this philosophy: its image is carefully controlled and constructed, and the capacity for watching and being watched becomes its own infrastructure” (Rothstein, 2015). Accordingly to Rothstein, artists and theoreticians should criticize and expose the hidden nature of systems, in order to achieve a more comprehensive understanding of our society. “The efforts of researchers and artists to discover what is going on with our infrastructure is not about commanding god-like powers, but about speaking with the spirits, wherever they chose to haunt us” (Rothstein, 2015). Recognizing the digital as the most pervasive infrastructure that animates the current cultural production, seems necessary to enquiry its nature and the imaginaries that it displace in our contemporaneity.

References

- Blanchette, Jean-François (2011). A material history of bits. *Journal of the American Society for Information Science and Technology*. Volume 62, Issue 6, pages 1042–1057, June 2011.
- Brown, Bill (2010). Materiality. In Mitchell, William John Thomas (Eds.). *Critical Terms for Media Studies*. Chicago: The University of Chicago Press.
- Chierico, Alessio (2016). Medium Specificity in Post-Media Practice. *VIRUS, [E-]Journal*, no. 12 (July 2016).
http://www.nomads.usp.br/virus/_virus12/?sec=4&item=6&lang=en.
- Cubitt, Sean; Thomas, Paul (2013). Introduction: The New Materialism in Media Art History. In Cubitt, Sean; Thomas, Paul. *Relive: Media Art Histories*, pp. 1–22. Cambridge: MIT Press.
- Disch, Maddalena (2009). Process Art e arte povera. In Poli, Francesco (eds.). *Arte Contemporanea. Le ricerche internazionali dalla fine degli anni '50 a oggi*. Milano: Electra. pp. 122-49.
- Drucker, Johanna (2001). Digital Ontologies: The Ideality of Form in/and Code Storage: Or: Can Graphesis Challenge Mathesis?. *Leonardo, Journal of Arts, Sciences and Technology* Vol. 34, Issue 2, pp 141-145.
- Drucker, Johanna (2013). Performative Materiality and Theoretical Approaches to Interface. *Digital Humanities Quarterly*, Volume 7, Number 1. Alliance of Digital Humanities Organizations.
<http://www.digitalhumanities.org/dhq/vol/7/1/000143/000143.html> - accessed on 06/08/2016.
- Gibson, William (1986). *Neuromancer.*, New York: Ace Books.
- Gidal, Peter (1978). *Structural Film Anthology*. London: Bfi.

- Greenberg, Clement (1984). *The Crisis of the Easel Picture*. In *Art and Culture: Critical Essays*. Boston: Beacon Press. pp. 154-57.
- Greenberg, Clement (1985). *Towards a Newer Laocoön*. In Frascina, Francis (Eds.). *Pollock and After: The Critical Debate*. First published in: *Partisan Review*, July-August 1940.
- Harman, Graham (2014). *Art Without Relations*. *Art Review*, September.
http://artreview.com/features/september_2014_graham_harman_relations/ - accessed on 08/08/2016.
- Kirschenbaum, Matthew (2008). *Mechanisms: New Media and the Forensic Imagination*. Cambridge: MIT Press.
- Kittler, Friedrich Adolf (1990). *Discourse Networks, 1800/1900*. Stanford: Stanford University Press.
- Krauss, Rosalind (2000). *A Voyage on the North Sea*, in *Art in the Age of the Post-Medium Condition*. London: Thames & Hudson.
- Lippard, Lucy (1997). *Six Years: The Dematerialization of the Art Object from 1966 to 1972*. Reprint edition. Berkeley: University of California Press.
- Manovich, Lev (1996). *The Death of Computer Art*. Rhizome, 23 October 1996.
<https://rhizome.org/community/41703/>. - accessed on 19/07/2016.
- Marazzi, Christian (2014). *Sulla natura linguistica della moneta*. In Pasquinelli, Matteo. *Gli algoritmi del capitale: accelerazionismo, macchine della conoscenza e autonomia del comune*. Verona: Ombre corte. pp. 158–83.
- McHugh, Gene (2011). *Post Internet. Notes on the Internet and art*. 12.29.09>09.05.10. Brescia: Link Editions.
- Mometti, Diego (2009). *Pratiche artistiche in rete*. In Poli, Francesco (eds.). *Arte Contemporanea. Le ricerche internazionali dalla fine degli anni '50 a oggi*. Milano: Electra. pp. 348–64.
- Mukerji, Chandra (2015). *The Material Turn*. In Scott, Robert; Kosslyn, Stephen Michael. *Emerging Trends in the Social and Behavioral Sciences: An Interdisciplinary, Searchable, and Linkable Resource*. John Wiley & Sons, Hoboken.
- Parikka, Jussi (2015). *A Geology of Media*. *Electronic Mediations*, Volume 46, University of Minnesota Press.
- Parikka, Jussi; Richterich, Annika (2015). *A Geology Of Media And A New Materialism*. *Digital Culture & Society*. Volume 1, Issue 1, Pages 213–226, October 2015.
- Paul, Christiane (2015). *From Immateriality to Neomateriality: Art and the Conditions of Digital Materiality*. In *proceedings of ISEA International Symposium on Electronic Art 2015*, Vancouver.
- Rothstein, Adam (2015). *How to See Infrastructure: A Guide for Seven Billion Primates*. Rhizome. - <http://rhizome.org/editorial/2015/jul/2/how-see-infrastructure-guide-seven-billion-primate/> - Accessed on 10/08/2015.
- Simon, Joshua (2011). 'Neo-Materialism, Part Two: The Unreadymade'. *E-Flux Journal*, no. 23 (March 2011). <http://www.e-flux.com/journal/neo-materialism-part-two-the-unreadymade/>.
- Stein, Danielle (2009). *Tino Sehgal*. *W Magazine*, November 2009.
http://www.wmagazine.com/culture/art-and-design/2009/11/tino_sehgal/. - accessed 17/07/2016.
- Vierkant, Artie (2010). *The Image Object Post-Internet*.
http://jstchillin.org/artic/pdf/The_Image_Object_Post-Internet_a4.pdf.
- Weibel, Peter (2006). *The Post-media Condition*, in: AA. VV. (Ed.), *Postmedia Condition Catalogue*. Centro Cultural Conde Duque, Madrid. Retrieved from Mute,
<http://www.metamute.org/editorial/lab/post-media-condition> - accessed on 13/05/2016.

About the author

Alessio Chierico is an artist with theoretical background in contemporary art, design theory and media studies, graduated at Interface Culture department of Kunstuniversität Linz. He was visiting student at IAMAS in Ogaki (JP) and former student at NABA in Milan, and at the art academies of Carrara and Urbino (IT). In the last ten years of activity he had more than sixty exhibitions in: New York (US), Zagreb (HR), Tehran (IR), Linz (AT), Tartu (EE), Lisbon (PT), Augsburg, Munich (DE), Rome, Milan, Venice, Turin, Bologna (IT), Bucharest (RO), Trbovlje (SI), Paris (FR), among others.

OPTICKS, space travel and visual moonbounce

Daniela de Paulis

Abstract

OPTICKS is an art project realized by visual artist Daniela de Paulis in collaboration with the CAMRAS radio amateur association based at the Dwingeloo radio telescope in The Netherlands. The project is presented as a live audio-visual performance during which digital images are transmitted as radio signals to the Moon and back, using a radio station in Brazil, the UK, Switzerland or Poland as sending station and the Dwingeloo radio telescope as receiver. Each performance of OPTICKS includes a live audio-visual presentation with the artist and the radio amateurs team, streamed live from the Dwingeloo radio telescope. Each performance is also marked by the audience participation, people virtually attending the show in fact are invited to submit images to be moonbounced live. The project uses Visual Moonbounce, an innovative application of the Moonbounce technology, developed by Daniela de Paulis in collaboration with CAMRAS during her residency at the Dwingeloo radio telescope.

In 1946 humankind touched another celestial body for the first time in history by means of radio waves during the first Moonbounce contact. Moonbounce - also called Earth-Moon-Earth or EME – was developed after WWII by the US Navy as a reliable form of voice communication that was not affected by the terrestrial atmosphere. EME was replaced in the 1960s by the deployment of artificial satellites. Visual Moonbounce and OPTICKS are a contemporary take on the technology. They aim at making Space Travel available to all by transporting images to the Moon and back.

The project has been shown at many public events, it is also a recurring programme of Global Astronomy Month, a yearly international event created and coordinated by Astronomers Without Borders.

Keywords

Radio Astronomy, Art, Amateur Radio, Live, Performance, Moonbounce.

1. Introduction

The history of the Moonbounce technology (also called Earth-Moon-Earth or EME) can be traced back to the early 1940s, when Mr W.J. Bray of the British General Post Office proposed using the Moon as a passive satellite for communications. 'It was calculated that with the available microwave transmission powers and low noise receivers, it would be possible to beam microwave signals up from Earth and reflect off the Moon. It was thought that at least one voice channel would be possible'. [1]

The Moonbounce technology however was initially developed by the United States Military Navy, shortly after WWII, 'with the first successful reception of

echoes off the Moon being carried out at Fort Monmouth, New Jersey, on 10 January 1946 by John H. DeWitt. [2]

'On 24 July 1954, James H. Trexler, an engineer in the Radio Countermeasures Branch at the Naval Research Laboratory (NRL), spoke carefully into a microphone at the laboratory's Stump Neck radio antenna facility in Maryland. Two and a half seconds later, his words speeded back to him at Stump Neck, after traveling 500,000 miles via an Earth-Moon circuit.

For the first time ever, the sound of a human voice had been transmitted beyond the ionosphere and returned to Earth'. [3]

This experiment was part of the Navy's Communication Moon Relay project, whose aim was developing a reliable form of global communication, not affected by the vagaries of ionospheric propagation. Before the deployment of artificial satellites such a reliable communication technology was revolutionary and deemed as a necessary tool for the national security. The US Navy in fact intended to use EME to detect radio signals from the Eastern block as well as for sending signals to allies avoiding the interference of the terrestrial atmosphere.

The Communication Moon Relay system 'was inaugurated publicly on 28 January 1960. As part of the inaugural ceremonies, pictures of the aircraft carrier U.S.S Hancock were beamed from Honolulu to Washington via the Communication Moon Relay system. The transmitted facsimile featured thousands of Hancock officers and seamen spelling out 'Moon Relay' to a worldwide audience'. [4]

This was the first time an image travelled to the Moon and back, however the system required was extremely complex, in fact it 'operated at frequencies around 400 megahertz, it could accommodate up to sixteen teleprinter channels operating at the rate of sixty words per minute, and it was capable of processing teletype and photographic facsimiles' [5].

During the 1950s, Moonbounce started attracting the interest of non-military commercial users, with the first radio amateur detection of signals from the Moon taking place in 1953.

The Moonbounce technology was replaced in the late 60s by the deployment of artificial satellites. Despite being short lived, EME proved to be highly influential in the development of both artificial satellites and radio astronomy.



Fig. 1: Facsimile picture of the USS Hancock with ship officers and crew spelling out 'Moon Relay'. This picture was transmitted via the Moon from Honolulu, Hawaii, to Washington, DC on 28 January 1960 (courtesy of US Navy, NASA)[6]

Used as an espionage tool by the US Navy to spy over the Soviet Union and Eastern Europe, Moonbounce played an important role in the Cold War and in the Space Race. EME can be considered the first form of Space travel, for which human kind touched another celestial body for the first time by means of radio waves.

2. Moonbounce and Art

Despite its short and controversial life as a military two way communication system, the Moonbounce technology is still currently used by radio amateurs and artists alike.

Several remarkable art works have been created using Moonbounce. In 1987 American composer Pauline Oliveros performed her sound piece 'Echoes from the Moon', collaborating with ham radio operators Dave Olean in Maine and Mark Gummer in Syracuse, New York. During the performance Oliveros sent the sounds of her accordion from a microphone to a phone line, receiving the echoes back from the Moon after approximately two and a half seconds. She also involved the audience, people used to queue in her events and 'seemed to get a big kick out of hearing their voices return processed by the Moon' [7] Oliveros performed 'Echoes from the Moon' several times up till recent years, always generating great enthusiasm in the audience.

In 2007 British artist Katie Paterson used Moonbounce in her sound installation 'Earth-Moon-Earth', for which she sent to the Moon and back, with the help of a group of radio amateurs in the UK, Beethoven's 'Moonlight Sonata' converted into Morse code. The moonbounced sounds were then converted back into notes and played by an automated piano in the exhibition space [8].

3. Visual Moonbounce

In 1972, NASA astronaut and lunar module pilot Charles Duke, left his family portrait picture on the Moon during the Apollo 16 mission. The image, wrapped in a transparent sheet, has been there for the last forty years.



Fig. 2: Charles Duke's family on the Moon's surface (courtesy: NASA)

Inspired by the image of this portrait laying on the Moon's surface, I started thinking of the possibilities of 'virtual travel', both onto the Moon and into outer space. The Moonbounce technology's artistic potential seemed to conceptually accommodate this possibility. My imagination was also triggered by the possibility of 'seeing' the traces of the 768.000 Kilometres journey to the Moon and back. What if Moonbounce could communicate *visually* this cosmic journey?

'During a research period in The Netherlands in October 2009, I got in touch with the CAMRAS team (C.A. Muller Radio Astronomie Station) at the Dwingeloo radio telescope in The Netherlands, with a proposal for an artistic project involving a live visual communication with the Moon using images and sound.

Coincidentally, contacting the CAMRAS team at the Dwingeloo radio telescope was the most appropriate option. The Dwingeloo radio telescope is not only able to receive good enough quality pictures from the Moon, thanks to its 25 metres diameter and additional technical features, but was also open to this artistic collaboration.' [9] Furthermore up till the present the Dwingeloo radio telescope is the only antenna in the world able to receive images via Moonbounce.



Fig. 3: The Dwingeloo radio telescope in The Netherlands. Inaugurated in 1956, the dish measures 25 metres diameter (courtesy of CAMRAS)



Fig. 4: Daniela de Paulis with the CAMRAS team at the Dwingeloo radio telescope [10]

Besides the early experiments with Moonbounce carried out with images by the US Navy – resulting in the successful reception of the B/W image shown in the previous paragraph – further experiments by radio enthusiasts presumably followed throughout the 1970s and 80s with no successful results. When CAMRAS and I started using Moonbounce with images in 2009, our experiments opened up a new application of the technology that I now call Visual Moonbounce (VM), meaning visual communication via the Moon.

Immediately after our initial contact, aware of the challenging task to be undertaken, CAMRAS radio operator Jan van Muijlwijk, 'started experimenting with possibilities of moonbouncing images using the MMSS'TV (Makoto Mori Slow Scan Television) software. The very first test was carried out on 6 December 2009 when Jan sent to the moon the portrait of his 3 metres dish in the back garden of his house. The signal was received by the Dwingeloo dish. In Jan's words: 'We were thinking about asking some big dish stations to do a test with us, but on 6 December 2009 I was at home while the Dwingeloo dish was also on the air [...] so I thought why not do a first SSTV try myself! I phoned Dwingeloo to suggest that I could send an SSTV signal, and so I did [...] Later on 26 February 2010, we successfully exchanged pictures with Daniel Gautchi in Switzerland and the first two way EME SSTV contact was made'. [11]



Fig. 5: First image to be moonbounced to Dwingeloo radio telescope: Jan van Muijlwijk's 3 m dish [12]

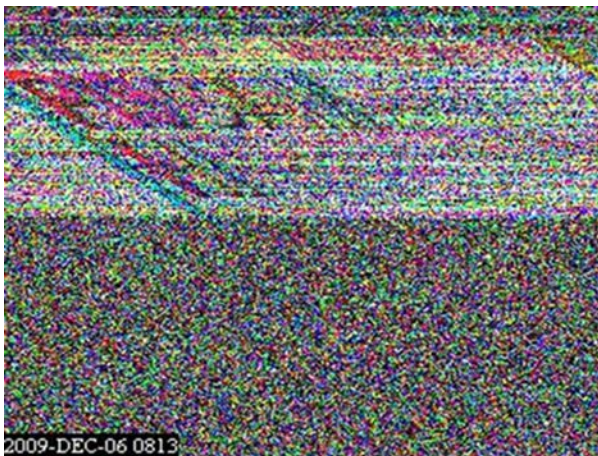


Fig. 6: The result of the first experiment, 6 December 2009 [13]

'The result of this first experiment was very promising, although the original image was not recognizable at this point. Several attempts followed until the moonbounced images started becoming more and more clear.

'The noise showing in any moonbounced image is what makes it interesting and evocative of the long journey to the Moon and back. In fact the radio signals containing the information of the image become weaker while travelling the long distance. This is one of the causes for the distortion of the original colours and shapes in the image, other causes being the poor reflective qualities of the Moon's surface, the Doppler shift and the lunar libration, amongst others'. [14]

'During transmission the MMSS'TV software converts the colours and pixels of the image into sounds that are then converted into radio waves; these are sent to the Moon and after bouncing off they are received by the Dwingeloo radio telescope, converted into sounds and then back into image using the same software. The sounds produced by each moonbounced image are unique to that image; in fact no two moonbounced images will ever be alike due to the continuously changing astronomical conditions'. [15]

One of my favourite moonbounced images is the portrait of Apollo 11 astronauts, I always show this picture in my presentations as it is symbolic of what Visual Moonbounce communicates. As mentioned in the previous chapter, Moonbounce can be considered the first form of Space travel and the picture of the first men to land on the Moon is possibly the best visual representation of this technology. When an image travels to the Moon and back the distortion of the radio waves leaves on the image the signs of the long

journey, thus the moonbounced image becomes the visual and long lasting memory of the virtual journey into outer Space.



Fig. 7: One of the first images ever to be moonbounced on SSTV (courtesy of NASA)[16]

3. OPTICKS

When the technology of moonbouncing images using the MMSSTV was fully tested by Jan, the CAMRAS team and some international collaborators – Bruce Hálász in Brazil, Daniel Gautchi in Switzerland and Howard Ling in the UK – I started working on ideas for using Visual Moonbounce within a live performance. I called the project 'OPTICKS', the name being inspired by the 1704 essay by Isaac Newton on the reflections, refractions, inflections and colours of light.

'During the first performances of OPTICKS in fact I used to moonbounce monochrome images of the seven colours of the light spectrum. In general however the title aims at suggesting the phenomenon of reflection and refraction of the radio waves by the Moon's surface, through a poetic and philosophical link between Moonbounce and the light spectrum'. [17]

OPTICKS is a live audio-visual performance between the Earth and the Moon during which digital images are sent to the Moon and back in real time and projected at an exhibition space while this happens.

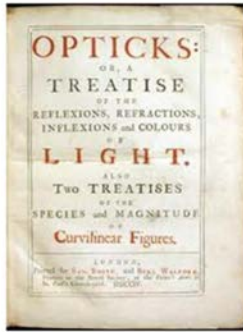


Fig. 8: book cover of 'OPTICKS', the pivotal essay written by Newton in 1704 (courtesy of Wikimedia Commons)

During the OPTICKS live show, each image takes approximately sixty seconds to become fully visible after returning from the Moon, gradually appearing line by line on the projection screen, as if generated by a scanner.

Indeed, the MMSSTV software that we use in Visual Moonbounce, is the contemporary, digitalized version of the Slow Scan TV (SSTV), a picture transmission method developed in the 1950s and used in Space Exploration missions and in the early stage of the NASA Apollo programme. 'The Apollo Tv cameras used SSTV to transmit images from inside the Apollo7, Apollo 8 and Apollo 9, as well as the Apollo 11 Lunar Module television from the Moon. SSTV was also used to transmit images of the far side of the Moon from the Soviet Space probe Luna 3. [...]. The early SSTV systems used by NASA however differ significantly from the SSTV systems currently in use by amateur radio enthusiasts today'. [18]

'The first performance of OPTICKS took place on 30 October 2010 at 01:00 UTC at Extrapool, an experimental art venue in Nijmegen in The Netherlands. Images of the seven colours of the spectrum were sent by Howard Ling in the UK to the Moon, received by Jan at the Dwingeloo radio telescope and projected in real time at the location'. [21]

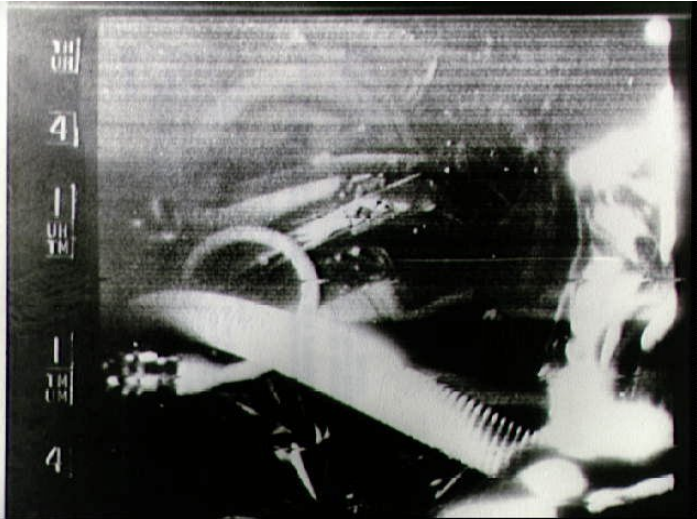


Fig. 9: Astronaut Gordon Cooper, SSTV broadcast from 'Faith 7' (courtesy of NASA JSC) [19]



Fig. 10: NASA slow scan image from the Moon (courtesy of NASA)[20]



Fig. 11: the title OPTICKS received by Moonbounce

During this show, a sound score especially composed for OPTICKS was played live by Spanish composer Enrique Tomas. Enrique composed a seven minutes score, especially tailored for the EME technology, in which each minute corresponds to a musical note. The sounds were pre-moonbounced and incorporated in the live show.

The idea of having a sound score was also inspired by the Newton's essay. The great scientist in fact believed in the hidden connection between the musical notes, the seven days of the week, the seven colours of the light spectrum and the seven celestial bodies known in his time. 'Newton constructed the colour music disc dividing the spectrum into the seven colours [...] to be fitted in between the eight notes of an octave. The colour music disc in OPTICKS analogizes music to colour, just as its prototypes (of Plato, Ptolemy and Kepler) had connected music to planets and other qualities'. [22]

Enrique, an experienced sound artist, enthusiastically took the challenge of composing sounds for Moonbounce, and this is how he describes his experience: 'The specifications of the project, with a maximum length of each piece of 72 seconds, a reduced spectrum between 400 and 2800 Hz and a monaural playback were an important constraint. Also I took into account the fact that my audios will be distorted due to the transmission through the atmosphere, the vacuum space and the reflection on the surface of the Moon'. [23]

This structure of the OPTICKS performance was used a few more times, including the show at the Amsterdam Planetarium in November 2010. The project however changes continuously so to be always different and unpredictable. Occasionally new collaborators join in. American sound designer Marty Quinn for example collaborated in one of the performances by 'sonifying' the pixels and the shapes of the moonbounced images using 'Design Rhythmics Sonification Research' methods that he previously developed as part of the NASA interactive exhibit known as 'Walk on the Sun'. [24]

After the first few live events I started using different types of images, some inspired by a particular topic, others submitted by the public attending the live event. Also I replaced the sound score with a verbal interaction with the audience, talking and answering questions.

'During the show it is possible to hear in the background the sounds produced by the MMSSTV while the images return from the Moon. Because each colour corresponds to a unique tone in the software, the connection between colours and sounds suggested by Newton is intrinsic to the MMSSTV software.

During each live performance, Jan and the CAMRAS team appear in a video call and answer questions from the audience. Usually, after moonbouncing four or five images a pause is needed, in fact the power amplifiers and coax cables become very hot and need to cool down to avoid burning. Every OPTICKS event is a bit of an adventure, and we always experienced some technical problems either before or even during the live event. The problems are sometimes caused by a slow Internet connection (the images in fact are received live at any location thanks to a remote desktop control software); or at other times there are problems due to high winds at one of the locations involved, or other technical failures at one of the stations.' [25]

Jan, Howard, Bruce and I presented OPTICKS many times already, always with the enthusiastic response of the audience. During one of the OPTICKS performances at Museon in The Hague (NL), images related to the history of Moonbounce and Space travel were moonbounced. The selection included the B/W picture spelling 'Moon Relay' that first travelled to the Moon in 1960 and the iconic cover image of the Voyager Golden Record showing instructions on how to decode the information contained in the phonograph records. These and all other moonbounced images, converted into radio waves, are still travelling into the Cosmos at the speed of Light, after being reflected by the Moon's surface and being scattered all around the outer space.

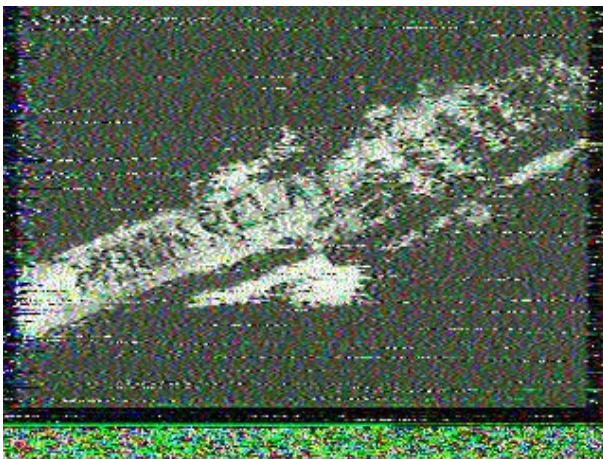


Fig. 12: the iconic image spelling 'Moon Relay' first moonbounced in 1960, as received by Moonbounce on SSTV during a performance of OPTICKS in 2012 (courtesy of Naval Research Laboratory)

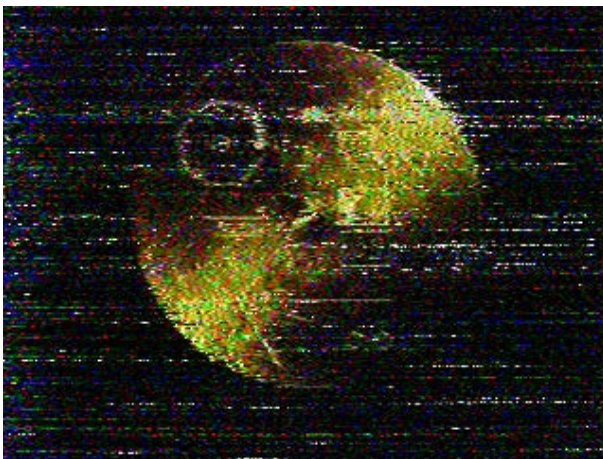


Fig 13: the image of the Golden Record's cover, moonbounced during a performance of OPTICKS in 2012 (courtesy of NASA/JPL)

One of my favourite performances was presented in April 2012, in collaboration with RAI Radio 2 programme 'Rai 'Tunes', directed by Italian DJ Alessio Bertallot. The programme can be followed both on the radio and on the web where it is possible to see the video related to the event. The images submitted by the radio listeners, including some iconic images from popular

culture, such as Pink Floyd's 'The Dark Side of the Moon' album cover, were sent to the Moon by Howard in the UK and received by Jan at Dwingeloo radio telescope while some classical and pop music tunes accompanied the event. A short recording of this performance can be viewed on YouTube. [26]

One of the most interesting performances of OPTICKS so far was presented as part of Global Astronomy Month (GAM) 2012 in collaboration with Astronomers Without Borders (AWB) [27].

'For this occasion CAMRAS collaborated with Prof. Lech Mankiewicz, together with radio operators from ARISS Polska: Armand Budzianowski, Andrzej Matuszny, Jacek Masłowski and Paweł Matuszny. The Polish team in a few weeks upgraded their equipment in order to participate in the live Visual Moonbounce event scheduled for the 28 April 2012 at 18:00 UTC. [...] The OPTICKS live performance for GAM 2012 was presented live from the Dwingeloo radio telescope: inside the cabin, CAMRAS radio amateurs Dick Harms, Theo Dekkers, Eene de Weerd, together with Jan, radio astronomer Roy Smits and myself, presented the event on Ustream for an international audience, moonbouncing images submitted by people of all ages and from all around the world. During the live event the Moonbounce activities were temporarily paused for transmitting the image of the Dwingeloo radio telescope followed by images of the primary colours (Red, Yellow, Blue) to a star called Upsilon Andromedae, 44 light years away. The Dwingeloo antenna rotated to track the star – together with the cabin and all of us inside – in front of the astonished audience following the event on the web. Upsilon Andromedae is believed to be hosting four planets, one of which, we hope, will receive the images in 2056 (centenary of the Dwingeloo radio telescope official opening) and perhaps it may respond sometime in 2100.

After the performance for GAM2012 I printed the moonbounced images and sent them back as cards to the people from all over the world who submitted them, together with my message certifying the authenticity of the journey to the Moon and back.' [28]

A certificate from both the CAMRAS and the Polish team has also been created to accompany the pictures. Some of the recipients of these images wrote back to me with a 'thanks' message, saying how much they appreciated the experience of being 'astronauts', even if only virtually. For further recordings and information on the GAM2012 event, see [29–32].

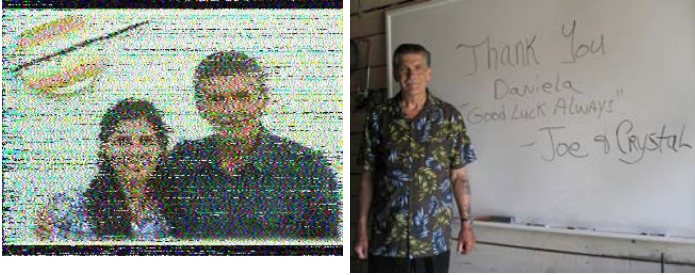


Fig. 14: the portrait of Crystal and Joe Smith, moonbounced during OPTICKS for Global Astronomy Month 2012 (left) Fig. 15: a special thanks from Joe and Crystal for their journey to the Moon and back (right)

As part of GAM 2012 I also presented a B/W video called 'le Voyage dans la Lune' (2011-2012), whose title is inspired by the homonymous French movie, made by George Méliès in 1902 and considered the first Science Fiction film in history [33]. Similarly, Moonbounce can be considered the first form of Space travel that allowed humankind to 'touch' another celestial body, by means of radio waves.

My version of 'le Voyage dans la Lune' is composed by 26 images of the lunar phases taken by Michael Oates (Manchester Astronomical Society) who kindly offered them for the project. [34]

The 26 images have been moonbounced from Brazil to Dwingeloo in September 2011. I joined the moonbounced images together into a moving sequence and added the sound which has been provided by JAXA (Japan Aerospace Exploration Agency). The sound is called 'Moonbell' and uses laser altimeter data from one of the sensors of the lunar orbiting satellite Selene/Kaguya, transforming the altitude data into musical intervals [35].

The area I chose to 'sonify' is on the far side of the Moon, starting at the Korolev crater and continuing across the Highest Point. I used a very slow version of the sound in order to suggest the rhythmic steps of someone walking on the Moon.



Fig. 16: one of the 26 moonbounced images used for 'le Voyage dans la Lune' (courtesy of Michael Oates, Manchester Astronomical Society)

The most recent work I realized using the Visual Moonbounce technology is an installation called 'Moon Relay' composed by seven images, each one projected in large size so to emphasize the pixelled and distorted quality of the photos. The images represent some of the nuclear explosions that took place during the Cold War era, including Nagasaki and Bikini. With this work I refer to the dark side of Moonbounce and its pivotal role during the Cold War and the Space Race.

In April 2015, as part of a recent live event, presented in collaboration with Astronomers Without Borders, we reflected off the Moon the historic family portrait left on the Moon's surface by astronaut Charles Duke during the Apollo 16 mission in 1972, the very same portrait that inspired me the Visual Moonbounce technology. It is feasible to think that the portrait might be completely bleached out by now because of the Sun's radiations hitting the Moon. Charles Duke agreed in sending me a digital scanned copy of the original photo which was sent to the Moon once again, this time returning back to Earth. I printed the Moon reflected image, signed it and sent it as postcard to Charles Duke himself who wrote: 'I think it is remarkable that you can do this'. Here below you can see the result.



Fig. 17: Charles Duke's family portrait before and after Moonbounce (courtesy of Charles Duke)

4. The Future

The future of Visual Moonbounce is looking interesting. The video 'le Voyage dans la Lune' is my very first attempt to use Moonbounce with moving images. However Jan, Armand and I have been discussing possibilities to moonbounce short films in a near future.

Besides my current experiments using video clips and holographic rendering of moonbounced images, Jan, Bruce, Howard and Armand are also developing ways to receive pictures with higher definition, as suggested by Dutch astronaut André Kuipers's moonbounced portrait below.

Recently NASA engaged in a very interesting experiment: beaming the image of the Mona Lisa painting to the Lunar Reconnaissance Orbiter (LRO) at the Moon, using laser technology.

"This is the first time anyone has achieved one-way laser communication at planetary distances," says LOLA's (Lunar Orbiter Laser Altimeter) principal investigator, David Smith of the Massachusetts Institute of Technology.



Fig. 18: this portrait of André Kuipers is the best definition image received so far by Moonbounce on SSTV (courtesy of NASA/ESA) [36]

"In the near future, this type of simple laser communication might serve as a backup for the radio communication that satellites use. In the more distant future, it may allow communication at higher data rates than present radio links can provide. [...] Precise timing was the key to transmitting the image. [...] Each pixel was transmitted by a laser pulse. [...] Turbulence in Earth's atmosphere introduced transmission errors even when the sky was clear. To overcome these effects, Goddard scientists employed Reed-Solomon coding, which is the same type of error-correction code commonly used in CDs and DVDs. [...] This pathfinding achievement sets the stage for the Lunar Laser Communications Demonstration (LLCD), a high data rate laser-communication demonstrations that will be a central feature of NASA's next Moon mission, the Lunar Atmosphere and Dust Environment Explorer (LADEE)," says Goddard's Richard Vondrak, the LRO deputy project scientist.' [37]

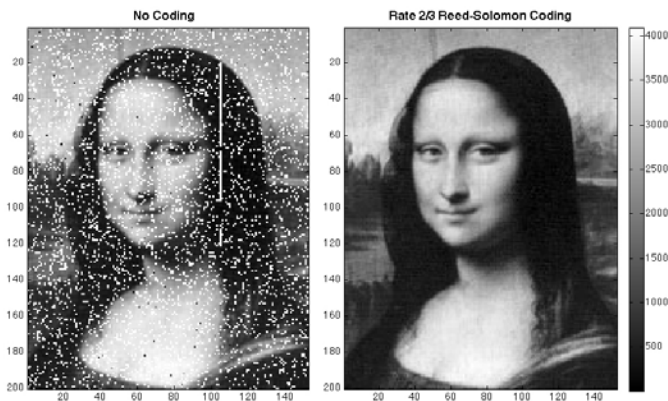


Fig. 19: 'NASA Goddard scientists transmitted an image of the Mona Lisa from Earth to the Lunar Reconnaissance Orbiter at the moon by piggybacking on laser pulses that routinely track the spacecraft.' [38] Credit: NASA's Goddard Space Flight Center

There is an interesting coincidence between the NASA experiment and the OPTICKS project, despite the different technologies used, laser and radio. Back in December 2012 in fact, my collaborators Jan, Howard and I moonbounced the image of the Mona Lisa painting during one of the OPTICKS live performances. In Jan's enthusiastic words: 'On one of those occasions the Mona Lisa was sent to the moon by a radio amateur in England, reflected by the moon and the very faint reflected radio signals were received by the big dish in Dwingeloo. And although the attenuation during the Moonbounce process is 1.000.000.000.000.000.000.000.000.000.000.000 times it was possible to reconstruct the image of the Mona Lisa using that very weak signal. [...] Another remarkable thing is that NASA used Reed Solomon forward error coding to eliminate the distortion the laser beam encountered on its long journey. This technique is used in digital CDs and DVDs but also on many other digital transfer protocols, for instance mobile phones.

But it is also used by EMEers!

Joe Taylor, radio amateur and Nobel Prize winning radio astronomer, created special software to push the boundaries of decoding very weak signals. This software has an advantage of about a factor 10 on a very well trained and skilled Morse code operator. Joe uses the same Reed Solomon code in his software tool.'

And again, in Jan's words, with reference to the NASA experiment: 'It was the first time laser was used to send data over such a big distance. The experiment was a success so laser can be used to transmit data. This creates an alternative

for using radio waves. Communicating via laser might even become the standard in future, who knows....!.

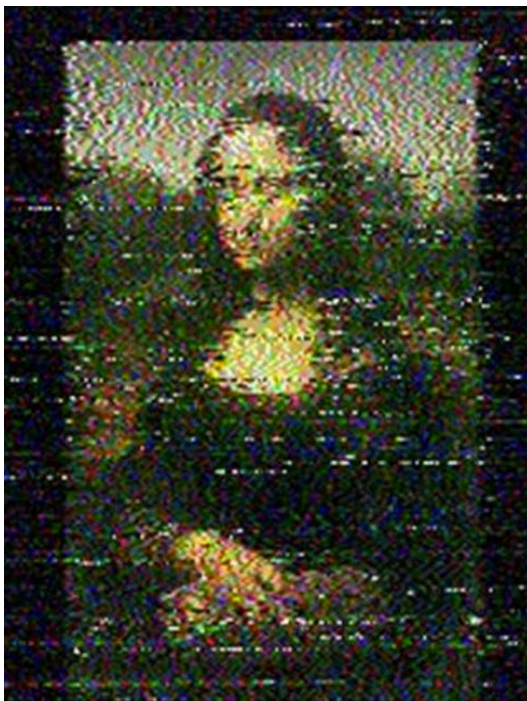


Fig. 20: Mona Lisa moonbounced during a live performance of OPTICKS in December 2012

5. Conclusion

Experimenting is an important process for artists and scientists alike. Something that started as a playful experiment for an art project might lead to many interesting pioneering ideas in this fascinating technology called Moonbounce, and even beyond that. In a not so distant future we might be able to do Venusbounce or Marsbounce, making Space travel available to all, by means of radio waves or even laser. Being a small part of this adventure is for me an amazing experience.

6. Acknowledgements

I will never be grateful enough to the CAMRAS team, Jan, Daniel, Bruce, Howard, Armand, Klodzka EME group and ARISS Polska for helping me making 'visible' the journey to the Moon and back.

Thanks to André van Es and Ard Hartsuijker for their continuous support, thanks to Prof. Michael Garrett, ASTRON and CAMRAS for making the Dwingeloo radio telescope available to my artistic research.

Thanks to Mike Simmons and Thilina Heenatigala and to all Astronomers Without Borders for offering me the possibility to regularly present my work during Global Astronomy Month.

A very special thanks to Jan van Muijlwijk and Marjan Pierhagen for their continuous support and mentoring throughout my artistic research and for the review of this paper.

Thanks to all participants in the OPTICKS performances for enriching my work with their images and thoughts.



Fig. 21: (left) Bruce Hálász's dish in Brazil. Fig. 22: Daniel Gauthi's dish in Switzerland (right)



Fig. 23: ARISS Polska radio stations in Poland

References and footnotes

1. [http://en.wikipedia.org/wiki/EME_\(communications\)](http://en.wikipedia.org/wiki/EME_(communications))
2. Ibid.
3. <http://history.nasa.gov/SP-4217/ch2.htm>
4. Ibid.
5. Gebhard, Evolution of Naval Radio-Electronics, pp. 117-18
6. Daniela de Paulis, (2012) Visual Moonbounce: Videos and Images in Moonbounce Technology, EME 2012 conference, Cambridge (UK)
7. Pauline Oliveros, 'Notes on Echoes from the Moon'
8. <http://www.contemporaryartsociety.org/become-a-member/artist-member/katie-paterson/398>
9. Daniela de Paulis, (2012) Visual Moonbounce: Videos and Images in Moonbounce Technology, EME 2012 conference, Cambridge (UK)
10. Ibid., page 101
11. Ibid., page 102
12. Ibid., page 102
13. Ibid., page 102
14. Ibid., page 102
15. Ibid., page 103
16. Ibid., page 103
17. Ibid., page 104
18. http://en.wikipedia.org/wiki/Slow-scan_television
19. <http://images.jsc.nasa.gov/luceneweb/caption.jsp?photoId=S63-07856>
20. <http://www.hq.nasa.gov/alsj/a11/video11.html>
21. Daniela de Paulis, Visual Moonbounce: Videos and Images in Moonbounce Technology, 2012, EME 2012 conference catalogue, Cambridge (UK)
22. Niels Hutchison, (2004) Colour Music: Music for Measure
23. http://www.opticks.info/blog/?page_id=155
24. http://www.opticks.info/blog/?page_id=155
25. Daniela de Paulis, (2012) Visual Moonbounce: Videos and Images in Moonbounce Technology, EME 2012 conference, Cambridge (UK)
26. <http://www.youtube.com/watch?v=s92ILgFuOs>
27. <http://www.astronomerswithoutborders.org/gam2012/all-programs/1071-opticks-2012.html>
28. Daniela de Paulis, (2012) Visual Moonbounce: Videos and Images in Moonbounce Technology, EME 2012 conference, Cambridge (UK)
29. A recording of the OPTICKS performance for GAM 2012 (unfortunately the first ten minutes are missing): <http://www.ustream.tv/channel/opticks2012>
30. Also a video made by Armand about the GAM 2012 event can be viewed here: <http://www.youtube.com/watch?v=-6-a8ygDKrA>
31. Results of the ongoing experiments on SSTV are often published by CAMRAS in the weekly bulletin: <http://www.camras.nl/>
32. Updates and further information on the OPTICKS project can be found here: www.opticks.info
33. link to the original film 'Le Voyage dans la Lune' by George Méliès <http://www.youtube.com/watch?v=cE9mUdwq2dU>
34. 'le Voyage dans la Lune' the moonbounced version by Daniela de Paulis <https://vimeo.com/41287703>

35. Moonbell: Listening to the Topography of the Moon:
http://wms.selene.darts.isas.jaxa.jp/selene_sok/about_en.html
36. Daniela de Paulis, (2012) Visual Moonbounce: Videos and Images in Moonbounce Technology, EME 2012 conference, Cambridge (UK)
37. http://www.nasa.gov/mission_pages/LRO/news/mona-lisa.html
38. http://www.nasa.gov/mission_pages/LRO/news/mona-lisa.html

About the author

Daniela de Paulis is an interdisciplinary artist based in The Netherlands. She exhibits internationally, often collaborating with other artists, scientists and radio amateurs. She holds a BA from the Academy of Fine Arts in Rome, Italy, and a Master Degree in Media Arts from Plymouth University, UK. Since October 2009 she is the first artist in residence at the Dwingeloo radio telescope and ASTRON (www.astron.nl) where she developed, together with the CAMRAS and the ASTRON team, a technology called Visual Moonbounce. She is currently a guest researcher at ASCA (Amsterdam School for Cultural Analysis), University of Amsterdam, developing her research on Interstellar Transmissions. Since 2010 she has been collaborating with the international collective Astronomers Without Borders (AWB), as the founder and director of the AstroArts programme. In 2013 she founded Cabine Voltaire, a pioneering online, collaborative platform for live debates on science, technology and the humanities. She is currently working on a new project called 'COGITO' for which she is collaborating with the Overview Institute (<http://www.overviewinstitute.org/>), as well as neuroscientists and philosophers. She is a reviewer for the Leonardo MIT Journal and the EVA (Electronic Visualization in the Arts) London conference, as well as a regular contributor for Astronomers Without Borders and www.astroblogs.nl amongst others. She has published her work with the Leonardo MIT Journal, Inderscience, Acta Astronautica and Cambridge University Press. She is a member of the international SETI (Search for Extraterrestrial Intelligence) committee as the speaker for SETI and culture. More information on her work can be found on www.opticks.info and www.danieladepaulis.com

Patterns of materiality/immateriality: dialectics in epistemology under the new scientific paradigm

Gabriel Pareyon

Abstract

This is a philosophical study on epistemics, informatics and the new scientific paradigm for defining *intelligence*. Its first section deals with the dialectics materiality/immateriality and exposes a critic on Cartesianism. A second section introduces an *analogical* (proportional) hypothesis of carbon as a topological pre-condition for the emergence of symbolic complexity, with relevant consequences for the research on natural language and semiotics. The concept of *intersemiotic synecdoche* is used for defining knowledge and intelligence by a network of epistemic, multidimensional proportionalities (from carbon topology to the rising of *cultural synecchism* directly related to intersubjectivity) associated to analogical thought; however *synexis*, here described as a “fourth dimension” of semiotics, comprises analogy as its (classical) subset.

Keywords

Synexis, synecchism, organic epistemics, reflexive epistemics, knowledge self-similarity

1. Introduction (semiotic landmark)

The ubiquity of the notions *pattern* and *matter* in modern science, is far from being trivial; it rather stresses how close our societies are from pre-scientific times, and how they do depend on the evolution of *basic intuition* in human species (for a critical view on this, see Quine, 1969). Whether “pattern” involves intuitions of *repetition* and *texture*, “matter” does construct a bond between the *knowing-on* and the *being-known*. The “matter” is thus a stage of reflexive epistemics, since *we are matter knowing matter*, especially including matter that constitutes *ourselves*. Complementarily, the “pattern” is a concept related to the steps of *matter knowing matter*, as the reflexive and rhythmic performance of epistemics.

The rhythms in the processes of *knowing-on* and *being-known* consist of combinations and proportions of cognitive steps. From this approach, knowledge results from a recurrent system of selection, preservation and retrieval of information, where these three operations may be of *accumulative* character; but also —something much more relevant to epistemics— they can be of *transformational* character, since they perform recursions where any retrieval of information can be employed for an upgraded selective process, and so forth, in different cognitive layers. This re-employment of information through distinct, simultaneous rhythms and stages of knowledge, makes possible what cognitive science describes as *intelligence*: the rhythmic coordination of a synchronised, self-articulated autonomous wholeness.

Despite its closeness, this wholeness performs enough *porosity* to exchange and transform information within a context: an ecologic and social environment where knowledge is negotiated among individuals and groups of individuals. This quality of knowledge as negotiation is defined as “intersubjectivity”.

The *knowing-on* and *being-known* processing cannot be explained as two fully distinct, independent behaviours, but as two aspects of the same reflexive systematisation. Thus, the “feeling of *knowing-on*”, e.g. a sensation of understanding something under the guidance of intuition, can be at the same time a feeling of *being-known*, especially when the involved knowledge is necessarily related to the construction of matter and patterns “basic” for self-understanding. This reflexive feature importantly participates in cyclical “self-correctness” of individual and collective thought, and has a synecdochic parallel in the evolution of organisms, where self-correctness equals to contextual evolutionary adaptation. The influence of this feature over knowledge processes and its epistemic correlations are developed in the present study as *organic epistemics*.

Under the influence of Hegelian epistemology, Peircean semiotics describes the *steps of matter knowing*, typically as trichotomies. In Peirce’s own words (my italics): “*firstly*, according as the sign in itself is a mere quality [...] *secondly*, according as the relation of the sign to its object consists in the sign’s having [...] some existential relation to that object, or in its relation to an interpretant; *thirdly*, according as its Interpretant represents it as a sign of possibility or as a sign of fact or a sign of reason” (CP 2.243). Of course, in this case, “the sign” is not the *matter itself*, but its qualia. The nature of the difference between the ontology and its perceived and appreciated qualities has been discussed along history of philosophy; here we may summarise the Peircean trichotomy to this difference, in terms of *matter*, *pattern* and *intersemiotic synecdoche*, as explained below.

If, for a first instance, “a sign in itself is a mere quality”, its related *matter* is indeed the matrix of necessary references for the ontologies (i.e. the objects connected to their signs). Besides, the *pattern* is nothing else but the “proportional shape” (a Gestalt) of this matrix, determining its function; although the latter process is a second step, as Peirce notices. Finally, the feedback between these matters and patterns has its *meaningful output* (i.e. never a tautology) on what the Euclidian tradition identified as *analogism* or an infinite system of proportionalities (as logical matrix, the optimal field for abstract intelligence).

We should remark, in this context, that abstract analogism in the history of Euclidian tradition —up to the Newtonian Principles, at least— can also be read as organic epistemics: mind constructions useful because of their structural correlation with the brain’s chemical and electrical patterns directly participating in the human architecture of reality (even, or especially imaginary). Then we are able to interpret the so called Euclidian tradition —as well as other abstract traditions based on the analogic mind— as structuralist anthropology interprets mythologies from different epochs, cultures and regions of the world, in terms of conceptual truths. This does not mean that we can reduce Euclidianism to a myth; on the contrary, this notion allows us to scrutinise the nature of mathematical thought as a *cultural truth* (for an introduction to this topic, see Knorr-Cetina, 1999).

Since Euclidian analogism is useful to start this discussion on epistemics, let us continue to employ Euclidian principles in order to discuss the basic intuitions of geometry based on the idea of proportion. Accordingly, the typical form of a proportion is classically represented as $a:b, b:c$ (since the tautology $a:a$ is too redundant); then we have a second simple form $a:b:c, b:c:a$, which actually is a variation and extension of the first case. We may proceed endlessly employing extensions of this model, without any remarkable issue beyond classical, formal logic. However, when we proceed from the logical formal pattern, to the qualia pattern (perception, Gestalt association, form and texture feelings), strict proportionality may become pointless. This is the most basic difference between analogy and synecdoche: while the first one depends on precise proportion, the second one is an open set of fuzzy qualia oriented by an undetermined proportionality.¹ Then we have two different, yet collaborative systems of proportion since analogy is to abstract-logical processing (left cerebral hemisphere), what synecdoche is to intuitive-emotional processing (right cerebral hemisphere). Both are mind devices whose collaboration is essential not only for the basic tasks for pattern measurement, comparison, simplification and representation, but also for adaptive and creative mental skills achieved as mixtures of *flexible* and *rigid* measurement.

We may associate the subjective notions of *flexibility* (or *fuzziness*) to synecdoche, and *rigidness* (or *sharpness*) to analogy. Thus, synecdochic thought allows the relationship between “roughly determined” patterns, a feature ungraspable to pure analogy. *Intersemiotic synecdoche* even allows us to connect

¹ For the present theorisation I take the concept of *metonymy* as a semantic and logical minor subset of synecdoche. In fact, this conceptualisation can be traced up to the rhetorical oldest Latin tradition, in contrast to recent interpretations. For a more in-detail explanation on this subject, see Meyer, 1993 & Nerlich, 2010.

vague aspects, although somehow perceived or felt, among different perceptual categories, however preserving a hierarchical relationship. By contrast, synecdoche does not accept logical tautology and especially analogic tautology (*a:a*) because precise equality is never felt or intuitively perceived, but only in an ideal, logical form.

A classic logical example of synecdoche is the proposition that holds a whole by its part (*toto pro pars*) or that inverts this relation (*pars pro toto*). This is nothing new to our introduction, since we may connect the concept “whole by its part” as a “*matter* by its *pattern*”; and, as happens with elementary abstract operations, we may invert the relation “*pattern* by its *matter*” without any loss. But something new arises here when we arrive to a Peircean thirdness, trespassing logic through transversal qualia: then the *pars* may belong to a logically determined set, but also to an undetermined, categorically different set (*toto*). Moreover, this association can be altered obtaining very different interpretations within an *intersemiotic nebula*, useful as a system of symbolic hierarchies, from the most specific to the most abstract texture of signs. This relationship between specific and abstract semiosis articulates complex meaning through synecdochic elaborations.

Many cases of *intersemiotic synecdoche* are suggested by Étienne Souriau’s (1892–1979) *La correspondance des arts* (1947); but here we may generalise this concept, not only for the arts, but for any pattern within a semiotic world, somehow connected to another pattern within a different semiotic world.

Commonly, mind patterns evolve in figurality that preserves or provides direction to the *world as hierarchical wholeness* (the feeling of reality as a unified, coherent wholeness). In this fashion, this multi-semantic, multi-layered self-constructed Gestalt operates as a centralised feeling giving rise to the illusion of the time-space continuum inhabited and plotted by societies (centres, concentrations) and individuals (as centres of centres related to a context). Then we may say that, in its more advanced organisation, long range *intersemiotic synecdoche* is a cognitive continuum expressed as time-space: the existential domain for our ontologies and their patterns.

Souriau’s cases of *intersemiotic synecdoche* are rather limited to the Greek notion of *ekphrasis* (literally “to say something from outside”, i.e. from a symbolic domain different to a source domain). However, as expressive mechanism, *ekphrasis* is mostly constrained to a descriptive purpose; therefore it is a subset of the *intersemiotic synecdoche*, which more than “expressive” or “descriptive” is rhizomatic and *metadescriptive*, functioning like a high level semiosis.

The concept of *intersemiotic synecdoche* also refers to a multidimensional crisscrossing of systems of semes, syntaxes and pragmatics, with the transformation of the steps *pars pro toto* and *toto pro pars* through patterns of signs and interpretants. From the view of linguistic topology, we may talk of a *fourth dimension of language*²(namely the dimensions are 1-semantics, 2-syntax, 3-pragmatics, 4-synexis), because of the special way *intersemiotic synecdoche* connects signs among semiotic worlds, from the simplest meaning and representation (*seme*), to emerging symbolic *complex realities*: the space of heuristics and hermeneutics where “high intelligence” and “creativity” manifest.

1.1. Symbolic grounds of physics

Physics and chemistry are models of analogic systematic thought, whose theories are demonstrable thanks to universal isotropy and proportionality. In few words, both disciplines, physics and chemistry, can be summarised as “proportional sciences” based on *general laws of proportions*. A striking feature of this analogic modelling is that such *general laws* (involving thermodynamics and information theory) are valid and necessary for the investigation of *knowing-on* and *being-known* processing in both fields of epistemics and neurology. Then physics and chemistry are —like biology— reflexive, self-referential human elaborations. By comparable reasons, mentioned laws of proportions are traceable in semiotics and linguistics, including former rhetoric. But, although the *general laws of proportions* equally affect physics and linguistics, analytic tradition in Western cultures clearly separates *scientific worlds* (“disciplines”) for the sake of exhaustive classification of human knowledge. Whether this method may result adequate for an encyclopaedia organised like a Porphyrian-tree, it would be useless for semiotics and organic epistemics.

From the viewpoint of cognitive science, emphatically including physical anthropology, the most prominent symbolic structures of the mind would have a physiological connection and correspondence, proportionally analogous to the connection and correspondence between signs and significant. Then the descriptive and preceptive features of physics and chemistry should correspond not particularly to an empirical given case, but in general to the mind processes synecdochically attached to the *laws of proportions*, necessarily reflected on both *being-known* and *knowing-on* processes.

Given that *intersemiotic synecdoche* connects systems of signs belonging to different cognitive domains, it also makes possible to assemble intersemiotic

² A concept first put forward by semiotician Georg Klaus (1912–1974), with emphasis in cybernetics, although not exactly to this depth and without the concept of “synexis” here proposed.

environments where sign systems weave perceived realities and subjective qualia from different sources. The feeling of universal wholeness as feature of cognitive individuation produces the illusion of homogeneous semiosis. However, reality and intersubjectivity are indeed composed by a hierarchical arrangement —a synecdochic harmonisation— among multiple kinds of signs. The periodic self-adjustment of this “semiotic harmony” gives rise to self-critical intersubjectivity and the development of knowledge as cultural transformation, including *reality expansion* as the possibility of experiential continuous enrichment.

Since organised, self-critical intersubjectivity is the main framework for the natural sciences, we may trace the influence of intersubjectivity over classical physics and the elaboration of reality, including description, measurement and formalisation of feelings such as time or space immersed in synecdochic intersemiosis.

The relationship between time and space may be cognitively summarised as a pattern degree of matter, or matter as degree of a pattern, not logically or geometrically concatenated, but epistemologically intertwined and coordinated by a synecdochic plot. Our sense of reality is due to a transversal synechism. This is why Peirce attempted to capture these ideas within his philosophical title “Immortality in the Light of Synechism” (1893), alluding the *time-space continuum*, rather as a cognitive-epistemic self-referentiality, than as a physical absolute (and then liquidating positivism). In other words, the discourse of physics is mainly constructed by the systematic identification of matrices and patterns interpreted as a symbolic correspondence with reality, but emphatically because this proportional correspondence analogously exists in physiology as cognition.

1.2. Remarks about Cartesian immateriality

In the context of Cartesian tradition, including its extension in Berkeley’s immateriality, the physical world can be interpreted as a system of ideas, *immanent* to the human existence. Then the matter and its patterns are supposed to be simple notions in fact determined by a “super-human order”. Immateriality should then be the *highest level* of epistemology, while matter would be an effect of ambiguous phenomenology. The mind structure of this idea is, curiously, also of synecdochic form: the human idea of “super-human order” makes possible a system for mirroring the unknown (the *Matter*, a material wholeness or pure ontology) into a projected, higher level of abstraction (the pattern), where “things make clear sense”, even in a metaphysical order.

Neurologist A. R. Damásio (1994, 2000) stresses how Cartesian rationalism, including its material/immaterial dialectics, was biased by cultural convictions. According to this criticism, there is no scientific basis for the rational, absolute division between *logical* and *emotional nature* in human reality. Although specific brain regions are identified to these different “natures”, they collaborate in order to produce a unified, simultaneous and complex reality; they even transform reality through processes of knowledge and communication. Congruently, Cartesianism and Berkeley’s immateriality are *models of reality* constructed by intersemiotic synecdoche; in this particular case, a *pars pro toto* where the whole is the matter and its parts are abstract patterns.

What is different between Cartesianism and Damásio’s arguments is a physical model and its description, but not the human basic means for modelling and describing. This is why the *intersemiotic synecdoche continuum* provides us with clues about intelligence as selfness: not by its potential infinite variety, but especially by its complexity in spite of uniformity.

2. A specific case: the *carbon hypothesis* of human symbolism

Carbon is a very special material that can be helpful for exploring immateriality. In various “natural” forms, carbon has been part of every-day human life, and has an important role in the evolution of societies, including its major participation in history of farming, cooking, writing and recording. Congruently, carbon has a generalised, common image of tangible and ordinary matter. In contrast, let’s figure out how carbon has another, completely different appreciation as neurological plot, architectural nanostructure, 2D topology (i.e. graphene theorisation), harmonic lattice, or phraseological precondition: we should then admit that carbon is rather “immaterial”, since it cannot be grasped as the first, practical examples. Furthermore, the cultural contents of farming, cooking, writing and recording practices based on carbon properties, are also highly abstract and immaterial. The gap between materiality and immateriality can be thus strongly determined by pragmatics and (inter)subjectivity; and also we see that matter can turn into an abstract pattern (still being carbon). This is possible inasmuch intersemiotic synecdoche employs fuzzy ontologies (symbolic plurality of carbon) connected among them by a Fregean network (fuzzy grammars of carbon).

This is the case of an ontology (carbon) as matter (physical matrix) that may have a symbolic pattern (immaterial), or a pragmatic, even common usage (material). This example is not trivial, since —as explained below— carbon may actually be characterised as the framework for natural language (including music), as well as for the pre-symbolic mind’s self-organisation. This issue is a

relevant topic for the investigation of artificial intelligence, and for a wider definition of intelligence, where matter and pattern synecdochically evolve.

In order to portrait at least a general image of the rhythms of oxygen and carbon in human breathing and their influence in speech, music, gestural language and proxemics, we need to take into account recent literature about human biorhythmic harmony (i.e. physical and physiological dynamic proportionality). In this way, McGuinness & Larson (2004:5) proposes a diversity of tunings —not exactly using this term— of cardiovascular synchronization that behave as a system of harmonic couplings (in a physical sense). As brain oxygenation strongly depends on this synchronization, Large (2010) hypothesizes that Hebbian synaptic plasticity (i.e. the adaptation of neurons in the brain's knowing-on and being-known processes) shares with cardiorespiration the same kind of proportionality. Language would then be an expression of sympathy and coordination of a complex selfness, an articulation of endorhythms and exorhythms oriented by carbon signals at different levels: from organic chemical bonds, to cellular function coordination, and then to cardiorespiration that provides rhythmic assortment of oxygen and hydrogen to the brain and the emerging mind.

2.1. Carbon expressiveness

Let us think of carbon, not uniquely as a theoretical issue of chemistry, neither as an ordinary, simple object, but as a leading thread between the atomic and molecular worlds, determining organic bonds and genetics, and making essential part of us and our cultures and societies. Weather Damásio (1994, 2000) demonstrates how relevant is for physiology and neurology recognising the wholeness of emotional and rational thought, as well as accepting functional continuity between mind and brain, material/immaterial continuity is equally relevant. Summarising this idea in the context of the carbon hypothesis of human symbolism, there should also be a continuity of the matter (with the physical features of carbon) and its patterns, even if the latter are imaginary (with carbon topology as a guide for the mind's self-structuring). Then we may talk of “carbon expressiveness” since the matter is meaningful and eloquent through semiosis, as symbolic patterns emerging.

In a first approach to this complexity, picturable as *intersemiotic*, i.e. multi-domain, multi-layered synechism, we assume that even a text like the present one consists of a pattern of “words” and “spaces” representing human breathing (we should obviously include punctuation marks). By consequence this text —like many others— must be a symbolic mirror of aspects of human cardiorespiration; a self-referential texture synecdochically representing —

among other subtleties—the rhythms of oxygen and carbon related to human language and its implicated physiology.

2.2. Carbon as precondition for *organic epistemics* and semiotics

It is interesting to notice that the first time the term *semiotics* appeared in English within a scientific context, was about 1620 in the field of physiology, as “the branch of medical science relating to the interpretation of symptoms”. This idea directly comes from the Greek ancient medicine, especially from the Hippocratic tradition where *semeiotics* was “the physician’s primary task [in order] to unravel what a symptom stands for” (see Sebeok, 2001:4–5). This “primary task” was prominently of a synecdochic character, since a physician is usually incapable to immediately determine a sickness, but only to approximate a diagnosis interpreting the *toto* (a possible sickness) by its *pars* (the sign or symptom). This synecdochic definition of semiotics is particularly valid in organic epistemics, if we interpret semiotics as an instrument exploring knowledge as a symbolic selfness, and its abstract categories as meaningful categories with a physical, if not psycho-physiological correspondence.

This “organic” approach to semiotics allows us to reinterpret the meaning and function of semiosis as synechism. Let us, for this case, introduce the definition of Meyer (1993:85, abridged in Nerlich, 2010:315): “The category of synecdoche appears to be a rhetorical class of fluctuating extension, a nebula of figures varying around a stable kernel”. There are two possible interpretations of this highly abstract —almost quantic— description of synecdoche: the first one, where we must accept an image of mechanical abstraction, or the second one, where the “nebula of figures” and the “stable kernel” are rather strictly physical intuitions, with specific meaning for epistemics and the biology of mind and brain. This meaning is possible thanks to a proportional relationship bonding our environmental contact and experience (including long-term evolution), with the matter and patterns of the body’s own *knowing-on* and *being-known* processing. From this conception, “we” (societies made of centralised and concentric individuals) *are the communication* between our environment and individual physiology guided by the “stable kernel” that is the feeling and effect of individuation: ontology embedded within the *existential synecdoche* where *myselfness* is the “stable kernel”, and the *ourselvesness* is the “nebula of figures”. In such manner, language simultaneously represents individual subjectivity (related to the symbolic “kernel”) and intersubjectivity (the epistemic environment, “nebula of figures” that makes the kernel meaningful within a specific context). This synecdochic ecology makes also possible a direct proportionality between language and culture.

3. Impact on languages

Semiotically, there is no sufficient reason for setting music, proxemics, and haptic and visual codes utterly apart from language, as they were fully incompatible, uncollaborative sign systems. By contrast, there are good reasons for using and discussing the notion of *natural language* as a comprehensive environment for proxemics, verbal, visual, haptic and musical languages composing a same, whole semiotic reality. This holistic, integrational conception induces the notion of semiosis as an ecosystem with a necessary variety of sources and exchanges (including exo- and endosystems), with species of information coexisting.

A remarkable example of Cartesian scission separating reason and emotion is the classical division between language and music. But ultimately both categories intersect and they share important semiotic structures (at least syntactic hierarchical organisation and pragmatic contextualisation). Arguments may be invoked distinguishing sensory specialisation, cortical brain functions and lateralisation, but at the bottom the analytic separation of languages is forced by an encyclopaedic, dialectic and axiological tradition that disregards the importance of transversal symbolisation and synechism as deep meaning.

Markov levels of statistical order in language equally may characterise speech and musical coherence degrees. This statistical- hierarchical composition crucially has harmonic features (dynamical proportionalities) common to biological levels of self-organisation. Human communication expresses this “harmonicity” through different means and manners, formalised in different traditions. Accordingly, speech, songs and other vocal repertoire reflect body symmetries that also may be visible in dancing metres and steps, aerobic exercise, muscular performance and cardiorespiration. An analogous kind of harmony is clearly present in urban rhythms and noise, economic and social behaviour, socialisation and culture (see Pareyon, 2011).

3.1. Synechism in materials, as a *matter of fact*

Although for moments guided by pragmatics, the above described carbon dichotomy on materiality/immateriality is epistemologically correlated to the particle/wave dual behaviour observed in carbon atomic networks (a typical state dichotomy in graphene lattices interaction). This epistemic modelling has also correspondence in the brain/mind structure, as self-organised holistic systems of self-consistency which coordination does imply an epistemic “nebula”, a network of subsidiary processes that weave the context for cognition.

Statistically, for example in the domain of granular computing, we may characterise the difference between a particle and its wave in terms of *noise*: the real or potential change of state of a particular matter. Let us then pay more

attention to the concept of noise as meaningful pattern directly emerging from the matter.

Along technological evolution, noise has been considered as an idle, if not harmful parasite of information. Although Shannon's theory since its origin admits noise as an amount of information, during the 20th century engineering developments fought hardly to eliminate noise "hindrance" from electric and electronic circuits (this history can be traced from BTL, 1938, to Van der Ziel, 1950; up to Morshed, 2007).

While there are obvious reasons to qualify noise in electronic circuits as a "hindrance" for communication and engineering performance, there is neither sufficient reason to believe that this noise is meaningless or lack of informatic expressiveness. On the contrary, noise of conducting materials (*matter*) is meaningful as a track (*pattern*) of material qualities.

Every single isotope of electrically conducting or isolating element in a computing system does have a specific angular spin frequency, known in physics as Larmor frequency. These frequencies are chaotic in highly unstable systems (e.g. radiation), but they are stable and harmonically ordered in other processes, such as many happening in organic compounds, and especially in carbon based biological systems. In these stable systems, thousands of millions of atoms synchronise their angular spins, composing a massive plot of harmonic bodies identified as *individuals* and *groups of individuals* in relative communication. In this context we may define "communication" as a form and degree of matter/pattern synchronisation, constituting *individuals* and *groups of individuals* as coordinated systems of information (for this concept of synchronisation see Pikovsky *et al.*, 2001).

In biology, as well as in cybernetics and semiotics, the difference between processes of accumulation and coordination is of extreme importance. The crucial moments of evolution in matter and its patterns are not only ruled by scattering and concentration, but particularly by the coordinative rhythms between scattering and concentration. This does mean that the rhythms of matter/pattern consistency should necessarily involve all phenomenology of material/immaterial expressiveness, as such expressiveness is nothing else but the self-interpretation of the matter/pattern consistency.

3.2. Strong or weak dialectics in epistemology?

Since ancient times, philosophy discusses if dialectics is a natural symmetry of universal matter (*strong dialectics*); or rather dialectics is a human heuristic

invention for dealing with a natural asymmetry of universal matter (*weak dialectics*). From the perspective of the present study, both are valid, yet complementary arguments, as their only remarkable difference is the proportionality between the involved (a)symmetries: if the cognitive “kernel” is allocated as the *being-known* centre, then strong dialectics arises; by contrast, if the cognitive “kernel” is allocated as the *knowing-on* centre, then weak dialectics arises.

Hegel writes that “the truth is the whole”, but he recognises that the whole is only graspable not as an absolute, but by its components since “[the] truth is always infinite, and cannot be expressed or presented to consciousness in finite terms” (Hegel, *PM* 81 & *EL*, §28, 62). Under this conditional logic of the absolute, Hegelian thought upholds how synecdoche supports our valid thoughts which, although partial, may reflect existential wholeness. Then the truth is accessible by its part; and the part is knowable by its (contextual) truth. Further beyond, Spinoza postulates that the truth is *geometrically proportional* (*Ethica*, 1677), an idea reelaborated by neurologist Damásio (2000) with the novel introduction of an integrational (a)symmetry of the brain/mind, synecdochically connecting the individual with its species, and the species with ecology.

Conclusions

Mathematically, language depends on analogy as the foundations of geometry and arithmetic in strict logical proportionality. However, in its broadest conception, language rather depends on synecdoche or, more exactly, on intersemiotic synecdoche as a mind continuum configuring the world and its *possible own partial translations*. This holds for individual, social and ecological levels of pre-symbolic and symbolic contact.

Epistemologically, and because mathematics is a subset of human language, analogy is a classical subset of a fuzzy synecdochic universe. This is a semiotic statement that complements the logical postulates of fuzzy logic (Zadeh, 1975, 2002).

The brain/mind dichotomy is a sign, not just of abstract Cartesian analogism, but of qualitative asymmetric and reciprocal relationship. Such reciprocity is in its turn a sign of synechism where the brain’s structure has a continual communication and transformation into another, yet complementary *different world*: the mind. In few words, we may confirm that the relationship between brain and mind is of intersemiotic-synecdochic nature, and this relationship is replicated in communication between mind and body, as well as between the

immateriality and materiality including individual and collective, and collective and ecological synecdochic relationships.

Regarding our physical modelling of empirical and meta-empirical knowledge, we need to reinterpret the deep synecdochic meaning of the ontologies that makes-up our representational world: *matter*, *particle*, *kernel*, on one side, and *pattern*, *wave*, *nebula* are inter-synecdochically associated parts of the same dialectics. Far of being purely abstract, such dialectics does mirror the form how cognition is self-twined and self-plotted. This semiotic view of *organic epistemics*, based on the carbonic hypothesis interpretation of cognition and culture, should contribute to answering the philosophical deeply solipsistic, but also collective question: What does myself make “me”?

Acknowledgements

Je suis très reconnaissant au Professeur Jean-Marc Chomaz, directeur de LadHyX, Paris, qui m’a invité à son laboratoire dans le but de prouver mon hypothèse biologique du carbone sur le symbolisme et le langage humain.

References

- BTL. (1938). *Bell Telephone System Technical Publications: Monograph B*, Technical Library, Bell Telephone Laboratories, Inc. Publication Department, 1077–1117.
- Hegel, G.W.F. (1817). *Encyclopaedia Logic* [EL]. *Enzyklopädie der philosophischen Wissenschaften im Grundrisse*, Heidelberg: Oßwald.
- Hegel, G.W.F. (1807). *Phenomenology of Mind* [PM]. *Phänomenologie des Geistes*, Bamberg & Würzburg: J.A. Goebhardt.
- Damásio, António R. (2000). *The Feeling of What Happens: Body and Emotion in the Making of Consciousness*, New York: Harvest Books.
- Damásio, António R. (1994). *Descartes' Error: Emotion, Reason, and the Human Brain*, New York: Putnam Pub Group.
- Knorr-Cetina, Karin (1999). *Epistemic Cultures: How the Sciences Make Knowledge*, Cambridge, Mass.: Harvard University Press.
- Large, Edward T. (2010). “A Dynamical Systems Approach to Musical Tonality” in (R. Huys & V.K. Jirsa, eds.) *Nonlinear Dynamics in Human Behaviour*, SCI 328, 193–211, Berlin/Heidelberg: Springer-Verlag.
- McGuinness, M., Hong, Y., Galletly, D. & Larsen, P. (2004). “Arnold tongues in human cardiorespiratory systems”, *Chaos*, 14(1), 1–6.
- Meyer, Bernard (1993). *Synecdoches: Étude d'une figure de rhétorique*, v.1, Paris: L'Harmattan.
- Morshed, T. H. (2007). “Measurement and Modeling of 1/f Noise in MOSFET Devices with High-kappa Material as the Gate Dielectric”, Doc. Diss., Arlington: The University of Texas.
- Nerlich, Brigitte (2010). “Synecdoche: A trope, a whole trope, and nothing but a trope?” in (A. Burkhardt & B. Nerlich, eds.) *Tropical Truth(s): The Epistemology of Metaphor and other Tropes*, Berlin: De Gruyter.
- Pareyon, G. (2011). *On Musical Self-Similarity: Intersemiosis as Synecdoche and Analogy*, Imatra: Acta Semiotica Fennica, ISI.
- Pareyon, G. (2015). “Posibles efectos de las frecuencias del carbono en estructuras (pre)bióticas como contexto orgánico para la bioacústica (Possible Effects of Carbon

- Frequencies in (Pre)biotic Structures as an Organic Context”, *Proceedings of the 1st AmexCarb Congress*, Nov. 2015, 92–94, San Luis Potosi: AmexCarb/Ipicyt/Conacyt.
- Peirce, Charles Sanders (1893). “Immortality in the Light of Synechism” in (N. Houser, ed.) *The Essential Peirce*, Bloomington: Indiana University Press, 1998; vol. II, pp. 1–3.
- Peirce, Charles Sanders (1903) “Pragmatism as the Logic of Abduction” in (N. Houser, ed.) *The Essential Peirce*, Bloomington: Indiana University Press, 1998; vol. II, pp. 226–241.
- Peirce, Charles Sanders (1931–35/1966). *Collected Papers*, vols. 1–8 (C. Hartshorne, P. Weiss & A. W. Burks, eds.) Cambridge, Mass.: Harvard University Press.
- Pikovsky, A., Rosenblum, M., Kurths, J. (2001). *Synchronization: A Universal Concept in Nonlinear Sciences*, Cambridge: Cambridge University Press.
- Quine, W.V.O. (1969). “Natural kinds” in (W.V.O. Quine) *Ontological relativity and other essays*, New York: Columbia University Press; pp. 114–138.
- Sebeok, Thomas A. (2001). *Signs: An Introduction to Semiotics*, Toronto: University of Toronto Press.
- Souriau, Étienne (1947). *La Correspondance des arts : Elements d'esthétique comparée*, Flammarion, Paris.
- Spinoza, Baruch (1677). *Ethica, Ordine Geometrico demonstrata*, Amsterdam: Rieuwertsz.
- Zadeh, Lotfi A. (1975). “Fuzzy logic and approximate reasoning”, *Synthese*, 30: 407–428.
- Zadeh, Lotfi A. (2002). “From computing with numbers to computing with words — from manipulation of measurements to manipulation of perceptions”, *International Journal of Applied Math and Computer Science*, 12, 3: 307–324.

About the author

Ph.D. Philosophy, University of Helsinki (2006–2011), currently professor of Aesthetics and History of Mesoamerican Semiotics at CUCSH, University of Guadalajara (Mexico). Musicology researcher at CENIDIM-INBA, and post-graduate supervisor of PMDM-UNAM (Mexico City). Program chair and general editor of the International Congress on Music and Mathematics (Puerto Vallarta, 2014; proceedings publ. by Springer, Berlin, 2016, under the title *The Musical-Mathematical Mind: Mutual Patterns and Transformations*). His output as composer includes *Xochicuicatl cnequechtli*, the first modern piece of musical theatre in Nahuatl language. Email: gabrielpareyon@gmail.com

Your Boy is You: new media art as a critical analysis of biometric surveillance

Maciej Ożóg

Abstract

This paper focuses on ways in which new media art becomes a kind of critical social and cultural theory / praxis / intervention that examines biometric technologies, and questions their impact on politics of the body, new definitions of identity as well as new forms of power and social relations in the age of permanent insecurity. Searching for critical analysis of biometric technologies I refer to various artistic projects, in which subversive use of biometrics calls into question common beliefs, myths as well as political and ideological interpretations of these technologies and the role they play in establishing of new power regimes in the society of control.

Keywords

New media art, biometrics, surveillance, control, subversion.

1. Introduction

CCTV cameras combined with the facial recognition system. Passports containing digitalized scans of fingerprints and iris patterns. Airport gates analysing pupil dilation, body temperature, pulse and the pace of the heart. Cell phones and computers using face, voice, and fingerprint recognition or typing dynamics to authenticate the user. DNA tests defining potential diseases or determining consanguinity. All these commonly used technologies are the signs of the times. They are emblems of the society, which in the era of multiple risks, uncertainties and pervasive mistrust looks for ways to enhance the sense of security by investing hope in the development of technology of monitoring and surveillance, de facto becoming a society of surveillance (Lyon 2001) and control (Deleuze 1993). At the same time, these examples show the dominant trend in the development of surveillance technology in the direction of biometrics. Although the name, nationality, origin, etc. are still taken into account in the identification and verification of identity, the physical body is becoming increasingly important as an irremovable and objective sign of individuality. But what is a particularly important, modern biometric systems are based on automatic digital analysis and identification of the physical body (Mordini, Massari 2008), which leads to its new conceptualization as “machine-readable body” (van der Ploeg 2005). This fact directly influences the ways of understanding the identity, the possibility of its formation, the autonomy and privacy of the individual, as well as social interactions and power relations. Modern technologies are not only changing the face of surveillance and control, but at the same time establish a new cultural context. Thus they require extensive analysis that would enable understanding of their impact on the daily life, and the ways in which ordinary people relate and respond to the

omnipresence of surveillance. (Monahan 2011) Critical analysis of the cultural consequences of the development of these technologies seems to be a very important challenge, given that their dissemination favours the trivialization and naturalization of surveillance. In the common perception surveillance tools are becoming an obvious and indispensable part of the modern technological world. At the same time, in the dominant narrative their effectiveness and neutrality is emphasized above all. This conviction is reflected in the common perceptions of the methods and forms of surveillance and control, which usually does not take into account the specifics of the tools. (Marks 1996: 193). Meanwhile, the understanding of the nature of modern surveillance, including biometrics, is at least difficult, if not impossible, without in-depth analysis of the functioning of these technologies.

In this article I focus on the presentation of the activities of artists who take on a critical analysis of the surveillance society in the era of biometric technology, while using these technologies in an unconventional, often subversive way, as a tool of artistic creation. Combining cultural reflection and the meta-medial discourse they make it possible for the audience to peep inside the black box of technology and at the same time they provoke discussion on the widely repeated and accepted convictions, ideas, half-truths and myths regarding biometric surveillance. In the first part of the article I present the development of biometric technologies, pointing out to the most characteristic features of modern digital tools for automated biometric identification. The next section is focused on transformations of mechanisms of surveillance resulting from the application of biometric tools. I argue that modern biometric surveillance leads to tension between the human body and personal identity, which manifests itself in the dichotomy between the psycho-physiological subject situated in a specific socio-cultural context and its representation - an informational double that is constructed from abstract bio data. The third part is dedicated to analysis of a number of artistic projects that represent diverse artistic strategies of the use of biometric tools while introducing a critical discourse on the cultural status of biometrics. I refer to projects of artists who experiment with biometric technologies in a reflexive, creative and thought provoking way. Their works also represent various forms of artistic practice (interactive installation, interactive performance, performative 'open lab' science, technoscience workshops) as well as different modes of inclusion of the public into the discourse on the cultural dimensions of ubiquitous biometric surveillance.

2. The specificity and the development of biometric technology

While analysing the history of techniques and technologies used for determining identity Emilio Mordini, Dimitrios Tzovaras and Holly Ashton (2012) indicate that since the end of the twentieth century we have observed a rapid development of new biometric tools of identification. In a global world of universal mobility an increasingly important role in the management of the society plays a separate physical body and the technologies that enable the identification not by external information, added to the object, but based on the physical body itself. „Biometrics is the sole identification technologies which are based on ‘natural’ properties, say, properties which are owned by the item itself and are not added by us.” (Mordini, Tzovaras, Ashton 2012: 7) Just as the development of means of communication has resulted in the society of global nomads, so the need to control population flows led to the somatic turn in surveillance technologies – “the body became, once again, a source as well as a site of surveillance” and the means of identifying develop in a new direction, determined not by the question “who are you?”, “what do you possess?” or “what kind of document proves your id?” but “what one *is* - body parts?”. (Lyon 2001: 70) Joseph Pugliese (2010: 3-5) observes that, as a consequence, the truth of the subject is a truth guaranteed by technology, and biometric technologies are considered a source of objective and ultimate truth about man.

Confidence in the efficacy of biometrics is based on the idea of the neutrality of automatically and autonomously operating technology, but also on the idea of objectivity of corporal information, which is independent of the individual person. Your body is you; it testifies about you; it provides irrefutable truth about you, because you have only limited control over it. Thus, thanks to the somatic turn in surveillance a reinterpretation of categories such as individuality, subjectivity, autonomy and privacy of the individual is made. Power relations and the techniques of its exercise are also subject to change. The external gaze of the surveillant literally penetrates into the inside, crosses the border of the skin of the surveilled, not only and not so much to discipline and train, as to identify, verify, classify, categorize, and assort on the basis of biological data. Elia Zureik and Karen Hindle summarize this process in a synthetic way: „Clearly, biology as a signifier of persona is back in use, and is in the process of displacing impersonal technologies that rely on PINs and passwords. In a telling manner, the body (eyes, hand, and face) returns as the absent Other, this time encased in biometric technology. Thus, instead of the eye being the source of the surveillance gaze, now the eye becomes the object of the gaze.” (2004: 118)

The body has always been regarded as a source of reliable information about the individual. However, the major breakthrough and accelerated development of biometric technologies took place at the end of the last century. At least two reasons for this process can be distinguished. On the one hand, the key was the technological development: the introduction of digital technology enabling a remote acquisition of samples and their reliable analysis; and the development of medical diagnostic tools that give access to almost all physiological levels of the body. On the other hand, the motivations for the development of these technologies were the social and cultural changes intensifying since the eighties. Mordini (2008: 252-256) indicates that the development of biometrics was a response to the lack of ontological security in the era of globalization and was related to the insufficiency of previously used techniques of identification in the face of transformation of the concept of identity and individuality, global mobility and migration, loosening of traditional social ties, blurring the traditional state structures and the emergence of new forms of citizenship. In addition to the cultural transformation an important role also played the events that influenced world politics. Of particular importance was the terrorist attack on New York headquarters of the WTO. In an atmosphere of uncertainty, insecurity and widespread fear of terrorism the most effective remedies were explored. This political climate was used both by official authorities and commercial actors to spread the belief that it is automated biometrics that is the most effective remedy for the twenty-first century threats. (Zureik, Hindle 2004; Muller 2005; Pugliese 2010)

Modern biometric technologies allow the acquisition of large amounts of data, from the most basic like fingerprints, scans of the eyeball and the iris, voice specifics, to facial characteristics and facial expression, movement patterns, electrophysiological activity of the body, and the genetic structure. The most striking feature of today's biometrics, however, is the simultaneous use and cross-verification of different samples in multimodal systems and the creation of complex digital profiles / templates collected in the linked databases. (ISO 2016; Nanavati, Thieme, Nanavati 2002). This way, biometric technologies not only fulfil their basic task - to identify and verify the identity - but also take on a meaning-formative function; they can be analysed as a kind of "semiotic activity" (Mordini, Tzovaras, Ashton 2012: 10) generating virtual identity materially associated with a particular person, but being out of the subject's control, who in this case only is the provider of information. Thus, the physical body itself becomes the most reliable proof of identity, a "password" and "passcode" conditioning participation in a global society of control. (Davis 1997)

3. Body-as-information and a virtual information shadow

The “biometric gaze” establishes a new paradigm for identification and verification of identity; however, it is the logical consequence of the processes that determine the specifics of control society in the era of IT. Focus on a multifaceted analysis of the information collected in systems of linked databases was reflected in the approach, in which the essence of modern surveillance was placed in the problem of control over the data - dataveillance. (Clarke 1988) The somatic turn in techniques of surveillance is linked with the development of tools that allow treating the biological data in the same way as all other digital data. In biometric optics the material body is primarily a body of information, or even “the body as information” (van der Ploeg 2003). Conceptualization of the body as information carries significant implications for the practice of surveillance because the body becomes now “not only a site of surveillance but a source of surveillance data” (Lyon 2001: 81). Thus, a new form of surveillance is established, which could be described as *bodydataveillance*. Numerous researchers since the mid-nineties pointed to the growing importance of biotechnology and biometric tools in the practice of surveillance, however, in-depth analysis of the consequences of the “somatic turn” are to be found primarily in the works of Kevin D. Haggerty and Richard V. Ericson (2000) as well as Irma van der Ploeg (2003; 2005; 2007; 2014).

Haggerty and Ericson focus attention on the decomposition of the body, indicating that the biometric surveillance is no longer based on the observation of the body as a whole, but on monitoring the functioning of its individual parts and internal processes. The subject of the surveilling gaze is the body understood as an assemblage and a system of information flow - disunified, diffuse and devoid of internal cohesion. (Haggerty, Ericson 2000: 612-613) The body as assemblage of information is also the body, which is subject to virtualization – the flesh made data. This process enables creating abstracted, although rooted in the matter, information profiles – “data doubles”. (Haggerty, Ericson 2000: 611) The authors emphasize that a fundamental consequence of the disintegration of the material body is, on the one hand, the reduction of carnality to sheer information, and on the other hand producing an autonomous and automatically generated information replica of the body. However, it is not only a virtual representation of the embodied subject, but rather a new construct resulting from recomposition of bio data that emerges from unlimited manipulations of information retrieved from the body. (Haggerty, Ericson 2000: 614) Significant in this context are the questions about the ownership of the biological information, who decides over its processing as well as how the existence of an information double affects the real life of the embodied subject?

A Dutch researcher Irma van der Ploeg also takes up these problems. She observes that the development of biometric technologies leads to a change in the relationship between the material body and its information representation, which results not only in a new ontology of the body, but also impacts the existence of an embodied subject influencing the ways of defining identity, individual forms of experiencing carnality and existential prospects of individuals and entire social groups. In this perspective, biometric technologies are not only used for identification, but they define schemes of conceptualization of the body and the resulting direct implications for understanding and functioning of man as a material-virtual hybrid.

The primary consequence of the “biometric gaze” is the departure from the dichotomous relationship between materiality and virtuality. In the context of surveillance this dualism is expressed in the separation of “the human body on the one hand, with 'personal data' or information about that body as its counterpart”. (van der Ploeg 2007: 47) This dualistic opposition is difficult to sustain once data coming directly from the body play the increasingly important role in shaping of the digital double. The development of digital biometrics “undermines the neat division between the body itself as belonging to material reality exclusively, whereas digital data derived from that body, being mere ‘representations’, are thought to belong to a fundamentally separate domain.” (van der Ploeg 2007: 47) Thus was established the conceptual, material and technological continuity between the material body and its digital information collected and processed in databases. The disappearance of the difference between materiality and virtuality is the foundation of new ontology of the body as information. (van der Ploeg 2003: 64)

Analysing the practical application of various biometric technologies van der Ploeg (2014: 181) emphasizes that they have a significant impact on the forms of experiencing corporality, but they also define the opportunities and life chances of individuals. This widespread obtaining, collecting, analysing and processing of data from the body nowadays is a new kind of knowledge production about a person. It is problematic since it is often without knowledge, without consent, and even contrary to the will, intentions and interests of the individual. Thus, the individuals are to a large extent incapacitated, their right to question and verify the impact information shadow has on their existence are significantly reduced.

The result, and sometimes the purpose, of the knowledge about the individuals produced in this way is not only to recognize their identity, but to create an objective profile that is given, assigned to a person, regardless of his/her testimony and any other evidence of identity. „(...) such attributed identities

can become like a person's shadow: hard to fight, impossible to shake.” (van der Ploeg 2007: 48) Moreover, in the optics of biometric surveillance everyone becomes a “suspect”, and the personal testimony of a person by principle is less reliable than a silent testimony of the body. „These kinds of uses of body data may reinstate forms of determinism by the possibility that life chances and entitlements come to be made contingent upon them.” (van der Ploeg 2007: 48-49) The biological body is regarded as the most reliable source of knowledge about the subject, as the ultimate truth, as “an authoritative text”, which at least is difficult to argue with. (Lyon 2001: 83) The ultimate result of the belief in the “truth of the technological reading of the body” is the growing distrust to the testimony of a self-aware and responsible individual.

Thus defined relationship between the embodied subject and “the truth of his / her body”, carries with it the consequences of restricting the ability of self-determination of the subject. This results in detachment, alienation of the body, which, subject to technological process of objectification, becomes external and uncontrolled by the subject. This fact becomes of particular importance when we realize that biometric technologies fulfil not only the original function of identifying and verifying the identity. Shaping people's information profiles they create a social and political reality, according to the principle that “if technology defines a situation as real, it is real in its consequences.” (van der Ploeg 2014: 182)

4. Biometric technologies under (artistic) scrutiny

The basic tenet of supporters and advocates of automatic biometric technologies is their neutrality and low invasiveness. This thesis is in open contradiction with the practice, which provides infinite amount of evidence that any technology reflects a certain beliefs, worldview and value system, and at the same time creates particular socio-technical environments (Lianos, 2003). In the case of digital surveillance tools, including biometrics, the main determinant of the specifics of this environment is to automate processes of acquisition and data processing through algorithmic systems. The modern surveillance and control society is based on algorithmic surveillance (Norris, Armstrong 1999). This term refers to “surveillance technologies that make use of computer systems to provide more than the raw data observed. This can range from systems that classify and store simple data, through more complex systems that compare the captured data to other data and provide matches, to systems that attempt to predict events based on the captured data.” (Introna, Wood 2004: 181) Algorithmic processing of biological data is connected with the need to adapt of the body to the perception and cognitive abilities of the machines. In this context, the basic problem is, on the one hand, how the machines “see” the

individual, and on the other hand how the body is converted into an object of observation recognizable for the machine vision. “Ideally, biometrics aims to turn persons into mere living objects, which can be measured and matched with similar living objects.” (Mordini, Massari 2008: 494). Digital mapping of biometric data is, however, as a rule, incomplete, it requires a reduction of complex information into patterns readable for a machine (Introna, Wood 2004: 181), because, in contrast to that idealistic scenario, “human bodies are not biometrifiable” (Magnet 2011:2). Thus way, machines' gaze never reproduces the reality objectively, but always presents its technologically incomplete or even distorted vision. Mechanical objectivity is the founding myth of biometric surveillance, which is subject to critical analysis in works of many artists.

“My goal has been to develop patterns which are positively identified as faces by algorithms which human beings would perhaps not identify as faces.” (Crispin 2014: 12). Sterling Crispin's project *Data-Masks* (2013-2015) is an example of deconstruction of an automatic face recognition technology, which shows the problematic process of forming algorithmic representation of the human face. Using the reverse engineering strategy Crispin analyses the conditions to be met by the subject perceived by the machine for it to be considered a human face. He emphasizes in this way the fact that the machine face recognition depends directly on a previously prepared schematic model, which then serves the machine to properly identify the perceived object. The process of teaching the machine to recognize specific shapes as a human face involves specifying the basic features distinctive of a face. It is based on the reduction of complex data to relatively simple schemes digestible for the mechanical observer. In the case of *Data-Masks* the final result of the analysis of the facial recognition algorithms are three-dimensional masks, which are “embodied representations of how computer vision and surveillance systems represent people” (Crispin 2014: 30). Visualization of the algorithmic machine perspective leaves no doubt - this is what the machine detects as a face, to the human eyes is only an amorphous lump. In this way the “objectivity” of the look of the machine is questioned. It is rather a manifestation of the reducing and dehumanizing transformation process, or rather creating an image of a person by the “Technological Other”, as Crispin defines biometric surveillance systems (2014: IV).

Productive and at the same time alienating effect of the algorithms' work is also the theme of an installation *Desire of Codes* (2010) by Seiko Mikami, which can be described as a kind of space of surveillance, saturated with various devices tracking the physical presence of spectators. Mikami uses dozens of cameras responsive to the movement of the viewer, microphones which capture all

sounds that fill the space and heat sensors. All collected data are shown on the screen-sculpture, called by the author “Compound Eye Detector Screen”. It is composed of 61 small screens showing independent images. This design of the installation and, above all, the screen, confronts us with an algorithmic vision of space that is recorded, or rather created, by a system of perceptual machines. It is a dynamic network of data, which are constantly connecting with each other in unstable, temporary configurations. Configurations, which not as much map the physical human presence in the installation space, as create fragmentary information shadows again and again. As stressed by Mikami, the aim of creating such an environment of surveillance was „to highlight the increasingly blurred dividing line between ‘the body defined by data’ and ‘the body of flesh and blood’” (Takei 2010). This dichotomy also intensifies the sense of alienation towards the autonomous surveillance system, which because of its material structure, but also the mode of operation, can be associated with a mysterious, unknown, and uncanny, independently functioning organism (Spielmann 2012: 10-11). An organism, which works based on principles that are difficult to decode, and which exhibits a peculiar agency. A person entering the installation is subjected to constant machine observation and transformation simultaneously. The course of the process and the final results are beyond our influence. A living person becomes objectified. Brought down to strings of information, obtained from his body and constantly restructured. Thus losing control over his/her own subjectivity and identity. This machine produces its own vision of a human. Its activity makes us aware that we „become mere segments or fragments of a network or a system instead of people with histories and identities.” (Schenker 2011)

The works of Crispin and Mikami reveal one of the essential features of digital biometric surveillance technology - their activity is based on algorithmic operations, which are difficult to identify and verify or even notice by an external observer. They work in the background; they are “silent technology” (Introna, Wood 2004: 182-3), whose presence we see mainly thanks to the final result of the operation and by the effects that this action causes. This fact makes the external control over the course of the process and their effects is greatly reduced, and often even impossible. Automatic digital biometric technologies appear not only “mysterious” but also their functioning is as far non-transparent. At the same time the effect of their actions may be incapacitation of the subject who undergoes biometric surveillance. Marnix de Nijs, Heather Dewey-Hagborg and Paul Vanouse undertake this problem in their works by analysing the specificity of functioning of various biometric technologies and the social and cultural consequences of their dissemination.

Direct confrontation with the “technological Other” acting autonomously is the basic experience of the viewers of Marnix de Nijs’ works *Physiognomic Scrutinizer* (2008-2010) and *Mirror_Piece* (2010-2011). Both installations have the strategy of intensification of error in the operation of automatic face recognition in common. It is not, however, the wrong identification, which is important, but the authoritative attribution of identity. Based on the analysis of the viewers’ facial features the machine combines their appearance with the one recorded in a database of profiles of public figures and celebrities known for their unconventional, controversial or downright criminal behaviour.

In the case of *Physiognomic Scrutinizer* the relationship of subordination to the machine is reinforced with the structure of the installation, which takes the form of an airport gateway. The viewer is forced to undergo automatic identification, because only then he will be able to pass the gate. What’s more, standing in front of the ‘eye’ of the machine it is not possible to follow the process of face recognition, as it is visualized only on monitors placed at the other side of the gateway. Gaining access to the fenced space, and thus the opportunity to see the monitors, does not affect the position of the human against the machine. On the contrary, it increases the feeling of dependence on the decisions taken by it. The viewer not only has no effect on the process of “identification”, but also is devoid of any possibility of appeal against the verdict of the machine, or to correct a misdiagnosis. The authority of technology somehow guarantees the explicitly false identity attributed to him or her.

Marnix de Nijs mocks the belief of reliability of surveillance equipment and observes its fetishization. Belief in the infallibility of automated biometrics is shown here in a distorting mirror, but an indelible impression remains that it is here that the problematic widespread use of these technologies lies. Their dissemination leads to the standardization, automation and dehumanization of social relations. On the other hand, its result is restricting or even negating the confidence in a testimony of a living person. As Philip E. Agre (2003) observes “when a machine does produce a false match, the reputation of technology for accuracy will create a greater stigma than would a false identification by a person.” The problem of stigmatization resulting from the machine attribution of identity and powerlessness of the individual against the authority of the machines is emphasized in the installation *Mirror_Piece*. In this case, the viewer can watch the whole process on the screen, which is also a mirror. The combination of his/her own mirror reflection with the soulless procedure of assigning false identity intensifies the feeling of incapacitation and alienation against the machine operating autonomously.

While all the projects mentioned so far were related to the use of biometric tools operating on the basis of monitoring the external aspects of the body, the two following examples take up the problem of using genetics as identification technology.

In the context of the culture of biometric surveillance two common beliefs about genetics are of particular importance. The first concerns the uniqueness of the individual genetic code. Individual DNA structure is considered to be an absolutely objective sign of identity. This conviction is reflected in the extensive use of the metaphor of “genetic fingerprinting”, which describes a procedure for analysing and visualizing fragments of the DNA. The other one is based on the idea that all the properties of a living organism are stored in the DNA code, which is presented as a “code of life”. Such understanding of the genetic structure leads to genocentric determinism, but also opens the way for genetic profiling and predicting the future of living organisms, because along this line of reasoning, all the individual characteristics of the organism can be anticipated based on the information contained in DNA. Heather Dewey-Hagborg's and Paul Vanouse's art projects represent a critical analysis of the assumptions underlying the genetic biometrics and the social and cultural consequences of this peculiar DNA mythology.

In *Strange Visions* (2012-13) Heather Dewey-Hagborg attempts to deconstruct methods of visualization of suspects' faces based on the analysis of DNA samples referred to as DNA phenotyping or molecular photofitting, which gain importance in forensic sciences. Using genetic material obtained from waste found in the streets of New York (hair, butts, chewing gum) the artist forms three-dimensional portraits of anonymous people. In the case of this work, the tension between the specificity of input data and the ultimate effect of the applied techniques and scientific procedures is essential. Pictured here is the relationship between genotype understood as a code, a number of instructions stored in biological material and phenotype, which is a realization of these instructions in the form of an individual living organism. What is important, the phenotype is never a simple materialization, a direct execution of instructions. Many factors, not genetically determined, impact its shape, such as a. o. age, environmental context, and lifestyle of the individual, as well as social interactions, plastic body modifications or medical interventions. For these reasons, DNA phenotypic can be considered as a method, whose product is only an approximate, incomplete and simplified picture of the DNA's donor. Moreover, what is problematic in such a portrait is that the typological properties dominate over the individual ones. This fact, which Dewey-Hagborg emphasizes (2015), may result in hiding prejudices and stereotypes of race or gender under the mask of the authority of science. This assumption seems

likely, given that the DNA phenotyping is a method which does not take into account the complex conditions for shaping the phenotype and thus provides a rather generalized and normalized visualization of an individual. In this context the question of the cultural, social and political aspects of this standardization is essential.

Strange Vision uses the example of DNA phenotyping to show a problem that is characteristic of all types of biometric technology. As Pugliese observes (2010: 7-9) these technologies operate on the basis of normative conceptualizations of the body, which are intrinsically inscribed in the technological infrastructure as to ensure its smooth, efficient and effective functioning. Due to these new “infrastructural normativities” all biometric surveillance technologies are stigmatizing and discriminatory to a certain extent. They impose normative schemes on, by principle, a non-normative physical body, which, however, is particularly evident in relation to social groups and individuals, who’s bodies do not comply with the technologically defined standards. This applies both to the issue of race, colour, sex, age, as well as disability. Problematic here is also the fact that these infrastructural norms are usually hidden in the black box of technology. As Dewey-Hagborg project shows, seeing the inside of the black box, understanding of the functioning of tools and an analysis of procedures of biometric surveillance is a prerequisite for a rational, substantive and critical debate on the impact of these technologies on society and culture. This challenge is particularly difficult with regard to the technology, which, like biometrics, and in particular, genetics, ignite the imagination of ordinary people, and at the same time are subject to constant rhetorical mystification and mythologisation from many manufacturers and their administrators.

Achievements of genetics have contributed to an unprecedented upheaval in criminology, allowing for never before seen effectiveness in combating crime. They enable unmistakable identification of suspects and determine their participation in the offense. The media image of genetic surveillance spread the conviction that the specific configuration of the DNA code is the ultimate and undeniable proof of individual identity. The issue of the use of genetics as a technology of identification is one of the main themes of the work of Paul Vanouse.

Courts of Justice have become the arenas where the spectacle of genetic transparency takes place. Although it is difficult to deny the influence of genetics on the transformation of investigative procedures and law enforcement, these areas clearly reveal the influence of lack of knowledge and incomplete, false vision of genetics generated by ignorance.

The project *Suspect Inversion Center (SIC)* (2011) refers to the trial of O.J. Simpson's from 1994, in which DNA testing played a fundamental role. One of the strongest arguments of the prosecutors were the athlete's DNA found at the crime scene. However, as Vanouse (2011) stresses the Simpson case "was the first time that a defence team had enough scientific understanding and authority to successfully counter prosecution claims of efficacy in criminal court." *SIC* is a performance during which Vanouse and his colleagues produce an exact replica of the image of DNA used in the course of the historic trial. In this case, however, the genetic material used for the experiment, comes from the artist himself. Thus he challenges the dogma of the infallibility of genetic identification. The essence of the problem is not only the genetic compatibility of the original and his artistic visualization, but also the impact of scientific procedures on the results obtained. The image of the DNA, created in accordance with the rules of science, gains a status of an artifact, and the process of DNA sequencing itself is conformed to copying of works of art, which is so far from the scientific transparency and objectivity. Presenting the analogy between the visualization of the DNA code and falsification of original works of art Vanouse reveals, on the one hand, invalidity of the conviction of the indisputable nature of genetic identification, and on the other hand, he draws attention to the fact that the image of DNA is "a culturally constructed artefact" (Vanouse, 2008: 177). It is the product of specific procedures, which depend on the technical conditions, but also, and perhaps primarily on certain decisions made by the lab staff.

SIC, and other projects like *Latent Figure Protocol* (2007-09) and *Ocular Revision* (2010), in which Vanouse manifests the creative potential of the visualization of the DNA sequence in the process of gel electrophoresis, demonstrate the strength of the cultural impact of the myth of objectivity of science, but above all raise questions about the role of media representation of the DNA in the formation of false beliefs about genetics. If knowledge of scientific procedures can produce virtually any image from the same genetic samples in the course of artistic activities, it becomes obvious that the preparation of DNA image can be an extremely powerful tool to manipulate public opinion. Knowledge of scientific procedures proves to be a competence, which enables resistance to intentionally or unintentionally disseminated distorted notions and prejudices. The works of the Canadian revealed an error, or perhaps a hoax, on which a comparison is made, of the genetic code to the fingerprint and the metaphor of "genetic portrait". Genetics unveils new and previously unknown aspects of life but certainly is not a definitive solution to the problem of the identification of the individual. Naturalization of misconceptions in the spirit of scientific objectivity does not change the fact that "nature didn't put DNA in our bodies as a personal identification system" (Vanouse 2008: 181).

Dewey-Hagborg's and Vanouse's projects provoke to pose a series of questions revealing the unstable cognitive status of genetics in contemporary culture. To what extent is the observed visualization of the DNA sequence a reliable representation of the genetic specificity of the analysed samples? How can you prove that the image depicts the DNA sequence abstracted from a particular sample? Are there procedures, and if so, based on which principles, to ensure compliance of the sample and the image? What significance in shaping the public image of the genetics does the specific nature of the used tools have? The latter issue is of particular importance at the moment when we realize that the molecular biology not only allows us to determine the genetic map of the human but that the genetic map largely determines the human. It is not a neutral representation of reality, but *toujours déjà* its multi-conditioned transformation.

5. Conclusion

In 2004 Giorgio Agamben (2004) published a text, which is considered one of the first and most radical critical responses to the widespread deployment of biometric technologies understood as security technologies. He radically criticized the practice of using physical characteristics of the body to identify and verify the identity. He pointed out that such "biological tattoos" radically change the power relations in control society limiting personal freedom, civil liberties or even humanity by bringing a human to the level of a purely biological being, the level of naked life. After more than ten years since the publication of *No to Bio-Political Tattooing*, it is clear that a warning of the Italian philosopher loses in a collision with reality. Biometric technologies became widespread, common, and gained public acceptance as an effective tool of control and surveillance. This fact does not devalue Agamben's theses, quite contrary, it makes them even more current. For the more we get used to certain technologies, the more they become an obvious part of everyday experience, the more they become transparent, the more difficult a critical analysis of their cultural status turns out.

In this article, I have tried to emphasize the need for such careful observation, putting forward the argument that the art of using biometric technologies can sensitize us to the numerous, difficult to grasp at first glance, conditions and consequences of the dissemination of biometric surveillance. Artists, whose works I have recalled, through the analysis of the functioning of different technologies, reveal and make the subject of discussion complex and unobvious political, economic, cultural conditions, which are inscribed in the specificity of these tools. Although one can question the impact of this type of practice, it seems, however, that it is an important antidote to the dominant one-

dimensional narrative, in which biometric surveillance is presented as the most effective remedy for dangers in times of the global fight against terrorism. This type of artistic activities fulfils a cognitive function, become a form of critical theory of culture, but mainly precipitate us from sleep stimulating and intensifying a feeling of *Unheimlichkeit* in contact with the increasingly autonomous machines, in the face of, although created by ourselves, but still foreign the “Technological Other”.

References

- Agamben, Giorgio (2004). *No to Bio-Political Tattooing*. “Le Monde” 10 January, <http://www.ratical.org/ratville/CAH/totalControl.html> (access 09.06.2016).
- Agre, Philip E. (2003). *Your Face Is Not a Bar Code: Arguments Against Automatic Face Recognition in Public Places*. <http://polaris.gseis.ucla.edu/pagre/bar-code.html>. (access 18.06.2016)
- Clarke, Roger (1988). *Information technology and dataveillance*. “Communications of the ACM” 31(5): 498-512.
- Crispin, Sterling (2014). *Data-Masks Biometric Surveillance Masks Evolving in the Gaze of the Technological Other*. http://www.sterlingcrispin.com/Sterling_Crispin_Data-masks_MS_Thesis.pdf (access 17.04.2016).
- Davis, Ann (1997). *The body as password*. “Wired” 5(7): 132-140.
- Deleuze, Gilles (1992). *Postscript on the society of control*. “October” 59: 3-7.
- Dewey-Hagborg, Heather (2015). *Sci-Fi Crime Drama With A Strong Black Lead*. “The New Inquiry” July 6. <http://thenewinquiry.com/sci-fi-crime-drama-with-a-strong-black-lead/> (access 12.05.2016)
- Haggerty, Kevin D., Ericson, Richard V. (2000). *The surveillant assemblage*. “British Journal of Sociology” vol. 51 (4): 605-622.
- Introna, Lucas D., Wood, David (2004). *Picturing Algorithmic Surveillance: The Politics of Facial Recognition Systems*. “Surveillance & Society” 2(2/3): 177-198.
- ISO. JTC 1/SC 37 *Biometrics, Standing Document 2 (SD 2) - Harmonized biometric vocabulary – version 18*. <http://isotc.iso.org/livelink/livelink?func=ll&objId=16755764&objAction=browse&viewType=1> (access: 25.08.2016)
- Lianos, Michalis (2003). *Social Control After Foucault*. (trans. D. Wood and M. Lianos), “Surveillance & Society” 1(3): 412-430.
- Lyon, David (2001). *Surveillance Society. Monitoring Everyday Life*. Buckingham, Philadelphia: Open University Press.
- Magnet, Shoshana (2011). *When Biometrics Fail: Gender, Race, and the Technology of Identity*. Durham, NC: Duke University Press.
- Marx, Gary T. (1996). *Electric Eye in the Sky: Some Reflections on the New Surveillance and Popular Culture*. In: *Computers, Surveillance and Privacy*. Lyon David, Zureik Elia (eds). Minneapolis: University of Minnesota Press, pp. 193-236.
- Monahan, Torin (2011). *Surveillance as Cultural Practice*. “The Sociological Quarterly” 52: 495-508.
- Mordini, Emilio (2008). *Biometrics, Human Body, and Medicine: A Controversial History*. In: *Ethical, Legal, and Social Issues in Medical Informatics*. Penny Duquenoy, Carlisle George, Kai Kimpka (eds). Hershey - London: IGI Global, pp. 249-272.
- Mordini, Emilio, Massari, Sonia (2008). *Body, Biometrics and Identity*. “Bioethics” 9: 488-498.
- Mordini, Emilio, Tzovaras, Dimitrios, Ashton, Holly (2012). *Introduction*. In: *Second Generation Biometrics: The Ethical, Legal and Social Context*. Mordini Emilio, Tzovaras Dimitrios (eds). Dordrecht, New York: Springer, pp. 1-19.

- Muller, Benjamin J. (2005). *Borders, Bodies and biometrics: towards identity management*. In: *Global Surveillance and Policing. Borders, Security, Identity*. Zureik Elia, Salter Mark (eds). Portland: William Publishing, pp 83-96.
- Nanavati, Samir, Thieme, Michael, Nanavati, Raj (2002). *Biometrics: Identity Verification in a Networked World*. New York: John Wiley & Sons, Inc.
- Norris, Clive, Armstrong, Gary (1999). *The Maximum Surveillance Society: The Rise of CCTV*. Oxford: Berg.
- Pugliese, Joseph (2010). *Biometrics: Bodies, Technologies, Biopolitics*. New York: Routledge.
- Schenker, Dylan (2011). *Desire Of Codes: Exploring The Role Of The Spectator As Subject*. http://thecreatorsproject.vice.com/tcp/tcpArticle/author/author_id/dylanschenker/Article_page/2. (access 11.06.2016).
- Spielmann, Yvonne (2012). *Perceptual-responsive environments: sense and sensibility in Japanese media artist Seiko Mikami's installations*. "Journal of Aesthetics & Culture" Vol. 4: 1-13.
- Takei, Mariko (2010). *Conversation with Seiko Mikami*. "Shift" 23.04.2010. http://www.shift.jp.org/en/archives/2010/04/seiko_mikami.html (access 10.05.2016).
- van der Ploeg, Irma (2003). *Biometrics and the body as information: normative issues of the socio-technical coding of the body*. In: *Surveillance as Social Sorting*. Lyon David (ed.). London, New York: Routledge, pp. 57-74.
- van der Ploeg, Irma (2005). *The Machine-Readable Body. Essays on Biometrics and the Informatization of the Body*. Maastricht: Shaker.
- van der Ploeg, Irma (2007). *Genetics, biometrics and the informatization of the body*. "Ann Ist Super Sanità" Vol. 43 (1): 44-50.
- van der Ploeg, Irma (2014). *The body as data in the age of informatization*. In: *Routledge Handbook of Surveillance Studies*. Ball Kristie, Haggerty Kevin D., Lyon David, (eds). London and New York: Routledge, pp. 176-184.
- Vanouse, Paul (2008). *Discovering Nature Apparently: Analogy, DNA Imaging and the Latent Figure Protocol*. In: *Tactical Biopolitics. Art, Activism, and Technoscience*. da Costa Beatriz, Philip Kavita (eds). Cambridge, Massachusetts, London: MIT Press, pp. 177-192.
- Vanouse, Paul (2011). *Suspect Inversion Center*. <http://www.paulvanouse.com/sic.html>.
- Zureik Elia, Hindle, Karen (2004). *Governance, Security and Technology: The Case of Biometrics*. "Studies in Political Economy" vol. 73: 113-137.

About the author

Maciej Ozóg (PhD) - theorist of culture and sound artist. His research focuses on interactive art, tactical media, bio art, surveillance studies and posthumanism. He has published a number of articles on aesthetics of interactive art, history and theory of avant-garde film, video art and experimental music. He teaches at the Department of Electronic Media, University of Lodz, Poland. Since the early nineties he's been involved in experimental music scene of Poland. He works in the field of live multimedia performance, interactive installations and video art.
maciej_ozog@uni.lodz.pl

This research was supported by the National Science Center in Poland through individual grant DEC-2011/03/B/HS2/05253.

A personal media art archive based on the symbol of the fly

Christa Sommerer & Laurent Mignonneau

Abstract

Media art is an ephemeral form of art, since its components are particularly prone to obsolescence. We have created a series of artworks that deal with media art archiving in a proactive way by conserving portraits of media art experts which are composed of computer programmed flies.

Keywords

Media Art Archiving, Artificial Insects, Preservation, Portraiture

Dr. Oliver Grau, one of the leading figures in the field of media art history and the founder of an international conference on this topic, writes that many key media art works from the past 50 years are currently being lost. He states that a large part of our cultural heritage is in danger of disappearing because it is not being collected or preserved. [1] A recent surge of media art archiving strategies shows that there is a longing for more permanence and for the conservation of media art artefacts.

We have been active in the field of media art for around 25 years. Observing the rapid disappearance of media artworks over the past decades, we became concerned with creating a personal media art archive that involves the collection and preservation of portraits of important media art protagonist. We do this artistically in the form of video portraits and plotter drawings. Photographs and videos are taken from these media art experts and then transformed with our special software into portraits composed of artificial flies. The symbol of the fly is used to recall decay and vanitas.

Insects have inspired artists since centuries. They depicted, modeled, analyzed, interpreted and investigated them in their works of art: there are for example paintings from the Middle Ages where insects and their larvae symbolized death and decay; there are the realistic depiction of insects in the Renaissance tableaux which proved a painter's mastery; there are also more scientific depictions of insects in still life painting of the 17th century; or more symbolic illustrations of insects in the Romantic period to the 20st century. [2] Modern artists such as Jan Fabre work with real insects, in his case with scarabs for large scale installations and sculptures. [3] Art history could even be studied through the eye of an ethnomologist [4]. Animals Studies, a recent field of investigation, deals with animals in general, however insects have often been left out of the focus. [5, 6]

When we consider that 80 % of all animal species are insects and within the Eukaryots, insects boost the highest biodiversity with an estimated 10–30 million species living on Earth, we can just begin to understand the importance of insects for our biodiversity. In fact we owe a lot to insects, they are essential to our environmental balance, a third of our natural foods for example dependent on insect pollination. Insects are also highly sensitive beings which quickly adapt to changes; they are excellent indicators for the health of our natural environment.

However strangely, the opinion we have about insects, is not always positive. They are often associated with negative emotions, such as pest, disease, and death, and only a few insect species such as butterfly and bees really have managed to be loved by humans. No wonder that especially artists interested in nature started to investigate this love-hate relationship and the fascination and disgust we feel about insects. Jessica Ulrich states that while today the apperception of insects has changed and a more holistic view on insects prevails, we still perceive them as symbols “representing fragility, complexity and life values.” [2]

Using the motif of a common housefly, we created a special computer software that models the swarming movement of real flies. Our artificial flies are programmed to swarm around randomly and once they detect an outline coming from an external source, such as a still image or a video, they try to sit on that outline. After a while when all outlines of the image are detected, the image itself is composed of flies.

Our source images are photographs and short video portraits we collected from around 70 of our colleagues in the media arts. It is an ongoing collection project that will expand over time. So far we have collected images and video portraits by such well-known media art pioneers, scholars, artists, theorist, gallerist and organizers as: Peter Weibel, Frieder Nake, Mark Wilson, Jeffrey Shaw, Hans Dehlinger, Edmond Couchot, Hannes Leopoldseder, Christine Schöpf, Lynn Hershman, Marie Hélène Tramus, Christiane Paul, Sarah Diamond, Peter d’Agostino, Gerfried Stocker, Oliver Grau, Maurice Benayoun, Paul Thomas, Jill Scott, Paul Sermon, Simon Biggs, Greg Garvey, Thecla Schiphorst, Jean-Luc Soret, Dominique Moulon, Erkki Huhtamo, Machiko Kusahara, Hiroshi Ishii, Ryszard Kluszczyński, Annick Bureaud, Derrick de Kerckhove, Jean-Louis Boissier, Anne-Marie Duguët, Victoria Vesna, Sean Cubitt, Joachim Sauter, among others.

The project is a personal collection of fly portraits of our peers who shape and have shaped the field of media art. It is our personal homage to our friends and

colleagues and a celebration of the archivist's melancholic understanding that not everything can be saved. Torn between knowing that media art is a form of art that is linked to decay and destruction, this work also envisions a format that can survive longer. We use the fly as a symbol of life and death, development and decay and to some extent also as an indicator for the health of our natural environment, in this case the environment of media art.



Figure 1. Portrait on the Fly (still from the video portrait series, Anne-Marie Duguet)

References

1. <http://www.mediaarthistory.org/declaration> (last accessed March 28 2016)
2. Jessica Ullrich, *Swarmy Pictures – Insects in Art History*, In: *Hunters and Hunted – Insects in Contemporary Art*, exhibition catalogue, Ed. Stefanie Dahte and Museum Villa Rot, Biberacher Verlagsdruckerei, 2012, pp. 72-78.
3. Jan Fabre, *The Master and the Scarabs, Conversations 04*, Interview by Maxime Pintadu, In: *Cercle Conversations & Images*, Cercle Magazine No. 3, Hong Kong: IdN Publishers, 2015, pp. 91-97.
4. Horst Bredekamp, *Grillenfänge von Michelangelo bis Goethe*, In: *Marburger Jahrbuch für Kunstwissenschaft*, Vol. 22, 1989.
5. Jacques Derrida, *The animal that therefore I am*, New York: Fordham University Press, 2008.
6. Thomas Macho, *Das Zeremonielle Tier*, Vienna: Styria Verlag, 2004.

About the authors

Christa Sommerer and Laurent Mignonneau are internationally renowned media artists working in the field of interactive computer installation. They are Professors at the University of Art and Design in Linz Austria where they head the Department for Interface Culture at the Institute for Media. Sommerer and Mignonneau previously held positions as Professors at the IAMAS International Academy of Media Arts and Sciences in Gifu, Japan and as Researchers and Artistic Directors at the ATR Media Integration and Communications Research Lab in Kyoto Japan. They also were Visiting Researchers at the MIT CAVS in Cambridge US, the Beckmann Institute in Champaign Urbana, IL, USA and the NTT-InterCommunication Center in Tokyo.

<http://www.interface.ufg.ac.at/christa-laurent/BIOGRAPHY/Biographylong.html>

Using images to analyze images. Semiotics meets Cultural Analytics

Maria Giulia Dondero

Abstract

In our text we examine image visualizations generated from big collections of archived images produced by Lev Manovich and his team in the field of Cultural Analytics. Our aim is to examine how these image visualizations function as analysis-images from two correlated perspectives of one semiotic approach: 1. *Enunciation*. What point of view is conveyed by the image visualizations about the computer-manipulated archive images? 2. *Rhetorical/ mereological composition*. What is the mereological relation between the final visualization and the multitude of images that it contains, filters, or manipulates?

Keywords

Visual Semiotics, Rhetoric, Image, Enunciation, Meta-language

0. Introduction

In our text we will examine visualizations generated from Big Data, particularly the images produced in the field of Cultural Analytics through the techniques of Media Visualization as practiced by Lev Manovich and his team in CUNY. The techniques used in Media Visualization take archived image sets (works of art, comics, films, etc.), often available on the Web, and apply computer mapping and analysis tools to them. In this article we will call them "analysis-images", to mean visualizations resulting from computer manipulations of image collections. These computer manipulations are done in a series of different stages; for instance, visual properties can be extracted, then quantified, and finally compressed to yield new visualizations.¹ Computer extraction and quantification techniques are performed on quantifiable visual parameters such as hue, saturation and brightness; position, the size of shapes, and so on.

Manovich studies collections of images (e.g., the complete works of a painter) through visualizations produced with programs such as *ImageJ* and *QT Image Processing*, which are meant to function as analytical tools aided by statistical techniques. On this point, Manovich states that Computer Graphics is to be understood as a method of research.²

¹ In Manovich, Douglass, Zepel (2011) the authors write that this process includes two parts: "1) automatic digital image analysis that generates numerical descriptions of various visual characteristics of the images; 2) visualizations that show the complete image set organized by these dimensions."

² See Manovich & Douglass (2009).

Our part will be to examine how these image visualizations function as analysis-images from two correlated perspectives of one semiotic approach:

1. *Enunciation*. What point of view is conveyed by the image visualizations about the computer-manipulated archive images? What strategies are used in the analysis-images to reflect/comment on the images that they visualize?
2. *Rhetorical/mereological composition*: What is the mereological relation between the final visualization and the multitude of images that it contains, filters, or manipulates? We will examine these visualizations as end-products of rhetorical operations that are "mereological" — meaning that they are centered on relations between the whole and the parts (including addition, deletion, selection, superposition) (Groupe μ 1992, Bordron 1991, 2011). By conceptualizing computer manipulations as mereological operations, we would like to answer the following questions: How is the analysis-image formed into a whole from a collection of millions of images? What are the compositional strategies one must use in order to successfully map and visualize the information bits of an image collection as a *comprehensive whole*, and also as an *esthetic form*?

1. Lev Manovich's "Media Visualization"

In communication science and digital humanities we are currently witnessing an explosion of publications about data visualizations produced for informational and esthetic purposes. Generally speaking, there is a growing need to study these data visualizations and get a grasp of their constructed nature (Bachimont, 2014), including the point of view they convey, via this construction, about the actual data, despite the illusion of objectivity lent by the statistical method used to generate them.³ In most studies, this issue is discussed in connection with visualizing numerical data or language data (Drucker 2014, Flichy 2003, Bonaccorsi 2014), but not specifically with respect to *visualizing visual data*.

For the purposes of this sort of sociological analysis, of course it is easier to construct diagrams and other analytical visualizations from numerical data and/or word data: in other words, from discrete units rather than images, which are syntactically and semantically dense (Goodman, 1968). Paintings are a case in point, as the relevant information is spread over a continuous space

³ See Cardon (2015) for an analysis of the values that currently support the algorithms.

and not very discretizable.⁴ It is true that if one is working with images as a focal point where cultural and/or societal changes can be understood, one cannot rely on the recurrence of fixed units (objects represented and themes); one must rely on translocal forms/formations, which Manovich calls *patterns*:

Until now, most visualizations of cultural processes used either discrete media (i.e. texts) or the metadata about the media. [...] In contrast, our method allows for the analysis and visualization of patterns as manifested in changing structures of images, films, video and other types of visual media. (Manovich & Douglass, 2009: 23).

We need to be able to examine details of individual images and to find patterns of difference and similarity across a large number of images." (Manovich, Douglass & Zepel, 2011: 3). Our goal is to understand which enunciative strategies and which compositional theories (mereology) are embodied in the visualizations produced by Manovich.

As mentioned previously, we will enlist a metavisual and enunciative approach (known as the "uttered enunciation") from the semiotics of images and art history (Marin 1993, Fontanille 1989, Dondero 2016a, Dondero & Fontanille 2014, Stoichita 1993, Caliendo 2008, Damisch 1972, Böhm 2007, Elkins 2008). These approaches have focused on types of viewpoints recorded in images — and the values associated with them — by attempting to demonstrate the image's reflexive autonomy with respect to verbal language. However, in semiotics (Dondero 2014) we were positing that a reflexive image is supposed to deploy at least three kinds of meta-operations:

1. one on itself (*meta-image*),
2. one on the pictorial or photographic medium, which serves as its substrate and presents it to the observer (*metalanguage*),
3. one on how its social and institutional status works (be it artistic, scientific, religious, ethical-political or other) to make it intelligible (*metadiscourse*).

In semiotics these explorations have always been done in contexts that are almost solely synchronic, and focused on small corpora of images. Even in cases where the corpora have in fact been established as relevant objects of analysis, the goal of semiotics has continued to be one of describing the local workings of the images, grouped exclusively by generic (Beyaert 2009), auctorial (Floch 1985) and publishing commonalities (Basso Fossali & Dondero 2011).

⁴ See Dondero (2009) for a discussion of autographic arts such as painting, allographic arts such as music, and hybrid arts such as photography; this analysis also takes image status into account (scientific, artistic).

The approach used in Media Visualization sets forth a new way of studying images, one in which millions of images are studied through their visual qualities, and in which visual consideration of the visual is foremost, and entirely independent of verbal language.

Media Visualization effectuates a "distant" reading of visual archives,⁵ a computerized, statistical reading, as opposed to the "close" reading of small image corpora supported by the hermeneutic tradition in semiotics. We would like to take a "closer" look, semiotically speaking, at this "distant" analytical methodology which uses visual means to study images.

It should be pointed out that Manovich's analysis-images are meant firstly to describe the development of imaging styles and techniques,⁶ whereas semiotic analysis of self-reflexive images has pursued the goal of analyzing how the image functions, and only secondarily — and almost by accident — has it examined the diachronic transformations of techniques and the trends identifiable through these metavisual devices (changes in genres and styles, for instance, or the trajectory of an author).

The "hermeneutic" methods of semiotics, art history, and visual studies have thus far recognized certain metavisual strategies in pictorial and photographic images, based for instance on the *duplication* of their *framing device* (such as a frame within a frame, a mirror, window, or curtains), or based on using texture as a reflection on the sensory motivity of the maker. By contrast, the operations at work in analysis-images are completely novel. We will explore them after a short detour through the metavisual strategies identified by art historians and semioticians in pictorial and photographic images.

2. Metavisual devices according to Stoichita and visual semiotics

Victor Stoichita's work has taught us something of great importance: that it is possible to trace the development of the arts, and particularly genres in painting, by observing the development of frames within a frame (paintings, mirrors, windows, doors, niches, and so on). Stoichita calls these "metapictorial strategies" (1993).

⁵ See Hinterwaldner & Buschhaus, eds. (2006) on visualizations of image collections (*distant* reading) compared with *close* reading.

⁶ "The time has come to align our models of culture with the new design language and theoretical ideas made possible (or inspired) by software. Design, animation and visualization software allow us to start conceptualizing and visualizing cultural phenomena and processes in terms of continuously changing parameters - as opposed to categorical "boxes" still standard today" (Manovich & Douglass 2009: 8).

The different placements of these frames within a frame make it possible to trace the development and diversification of independent pictorial genres (portraits, landscapes, interior painting, still life, and others) from religious painting, which occurred in the early modern period. More generally — and panchronically — the different variants of frames within a frame show a variety of focalization acts recorded in the images, but they also show the presence of conflicts and competing forces within any focalization: obstructions to vision, gaps in the view, and so on.⁷

Stoichita's analyses describe the paintings of the early modern period as an organized whole which has a variety of relationships with its parts, and which governs the relations of the parts with each other. The pivotal device Stoichita explores — the frame — can be broken down into a number of perceptual operations meant to focus attention, to build a center and a periphery in the image, to distinguish encompassing forces from encompassed forces, or to distribute the supporting elements that form the foundation of the image's structure and the basis of our perceptual progression.

The frame as a general act of focalization generates a variety of devices, such as a painting within a painting, a window, a niche, a mirror, or a door, with each of these forms giving rise to different ways of thinking about the particularities of the syntagmatic relations of forces and shapes in visual language.

Below we will list the operations that we consider to be characteristic of each of these devices, which particularize the general focalization operations brought into play by the frame.

1. A painting within a painting deals with assembly operations, i.e., distancing and rapprochement, inclusion, and partitioning; these operations are seen in cabinets of curiosities (*Wunderkammern*), depicting the way in which a painting reflects on a portion of art history. What distinguishes the painting within a painting is the act of embedding one point of view within another, and in some cases, arranging them hierarchically.
2. A window is a device that can highlight actions such as passing, going beyond, projecting into the distance, traveling the distance, and pulling in what is distant; these actions accompanied the birth of the landscape genre. The operations we would like to identify as being specific to the window-frame are projection, exploration and going ahead.

⁷ See Dondero (2016b), where the operations in the devices studied by Stoichita are used to explore the metavisual aspects of scientific images.

3. A niche highlights operations characterized by competition between opposing forces such as /obstructing the view toward the horizon/ and /invading the spectator's space/ so that the viewer turns his attention back on himself. The niche is the device used in still lifes and *Vanitas*, which, although they look like forays into the banality of mundane objects, they function as appeals to the viewer's conscience. They use two strategies for this: a) the dark background and the wall, blocking all access toward the horizon, and b) the objects falling below the threshold separating the image and the observation space. The operations that characterize the workings of the niche, then, are obstruction of the horizon from the observer's view, counterbalanced by invasion of the observer's space.

4. A mirror, or for that matter, any reflective surfaces present in the image (armor, glasses, bottles, gold and silver cutlery, etc.), turn one's gaze back to the act of creating the painting; these surfaces express a kind of reflection on the activities of producing and looking. But unlike the niche, the mirror does not block one's view to the horizon; instead it can turn the horizon around into the foreground of the image — and make it possible to include the figure of the painter in the painting. The mirror is thus a framing device that can turn the view around, and allow additional viewpoints within the image by including scenes that are *a priori* outside it.

5. A door or curtains, on the other hand, allow the viewer to observe from an angle, to penetrate past an obstacle, or to look into a space in between. Doors and curtains can be used both to reveal and to hide, but above all, they let the viewer have a glimpse without being noticed. What is in play here is the gap in the closure of the visual field. The relevant operations can thus be described as follows: a) subtracting from and/or fragmenting the view, and b) ferreting out the strategies used to insert the gaze past obstacles.

All of these devices show us that every look we take at an image is very complex and dependent on micro-forces generated by one initial operation, which is focalization. The operations that we have detected from the devices Stoichita studied help us to see how diverse the actions required of the observers are. These are operations that are pushed to the extreme in art images, with the goal of having the viewer experience the full spectrum of his perceptual powers in response to the power of visual grammar.

Going back to our distinction, formulated earlier, between the meta-image, metalanguage, and metadiscourse, each image that contains a duplication of its frame affords not only a meta-image analysis, but it can also be understood as a reflection on its medium (metalanguage). This is especially true in photography, where the framing process is even more fundamental than in painting — which uses the sensory-motor creation of texture as its basis more so than the

framing. As we have seen, the point of view provided by the frame can also yield a reflection on the status of art (metadiscourse) and on the fact that art shows a predilection for nesting frames within frames, along with duplications and proliferations/variations on these creative mechanisms.

In parallel with art history, visual semiotics has also explored the metavisual concept, often by linking it to the issue of the uttered enunciation, that is, to the markers of the act of enunciation that are left in the image.

1. The foremost metavisual strategy is the *thematization of the act of enunciation* in the utterance. It has to do with representing in the image the act of producing it. Think of the painters shown working in paintings like *Las Meninas* by Velázquez (1656) or *The Painter in his Studio* by Vermeer, or the photographic act recorded in Denis Roche's photos.

2. The second strategy is *embrayage* (engagement), that is, a direct appeal to the viewer through a look or gesture directed toward the front. Needless to say, compared to an *embrayage* in painting, there is a surfeit of authenticity in photographs, for they reflect the distinguishing feature of the photographic process: to see what was seen.

4. The third strategy has to do with *texture*, or the *embodiment of the enunciative act* in the pictorial utterance itself. This strategy is nicely illustrated in paintings such as Van Gogh's *Wheatfield with Crows* (1890). This is where technique occupies the limelight, i.e., the relations between the medium and the result, played out between the treatment of the canvas and the rhythmic motions of the paintbrush, which are directly linked to the sensory-motivity of painting.

4. The semiotic method analyzes the quantitative method

In our view, Manovich's approach also pursues image analysis through framing devices and visual operations. Its inventiveness relative to practices seen in art history and visual semiotics is not solely defined by the targeting of large corpora of images analyzed statistically. While using the frame within a frame in most of his image visualizations, Manovich's analysis goes beyond framing operations. He uses tools that emphasize the differences and fine distinctions in the images: those which are not necessarily embodied in devices or objects, but are scattered across the surface of the image. Think about energy differentials (like light and color), for instance, which are measured for intensity and extent, and which are not necessarily contained within shapes or devices such as a frame within a frame.

Moreover, Manovich's approach is again innovative when compared with analytical strategies based on content analysis, i.e., on labeling the features of every image included in the collection. Manovich is quite aware of the pitfalls of

using verbal descriptions for images, taken from metadata and the themes represented; he proposes an alternative approach directed at examining image corpora through the plastic characteristics of the images. The descriptors are not metadata, then, but attributes of visual language, such as mutual placement, visual features in the topology of the image, types of lines used (straight, curved, and so on), hue intensities, and shading. Not only does he not use verbal language to index images, but even within his strictly visual consideration of the visual, he uses differences and distinctions as the hub of his analysis, rather than pre-determined devices.

Let us turn to Manovich's techniques for organizing a big corpus of images into a unique visualization. Now we are seeking to understand the semiotic strategies used to produce a whole: which compositional strategies are at work, how do the connections between parts work, and how is it unified? These parts can be identified with whole images or with parts of images, or with intensity averages when the image is not counted in its entirety, but instead is broken up into measurable values.⁸

Before aggregating, there are procedures used to extract visual qualities, and then, once these visual characteristics are measured, Manovich proceeds with recomposing in the data space produced from the initial quantitative analysis.⁹ Manovich describes the process of recomposition/ unification in a general fashion:

We create 2D visualizations that position the images according to their feature values. For example, we may use horizontal dimension (x-axis) to represent grayscale mean, and vertical dimension (y-axis) to represent grayscale standard deviation. These image features calculated by software in step 1 became image coordinates in a 2D space. In this way, *the differences between images along a visual dimension are translated into their positions in space*. (Manovich, Douglass, Zepel 2011: 14).

For this reason, in the final visualization, is that the degree of similarity/ difference between paintings is simply equal to the geometric distance between the points in the space.

⁸ The examples of dimensions that can be measured include contrast, presence of texture and fine details, number of lines and their curvature, number of type of edges, size and positions of shapes, and so on. In the case of color images, it's also possible to measure the colors of all pixels (hue, saturation, brightness).

⁹ Firstly, a data representation is modular, i.e. it consists of separate elements: objects and their features. Secondly, the features are encoded in such a way that we calculate on them. (Manovich 2015: 18).

The first and most obvious composition strategy is unification into a mosaic. As states by Reyes (2014), the mosaic is generated by ordering the corpus of images one after another in a sequential manner. The ordering rule could be obtained from measures of visual features (for instance going from the brightest to the darkest), from metadata (for instance by year) or by order of appearance in the sequence (from the first to the last frame). The resulting image montage shows a rhythm of variations and transformations.

In mereological terms, this image generated by Manovich (Figure 1) could be described as a sequencing of images that respects the whole of every image included in the corpus. The syntax is typical of verbal texts, which are arranged in lines to be read from left to right and from top to bottom. This image enables us to see the pace of the transformations and discern the patterns.

The operation generated by this visualization remains governed by metadata (the date, the sequencing of the pages in the manga, and so on). The rules are therefore external to the image (syntax by chronology, external grammar).

In this frame, we see a whole formed from other, smaller wholes; its parts, which are identifiable in the manga pages, have undergone no manipulation at all in their plastic characteristics, but have simply been sequenced so as to easily see the trends and the grayscale variations. This is a frame-within-a-frame operation where the aggregated visualization is unified by rules external to the image, and which I would call an "inventory-image". Its goal is to be exhaustive (although this is a local exhaustivity).

In the second case (Figure 2), in order to establish what Manovich is calling "Style Space", the placement of the images in the encompassing visualization is more interesting: this was done by mapping a relation between two variables onto a *space encompassing the existence of pictorial activity*.

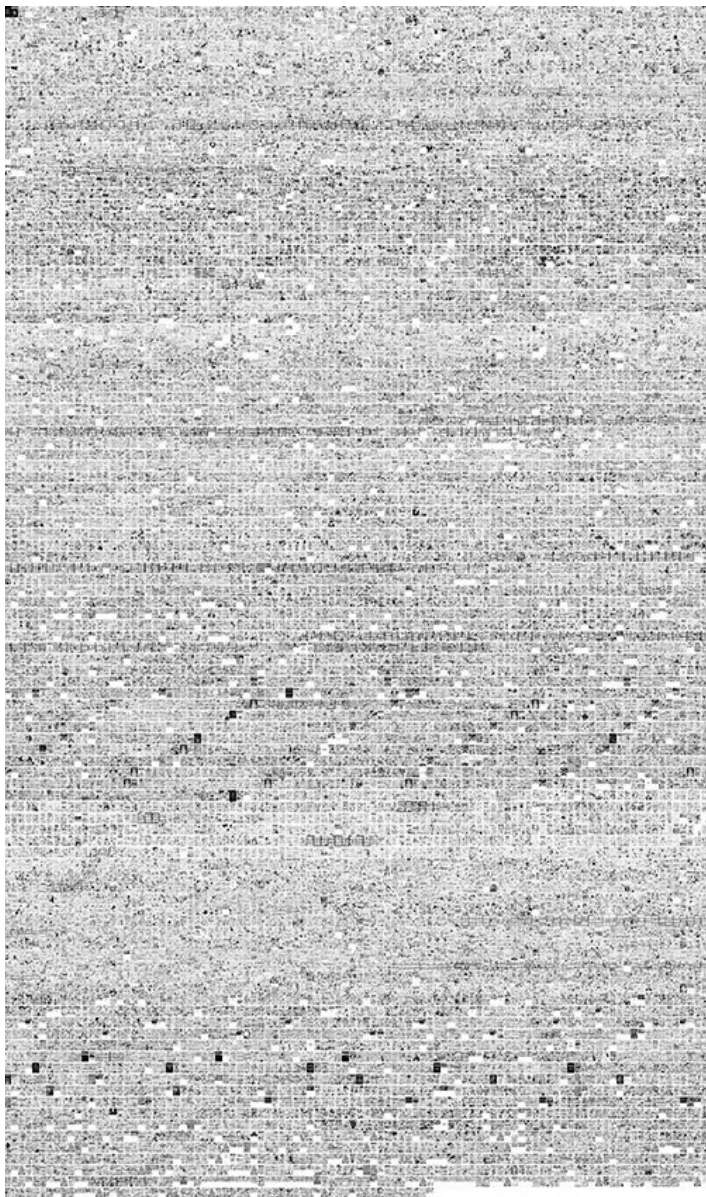


Figure 1. 10461 scanlation pages from One Piece as available on OneManga.com, organized by sequence of publication (left to right, top to bottom).

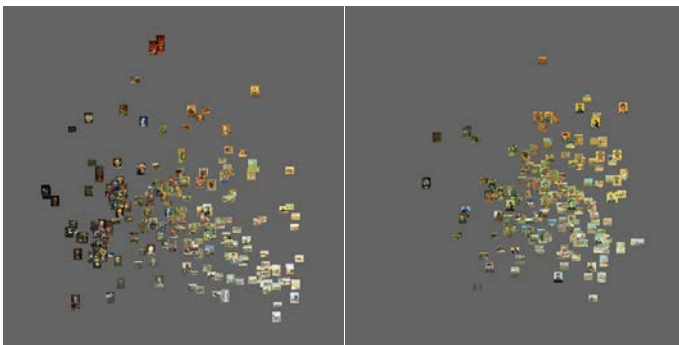


Figure 2a and b: Lev Manovich. *Comparing paintings created by Van Gogh in Paris (left) and Arles (right) on brightness and saturation dimension. X-axis – average brightness; y-axis – average saturation.*

This image represents the work Van Gogh produced during his time in Paris (2a), compared with his time in Arles (2b). While the first example (Figure 1) shows a whole that is enclosed and absolutizing, the two visualizations in Figure 2 (a and b) create a whole which has painting as its relevant field, with Van Gogh's work occupying a limited area.

This is once again a whole, but this time it is a whole that also depicts a space outside the object of study (the works produced by Van Gogh in Paris and Arles).¹⁰ This is not a whole that has been isolated, like the first case we examined, but a whole that shows parts and aggregations between parts (the paintings). These aggregations of parts are placed with respect to an empty, but equally relevant space (a gray background), for it is populated with virtual paintings; it is a space that *could have been* occupied by Van Gogh. The background area is a virtualized presence (brighter paintings may have been possible at that time, in Arles, but Van Gogh did not in fact produce them).

Referring to Bordron, in some ways, one could say that this whole is produced through "screen" operations, that is, sorting and distribution operations: For example, a screen lends unity to a diversity of light beams, no matter where they originate. This principle may be defined as a stop function or sorting function, which comes down to the same thing. The screen lends unification through selection. It assembles elements by virtue of its presence alone. (...) The screen separates because it unifies. (2013: 73, our translation).

¹⁰ This example shows the difference between the *reference corpus* and the *study corpus*, according to Rastier's distinction (2010).

In the lengthy legend that accompanies these two images, Manovich (2015) states: The visualization shows that on these dimensions, van Gogh's Paris paintings have more variability than his Arles paintings. We can also see that most paintings created in Arles occupy the same part of the brightness/saturation space as Paris paintings; only a small proportion of Arles's paintings explore the new part of this space (upper right corner).

The still nearly "empty" space at the top right is significant as a space that could have been actualized by Van Gogh, but was not. So it is a space suspended and unused, which will, however, be used by other artists. The space of this visualization has blank areas (the gray background) to signify what the painter did not do, showing the boundaries of his artistic trajectory (in terms of brightness and average saturation only, of course, not esthetic quality).

Another example of this sort of composition practice is a comparison between two evolving styles, Mondrian's and Rothko's (Figure 3). Here is another example of a style space concept application. Manovich compares 128 paintings by Piet Mondrian (1905-1917) and 151 paintings by Mark Rothko (1944-1957). The two image visualizations are placed side by side, so they share the same X axis.

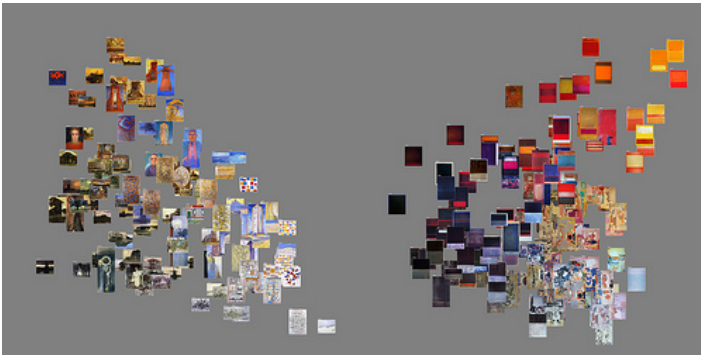


Figure 3. Lev Manovich. Mondrian and Rothko paintings sharing the same X-axis.

The paintings plotted on the graph are represented in their entirety (the frame is still there), so this visualization is another whole that is an assemblage of wholes. But not all the relevant characteristics of these parts/wholes are taken into account. Only certain parameters have been "selected" as relevant. In one way, the paintings of the two artists remain whole, with their frames, but the parameters subject them to a "breaking-up" operation. This action is metavisual, because the choices made about brightness and saturation are highlighted by assembling another "painting" of paintings that are grouped not

by the same rules as one finds in the Wunderkammern compositions (intertextual connections that are both semantic and compositional; see Stoichita, 1993), but by relations that concern only the selected historical period and some formal characteristics of the plane of expression.

The third and last case we have examined here is again different, because when millions of images are visualized, it becomes impossible to keep each painting (or manga page) visible as a part/whole within the encompassing visualization. The image, whose status was one of "part/whole" in the first example (Figure 1) and "part/whole-broken-down-into-various-characteristics" in Figures 2 and 3, is reduced to a simple point/value in our final example (Fig. 4). In this pixel definition, the point is just a value, that is, a final, rather abstract trace of the textuality from which it was extracted. The visual representation of all these values is an image named "Cloud" by Manovich. Rather than a visualization of images, it is a visualization of values instead.

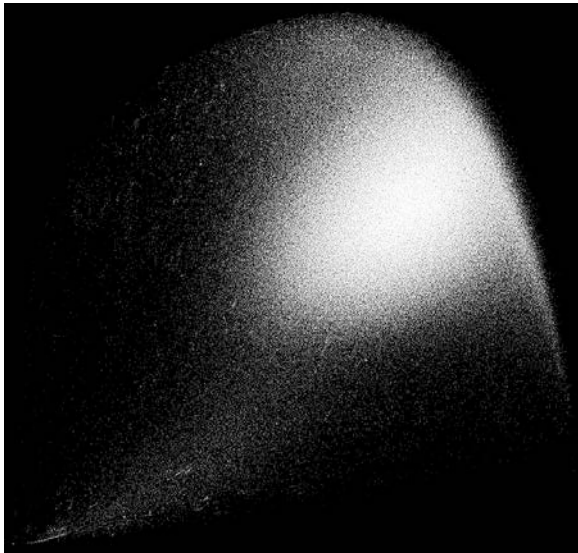


*Figure 4. One million manga pages rendered as points.
X-axis = standard deviation of greyscale values of all pixels in a page.
Y-axis = entropy calculated over greyscale values of all pixels in a page.*

Manovich's discussion of this image follows: "The plot shows that the distribution follows Bell-curve like pattern: single dense clusters with gradual fall off to the sides. The parts of the plot which remain black represent the graphical possibilities not realized in our manga sample." (Manovich, Douglass, Zepel 2011: 36).

Having reduced the characteristics of the manga pages to little black and white dots, this visualization delivers a "shape", which could be described as a portrait of the characteristics that were examined. Rather than plotting and distributing positions, this is a process of watching shapes emerge from visual textualities. The shapes emerge from the images because in this case, the variations are continuous, and so rather than producing separate zones, they create shapes depicting what was realized on a neutral (black) or shaded (grayscale) background. This shaded density makes it possible to visualize everything that exists from what was realized to what is possible, but unrealized: the actualized, the potentialized, and so on.

It seems we can conclude that in order to do a cultural analysis, especially when dealing with phenomena where the data are excessive (such as manga pages or the selfies taken in the world's largest cities over the last several years), one must abandon the wholeness of the parts, and instead reduce them to numerical values. In Figures 2 and 3, we saw whole images that were sorted and redistributed according to selected values (e.g., brightness), whereas in this case, all that is left of the image is the numerical value selected for relevance to the analysis. Now the whole no longer encompasses parts/wholes; it shapes the values extracted from these parts. The values take on a shape, i.e., the shape of the image collection, which emerges due to the selection of certain parameters. In Image 4, we are looking at selection operations, as in the previous cases, but what is different is that after selection, the data undergo a merging operation, fusing them into a whole where the parts do not keep their initial identities.

Conclusions

Although the basic mereological operation in our first two examples (Figures 1, 2, and 3) is a frame within a frame (inclusion), it differs significantly from the operations we identified in the wake of Stoichita's analysis of devices. Particularly in Figures 2 and 3, the frame within a frame depends on a "screen" effect, which allows one to redistribute the parts according to their affinities. In this case, we have sorting and distribution operations that place the entire corpus in different zones of the visualization.

In Figure 4, conversely, the frame-within-a-frame operation is no longer relevant: the point is to delete the very element that preserves the wholeness of the parts (the frame within a frame, fittingly) by putting the parts (the manga pages) through a filtering operation and a merging operation, fusing them into a shape: the shape of the image collection.

The aim of studying analysis-images from the metavisual perspective is to link the mereological manipulations to the epistemic operations performed on the image collections being visualized: the sequencing of parts, the "on-screen" distribution of parts, the merging of values, and the deletion of parts. Once the merging of values has occurred, the visualization of the parts is gone (the primary visual textualities selected for the study), and one obtains a shape of the collection of parts/images. These shape-engendering visualizations can also become esthetically relevant, not to mention informative.

Thus far, Manovich's work has been focused on examining the plane of expression, particularly what we call the *form* of the plane of expression in semiotics (eidetic, chromatic, and topological categories). We wonder whether someone might eventually manage to study vast numbers of paintings selecting the characteristics of their *substance* on the plane of expression -- texture, for instance, which is the focus of current investigations in semiotics. Or is texture a characteristic that is too attached to the unique material aspects of the painting to be studied by quantitative methods? We can also speculate whether Manovich's approach might someday be applied to analyses of the plane of content, or whether analyzing the content plane is too distant a goal for a methodology focused on exploring the transformations over time in visual culture.

References

- Bachimont, B. (2014). Le nominalisme et la culture: questions posées par les enjeux du numérique. In Stiegler, B. (ed.), *Digital Studies. Organologie des savoirs et technologies de la connaissance*. Paris: FYP Éditions. pp. 63-78.
- Basso Fossali, Pierluigi & Dondero, Maria Giulia (2011). *Sémiotique de la photographie*. Limoges: Pulim.
- Beyaert-Geslin, Anne (2009). *L'image préoccupée*. Paris: Hermès Lavoisier.
- Böhm, Gottfried (2007). *Wie Bilder Sinn erzeugen. Die Macht des Zeigens*. Berlin University Press.
- Bonaccorsi, Julia (2014). "Le monde de l'opendata: les jeux sémiotiques et esthétiques de la «visualisation» comme rhétorique de la transparence". *23ème Congrès mondial de Science politique, IPSA*. Montréal.
http://paperroom.ipsa.org/papers/paper_33260.pdf
- Bordron, Jean-François (1991). "L'objet en parties (esquisse d'ontologie matérielle)". *Langages* 103.
- Bordron, Jean-François (2011). *L'iconicité et ses images. Etudes sémiotiques*. Paris: PUF.
- Jean-François Bordron (2013). *Image et vérité. Essais sur la dimension iconique de la connaissance*. Liège: PUIg.
- Caliandro, Stefania (2008). *Images d'images. Le métavisuel dans l'art visuel*. Paris: L'Harmattan.
- Cardon, Dominique (2015). *A quoi revêt les algorithmes. Nos vies à l'heure des big data*. Paris: Seuil-La République des Idées.
- Damisch, Hubert (1972). *Théorie du nuage. Pour une histoire de la peinture*. Paris: Seuil.

- Dondero, Maria Giulia (2009). "The Semiotics of Scientific Image: from production to manipulation". *The American Journal of Semiotics* 25, 1-19.
- Dondero, Maria Giulia (2014). "Les aventures du corps et de l'identité dans la photographie de mode". *Actes Sémiotiques*, 117, URL: <http://epublications.unilim.fr/revues/as/4979>.
- Dondero, Maria Giulia (2016a). "L'énonciation énoncée dans l'image". *L'énonciation aujourd'hui. Un concept clé des sciences du langage*, Colas-Blaise, Perrin, Tore (eds). Limoges: Lambert Lucas, pp. 343-369.
- Dondero, Maria Giulia (2016b). "Voir en art, voir en sciences". *Nouvelle Revue d'Esthétique*. In press.
- Dondero, Maria Giulia & Fontanille, Jacques (2014). *The Semiotic Challenge of Scientific Images*. Ottawa: Legas Publishing.
- Drucker, Johana (2014). *Graphesis. Visual Forms of Knowledge Production*. Harvard University Press.
- Elkins, James (2008). *Six Stories from the End of Representation*. Stanford: Stanford University Press.
- Flichy, Patrice (2013). "Rendre visible l'information". *Réseaux* 2013/2, 178-179, 55-89.
- Floch, Jean-Marie (1985). *Petites mythologies de l'œil et de l'esprit*. Paris: Hadès-Benjamins.
- Fontanille, Jacques (1989). *Les Espaces subjectifs. Introduction à la sémiotique de l'observateur*. Paris: Hachette.
- Goodman, Nelson (1968/1976). *Languages of Art: An Approach to a Theory of Symbols*. Indianapolis: Hackett Pub.
- Groupe μ (1992). *Traité du signe visuel. Pour une rhétorique de l'image*. Paris: Seuil.
- Hinterwaldner, Inge & Buschhaus, Markus (eds)(2006). *The Picture's Image. Wissenschaftliche Visualisierung als Komposit*. Munich: Wilhelm Fink.
- Manovich, Lev & Douglass, Jeremy (2009). "Visualizing Temporal Patterns in Visual Media", http://softwarestudies.com/cultural_analytics/visualizing_temporal_patterns.pdf.
- Manovich, Lev, Douglass, Jeremy, Zepel, Tara (2011). "How to Compare One Million Images?", *Understanding Digital Humanities*, Berry, David (ed.), Palgrave Macmillan, http://softwarestudies.com/cultural_analytics/2011.How_To_Compare_One_Million_Images.pdf.
- Manovich, Lev, Douglass, Jeremy, Huber, W. (2011). "Understanding scanlation: how to read one million fan-translated manga pages", <http://www.imageandnarrative.be/index.php/imagenarrative/article/view/133>.
- Manovich, Lev (2015). "Data Science and Digital Art History". *International Journal for Digital Art History* 1, 13-35.
- Marin, Louis (1994). *De la représentation*, Arasse et alii (eds). Paris: Seuil.
- Rastier, François (2010). "Semiotique et linguistique de corpus". *Signata Annales des sémiotiques/Annals of Semiotics* 1, 9-34.
- Reyes, Everardo (2014). "Explorations in Media Visualization", *Extended Proceedings of the 25th ACM Conference on Hypertext and Hypermedia. Hypertext'14*. New York: ACM Press.
- Stoichita, Victor (1993/1997). *The Self-Aware Image. An Insight Into Early Modern Meta-Painting*. Cambridge/New York: Cambridge University Press.

About the author

Maria Giulia Dondero is Research Associate of the National Belgian Fund for Scientific Research (F.R.S.-FNRS) and teaches Visual Semiotics at the University of Liège. She is the author of three books: *Des images à problèmes. Le sens du visuel à l'épreuve de l'image scientifique*, with J. Fontanille (2012; trans. *The Semiotic Challenge of Scientific Images. A Test Case for Visual Meaning*, 2014); *Sémiotique de la photographie*, with P. Basso Fossali (2011); *Le sacré dans l'image photographique* (2009). She has published around 80 peer-reviewed articles in French, Italian, English, Spanish, Portuguese and Polish, and she has directed 15 collective works and special issues on photography, scientific images and enunciation theory. She is Co-founder and Director of the peer-reviewed Journal *Signata* and Co-director of the collection Sigilla (PULg). She is a member of the editorial board of several scientific journals, such as *Actes Sémiotiques*, *Interfaces numériques*, *CASA - Cadernos de Semiótica Aplicada*, *Texto Livre: linguagem e tecnologia*. She is General Secretary of the *International Association for Visual Semiotics* (IAVS) and first Vice-President of the *French Association of Semiotics* (AFS). E-mail address: mariagiulia.dondero@ulg.ac.be

Art and data: the aesthetic emergence of knowledge

Sandra Álvaro Sánchez

Abstract

The Aesthetic Rendering of Knowledge refers to two linked processes: the mediation of images in the processes of inscription of science and the use that artists make of the metaphorical movements of image for the layout of possible new worlds.

In our Postdigital situation, all processes of inscription have converged to the computer. The multidimensional spaces unfolded in the modelling of data to represent the world as a set of attribute-value relations are shaping a new epistemology and aesthetics. Diagrams are changing the way we understand and act our world and are characterized by its modularity, not only allowing us to model complexity towards the accomplishment of pre-emption and control but also the creation.

Keywords

Data Visualization, Software Studies, Culture Analytics, Materiality of data

1. In our Postdigital Situation data comes from everything and everywhere

The use of the word 'data' appeared in the 17th century and evolved conjointly with modern science. Firstly, it was understood according to its etymological meaning, 'to give', as the premise of arguments -before the facts. Later it shifted its meaning to refer to the result of experimentation, something that must be obtained through instrumentalization, translated to functions and integrated into systems by virtue of its standardization in metrology. (Rosenberg, 2013) Data as pieces of information in numerical form express the qualitative and quantitative properties of a system and the thresholds in which it can change. They allow the identification, location and the performing of operations upon phenomena. This variable index is collected and transported through different processes of inscription. Data is transported from the annotations in the anthropologist's notebook to the tables and classification systems that defined a culture, as well as from the traces in the sketchbook of explorers to the production of a map, which became a navigating tool and system of reference that later on was modified by city planning and become the support to locate and interpret new data.

Data is assembled in inscriptions, graphical representations that allow us to share knowledge and transport it through transformations in a cascade that can always be traced towards its origin to gain veracity. Graphical systems such as maps, blueprints and tables converge with classification systems and the transmission of knowledge and determine the way we understand our

environment and our possible actions in it. The graphical rendering of data has a long evolution in which varied fields of research and practitioners have meshed. Its story can be traced towards the first symbolic maps and calendars - Anaximander is attributed with publishing the first map of the world -; the first reference systems -in the *Almagest*, Ptolomeus assigned coordinates to all places and geographic features he knew in a grid that spanned the globe-; the statistical graphs developed since the 17th century aimed to quantify and discover regular laws codifying human behaviour; the automatic recording of image, until reaching the complex three-dimensional simulations rendered in computer screens and the abstract graphs that constitute current data visualization.

After the Digital Revolution and the spread of computers to all fields of knowledge, practice and production, data has become pervasive. The content of the cells on the tap of the Turing Machine become differences of potential read by a universal machine able to automate any computing function described in a program. Data occupies the placeholders assigned by a program becoming the contents upon which programs are performed. Inside the diagrammatic space, algorithmically defined, data becomes the material in which our world is imagined, known and acted. Inside the screened space of computers, data is rendered to produce the interfaces that allow our interaction with this medium, at the same time as determining our affordances on it and constraining the performance of the universal machine. Our action becomes inputs, new data, able to start processes but also to be stored in a database, a permanent recording of our digital identity that can be shared across the system to be acted by new algorithms, mined and visualized. In our technological milieu, we are continuously transduced in technological mediations, becoming unaware of being engaged in the system as data producers, processors and transmitters. The ontological binarism of data processing has migrated from labs to production, management and daily life. We are involved in the algorithmical management of data every time we publish a post or a picture, click a “like” button, add a friend to our collection and read a book or watch a film on-line. In addition, after computing has become ubiquitously embedded in physical space by the dissemination of networked objects equipped with sensors, we are also engaged in data processing when we use the public transport systems; make a purchase with our credit cards or cross in front of a surveillance camera.

Data has become massive, a continuous and discrete flux collected from our social interactions, our past and current cultural production and the sensing of our environment.

Data is produced as a by-product of our daily interactions inside the platforms of the Web 2.0. Nowadays nearly the half of the world’s population has access to internet. Among connected adults, almost all have a presence on social

media, with 92% having an account and 78% being an active user of at least one service. In addition, multi-networking is becoming common, with the average digital consumer having over six accounts and being active in over 3.5 services. The average user spends 1 hour 49 minutes per day on social networking. This interaction time is spanned in short intervals after mobile networking became popular and most people continuously shift their attention between physical and screened environments, where social and entertainment activities have converged such as talking with friends, watching television or listening to music.

Other large data sets are produced on the digitizing of historical documents that encounter with digital-born multimedia production to constitute an available networked universal archive of our cultural background. The Internet Archive reunites more than 223,000 collections including, books, software, audio, pictures and video, and Google stores an ever-increasing database of books in Google Books and art images in the Google Art project. There are also a large number of dedicated databases, such as ubu.web, archiving media related to avant-garde art, the International Film database, or storing the data of film production. In addition, a growing quantity of institutional archives are being put online, the Gaumont Pathé archives resumes the history of the 20th century in 250,000 documents, 17,000 films; the Spanish Filmoteca Nacional reunites films and the No-Do, the news programme turned into filmographic support, with the television production since the beginning of the radio-television Spanish service until today; the HathiTrust research centre has made available for research data extracted from 4,801,237 volumes, containing 1.8 billion pages. As well as the large quantity of digitized material there is the continuous production of digital content on the platforms of the web 2.0. Every second an average of 6,000 tweets are published on twitter and the creators of YouTube Spaces have produced over 10,000 videos, which have generated over 1 billion views and 70+ million hours of watch time.

Finally, there is the data produced by the flourishing technology of the Internet of Things. Nowadays there are more objects connected to the net than people, raising the 22.9 billion of connected objects that collect data about environmental changes, people mobility and transport use, consumption and purchases, power and water consumption and anything that can be sensed by an identified and geolocated device.

This data deluge is producing a new hype, fostering technological research. Communications companies, governmental institutions and research centres are focusing on the development of artificial intelligent systems able to mine this big data towards its use in advertising, behaviour control, and sustainable

development. However, in academic and media literature the concern is growing about the changes operated upon our society and subjectivities by the automatization of hitherto exclusively human functions. The algorithmic processing of data has not only changed the ways we perceive our world and research is conducted, but also the way we act and construct our environment. Data processing algorithms are incorporated into processes of decision-making, design and management. The computing of big data and the associated technologies of the Internet of Things and *smartcities* are producing new technological systems determining our affordances in the environment. This text is aimed firstly to summarise a map of the development of the computing and visualization methodologies we use to describe and act in our world and the implication of art in its development. Secondly, the aim is to look at the artistic work with data as a source of social intervention and proposals of new possible modes to design our material environment.

Visualization is a method of computing that transforms the symbolic into the geometric, enabling us to see the unseen, (McCormick, 1987) a procedure that started in the development of scanning systems and the algorithms and data structures to allow rendering the data obtained into images able to simulate our world and the phenomena occurring on it. This methodology has migrated from scientific research to the analysis of cultural production and human behaviour and become a necessary resource of our literacy. Visualization is not developed for machines but for humans, giving form to data taking advantage of the capacities of human perception to recognise patterns. (Wright, 2008) It is a method useful for making the actual data deluge and the computing processes that are performed at a scale and velocity not affordable to human perception as humanly understandable. The rendering of data by computers has developed a new aesthetics and epistemology. Our world is perceived as a complex net of relations distributed across multi-layered spaces, a new panoptic view that assembles real-time obtained heterogeneous data in abstract maps towards the complete rendering of the ecologies of isolated macro-systems. An example is the *Earth* project by Cameron Beccario, consisting of an on-line interactive earth globe to visualize worldwide weather patterns. The author uses data from the Global Forecast System to render colour coded wind streams according to velocity and sweeping across the three-dimensional globe. When the user clicks on a location further information is provided as geographical coordinates, wind speed and temperature. Since 2013, this map has been expanded with new layers to show other environmental information such as carbon monoxide concentration, dust and sulphate extinction and measured temperature. Another example is the *GDELT* project by Kalev H. Leetaru. This earth globe geolocates data mined from the worldwide news stream and is aimed at seeing how new stories group countries into distinct clusters, by means of listing the

countries mentioned in every monitored article published anywhere in the world and assuming that countries that are frequently mentioned together reflects geographic proximity and economic and political ties.

In contrast to the global view, which reduces the understanding of our world to the layout of systems of predefined possible relations between selected features, art explores the materiality of data. Art engages in the disruption of the mechanisms of data processing to resurface its components and explore the possibilities of new assemblages. The production of new transducers and new visual and sonic data renderings is implied in new artistic strategies conducted to experiment with uncertainty and explore non-actualized possibilities. These strategies unveil the mechanisms of data processing, making it work out of functionally-framed context towards the production of a fragmented content assembled with the participation of audience. They foster the participation of new collectives in data collection and processing, establishing new channels of communication and promoting new agents towards the recuperation of the situated contexts and local knowledge that are lost in global networks. Finally, they explore the poetics of connection in a speculative experimentation aimed at the exploration of all possibilities and the promotion of new worlds. These strategies branch with social intervention and new proposals for the material production of our environment.

2. Visualization and cognition

Bruno Latour illuminates the importance of writing and imagining craftsmanship for science. Science works developing instruments that allow for collecting data, quantifying the behaviour of matter in an observable and traceable space, and inscribing these movements onto a surface that can be transportable such as a table, map, blueprint, diagram etc. These inscription processes become what Latour calls Immutable Mobiles, graphical and writing representations that allow data to be transported across a cascade of transformations towards the constitution of the facts. From the traces observed in the field and their accurate labelling to the lab and finally to the institution that will support their validity and spread. Systems, structures, patterns, theories and abstractions are the result of the superposition of inscriptions. Coded in flat surfaces, data has become mobile and immutable, can be modified in its scale, reproduced, recombined and become part of written text. The images produced in the differentiated steps towards the establishment of scientific facts becomes the place of encounter from where knowledge can be shared, discussed, re-elaborated, put in connection with other facts, proved and believed. In addition, realms of reality that seems far apart are inches apart, once flattened onto the same surface, the described objects of research

encounter with the economics, marketing and management. Work can be planned, dispatched, realized and responsibility attributed. (Latour, 1986)

Latour illustrates this process reinterpreting modern revolution through its visualization methods. Scientific revolution becomes considered a revolution of *sight* due to the invention of perspective and printing press, the methods that evolved visual culture having a role in the development of knowledge, redefining both what is to see and what there is to see. Perspective gave optical consistency to representation, allowing phenomena to be dominated by eyes and hands. The recognition of internal invariances through all the transformations produced in changes in spatial location leads to a homogeneous space of representation divided into identifiable coordinates of longitude and latitude and in continuity with geometry, which allow continuity between transformations planed in bi-dimensional space and transformations performed in three-dimensional objects. In turn, the printing press becomes an accumulator of time and space. Text and engraved figures can be reproduced and distributed without loss, across time and space. They become the support for the accumulation of knowledge, which can be perceived as one in the same medium and dominated in a large scale. The printing press allowed the spread of knowledge and its faster evolution at the same time as the homogenization of language towards the emergence of new fields of research.

Inscriptions such as the Mendeleyev table allows us to see relations between data, in which the properties of an element and its possible combinations unfold completely from its position in the table, not only allowing classification but also the discovery of new elements stablishing variables to be fulfilled. At the same time, the homogenization of knowledge to a media allows the accumulation and sharing of knowledge. *The Mundaneum* envisioned by Paul Marie Ghislain Otlet is considered the precursor of the institutionalization of knowledge creation and transmission in the universal archive.

In our contemporary world inscription processes have been delegated to computers and automated in a machine with powerful computing capacities able to process large heterogeneous datasets and auto-spatialize it in topological surfaces, which allow multiple variations. Heterogeneous data can be rendered in interactive spaces where they can be modified in real-time. Screened in computers, images became manipulable in real-time leading to the Graphical User Interface, one of the main components that assembled into personal computers, the Computer Assisted Design Systems and Scientific Visualization. These systems evolved to form the simulated interactive spaces where research, production and entertainment converge.

2.1 Scientific Visualization

In 1963, Sutherland created Sketchpad in the TX-2, the first interactive computer, featuring a screen, a lightpen and twice the memory speed of the then largest commercial computers. Sketchpad was aimed at assisting in design and is considered the first interface allowing direct manipulation. Images were considered as objects and coded as vectors, a data structure that shape geometrical primitives such as points, lines, curves, and shapes or polygons, all of them based on mathematical expressions, by means of being led through locations called control points or nodes. In Sketchpad images can be manipulated, constrained, instantiated, represented iconically, copied and recursively operated upon, even recursively merged. This system is the core of human computer interaction becoming the precursor of the graphical user interface, the development of animation and design software, and the first video games, where it evolved towards new data structures able to render three-dimensional images and the raster graphics, the data structure that allowed rendering of the images synthesized in a computer as realistic simulations.

In science the rendering of data to image was developed towards scientific visualization, a procedure developed to manage with complexity. Scientific visualization consists of filtering raw data to select a desired resolution and region of interest mapping this result into a graphical form, and producing an image, animation, or other visual product. Ed Zajac pioneered this procedure at Bell Labs, where he produced the animation *A two gyro gravity gradient altitude control system*. Other early works are the series of films of molecular structures produced by Nelson Max and Laurence Livermore, the visualization film on the interaction of two neighbouring galaxies produced at Ohio State University in 1977. In addition, the works of Jim Blinn at the Jet Propulsion Lab of NASA, who produced over 500 scenes for 52 half-hour programs describing physics and mathematics concepts for college students.

However, scientific visualization was not described until 1987, when a SIGGRAPH panel released a report done for the National Science Foundation, *"Visualization in Scientific Computing"*. Visualization is considered as image understanding and image synthesis, a tool to interpret data fed into a computer and for generating images from complex-multidimensional data sets; a discipline that merges the convergent fields of computer graphics, image processing, computer vision, computer aided design, signal processing and user interface; the simultaneous study of human perception and computer imagining capacities to allow them to perceive use and communicate visual information. The first visualization systems aimed at interpreting data were referred to as modular visualization environments (MVEs). They were based on the dataflow

paradigm and consisted of modules independently developed with standardized inputs and outputs that were visually linked together in a pipeline. The users accessed an interactive graphic networking or mapping environment, where they could select program modules from a library and specify the flow of data between them. These systems were developed to allow scientists without graphical expertise to access the computerized medium to analyse data patterns. They allowed for rapid prototyping and interactive modification in a system that was extensible by means of the programming of new modules and whose results could be reused and easily shared. Most of the early visualization techniques dealt with 2D scalar or vector data that could be expressed as images, wireframe plots, scatter plots, bar graphs or contour plots.

The synthesis of images from complex data sets evolved through the creation of algorithms able to render the data obtained by sensing devices such as the medical scan Computer Axial Tomography, ultrasounds, geographical information, fluid dynamics and remote sensing to three-dimensional images and animations. *L.A. the Movie* produced by the Visualization and Earth Sciences Application (VESA) group at JPL is one of the first images produced with remote sensed data. It consists of a 3D perspective rendering of a flight around the Los Angeles (California) area starting from the coast of Catalina Island. The remotely-sensed imagery was rendered into perspective projections using digital elevation data sets from multispectral image data acquired by the Landsat earth orbiting spacecraft on 3 July 1985.

In 2008 Donna Cox, today director of the Advanced Scientific Visualization Laboratory at the National Centre of Supercomputing Applications (NCSA) (University of Illinois at Urbana-Champaign, USA), proposed the Renaissance Teams, teams in which artists and scientists work together to make the unseen visible. These teams produce high definition simulations derived from large systems of equations able to model and predict the behaviour of natural events. The production of simulations involves speculative data or the use of *visaphors*. Cox coined the term *Visaphor* to distinguish data-driven visualizations developed from quantitative data from visualizations that are metaphorically derived, models and metaphors used to speculate about invisible patterns and forms in the natural phenomenon by using computer-mediated and digital technologies to display quantitative and qualitative information. These models construct unperceived systems such as the behaviour of stellar bodies, the microstructure of inner organisms, and global natural phenomena such as storms, making them available to researchers that can record and study the numerical output produced in the solving of the complex equations that determine its behaviour in the supercomputer. This new process of inscription enables a system to be reproduced and the structure of its space of possibilities

and simulations to become laboratories where the emergence of complex phenomena can be studied.

2.2. Computer Visualization Simulation and synthetic knowledge

Delanda noted how the procedures of inscription developed in computers favoured the emergent conception of science in which knowledge is not attained in the formulation of general laws and the submission of identities to transcendental categories but in the speculative research of the mechanisms producing a given effect. (Delanda, 2011)

Matter is conceived as immanent and actuating thoroughly towards the assemblage of emergent wholes. An assemblage is a whole the behaviour of which cannot be deduced from the addition of its parts, a temporary disposition of matter having a history, summarized in the interactions that produce its origin and maintenance. Assemblages exhibit emergent properties that gives them qualities in addition to tendencies, the non-actual possibilities and an infinite list of capacities, the capacity of entities to affect and be affected, unfolding double events in the encounter with other entities on the environment. Tendencies and capacities compose the structure of space of possibilities of any assemblage. Simulations by virtue of their isomorphism- the independence mechanism through which a generated pattern can be translated into different wholes- can assist mathematical models in the deciphering of the structure of possibility spaces. Simulations explore possibility spaces by means of staging interactions in which capacities are exercised and varied in multiple ways until the singular features of the possibility space are made visible, allowing their effects to unfold and be studied.

Simulations are emergent wholes constituted by information, and programmable diagrams in which the parameters are defined, the population recursively produced with a statistical distribution of variability and its limits. Parameters are the gradients in which a system can change and evolve, a codification that determines the possible behaviour of a whole and its identity, the similarity between two wholes being determined by the value of their parameters at a given moment.

Simulations can be run and manipulated towards the discovery of the mechanisms producing an effect and the prediction of their evolution. In techno-social systems, this can be exploited towards a form of control based on pre-emption, the laying out of systems able to calculate possibilities until the exhaustion of uncertainty and suppression of any possibility. However, at the same time the multidimensionality of diagrammatic space and the abstraction attained by object-oriented languages, in which control has been decentred and

moved from the master program to the emergence of data patterns, allows the speculation of unrealized possibilities, the laying out of deterritorializations, towards the creation of unexpected morphologies and events.

The mathematical models where the structure of possibility spaces are explored produced visualization layouts that are applied to the study of any networked phenomena such as the emergence of communities inside the blogosphere; the research fields described by citations inside scientific literature; the structure of proteins; the trajectories traced by commercial airplanes; and the transmission of information in twitter. As a result, culture and social behaviour can be studied in its emergence and historical evolution.

3. The quantification of society and culture

The quantitative study of society has evolved from the application of statistical procedures to the study of social events. In the eighteenth century sociology appeared as a science of society aimed at quantifying human behaviour and discovering the patterns that led to the formulation of the general laws ruling society. In this period, official state statistical offices were established throughout Europe, in recognition of the importance of numerical information for social planning, industrialization, commerce and transportation. William Playfair is considered the founder of graphical methods for statistics; he invented plots still in use such as the line, area and bar chart published in his *Commercial and Political Atlas* in 1786, as well as the pie chart and the circle graph that appeared in the *Statistical Breviary*, published in London in 1801. Charles Joseph Minard produced the Napoleon's disastrous losses suffered during the Russian campaign (1812-1813), in which he used line charts to summarise the dense information in a history flow, and in the 50's introduced themed maps, maps meshed with statistical information that could be located in relation to space and time.

Nowadays, as our daily lives and culture go on-line, visualization and computer analysis are applied to the understanding of human relations and behaviour and to track and analyse the user-generated content inside social networks. In addition, it is used to analyse and classify digitized cultural documents and to follow the evolution of cultural areas producing digital objects such as music, web design or fashion. This methodology is related to new fields of research such as social computing, digital humanities and culture analytics.

This analysis produces maps, abstract spaces where human interaction and collective intelligence is tracked as an emergent whole, defined by its relationships, dynamism and tendencies. If initially Internet was understood as

a universal archive, in which efforts were conducted to the classification of contents for its retrieval, the participative architecture of web 2.0, defined by attribute-value database systems and the logarithmic management of data has evolved the net into a complex open system not subsumable to any classification and only traceable in its evolution. An early example tracing collective intelligence is the *History Flow* project produced in 2003 by Fernanda Viegas. It visualizes in a temporal flow the contributions and modifications to the Wikipedia topics.

From then computer analysis and visualization has been applied to the analysis and automatic classification of cultural products.

Ted Underwood et al. in the paper "*Mapping Mutable Genres in Structurally Complex Volumes*", describe a multi-layered solution that trains Markov models to segment volumes, and uses ensembles of overlapping classifiers to address historical change through a collection of 469,200 volumes drawn from HathiTrust Digital Library. In this way, he demonstrates the evolution of literary genres and proposes a taxonomy and method for the automatic classification of literary works.

Babak Saleh Kanako Abe Ravneet Singh Arora Ahmed Elgammal published: "*Toward Automated Discovery of Artistic Influence Who influenced this artist?*". In this paper, art history is dealt with as a knowledge discovery problem and computer vision algorithms are used to investigate painting-similarity and artist similarity. As a result, they provide a visualization of the evolution of painting across the reshaping of subjects and compositions from previous works by later artists.

Other cultural productions, the evolution of which has been elucidated by means of computational analysis, is the evolution of music "*Measuring the Evolution of Contemporary Western Popular Music*", the design of websites "*Quantifying Visual Preferences Around the World*", and the evolution of filmographic image "*Quicker, faster, darker: Changes in Hollywood film over 75 years*". Additionally, network layouts have been widely applied to the study of social platforms.

Haewoon Kwak, Changhyun Lee, Hosung Park, and Sue Moon take as a starting point the question "*What is Twitter, a Social Network or a News Media?*" to realize a complete study of the topological characteristics of the popular microblogging site. It includes information diffusion, trending topics and clusters of users, that are studied according to the properties of network layouts, considering tweets as communication channels of information diffusion to observe that retweets reach a larger audience and spread fast.

Social networks are also studied in relation to the new digitally born forms of communication nowadays becoming popular as posts, memes and selfies.

These studies include text analysis and computer vision algorithms to attend not only to the interactions among people but also to the characteristics of the contents produced. This is the case of the study “*Dawn of the selfie era*” and the studies about the transmission and variability on the content of ‘memes’ conducted by Lada Adamic and Limor Shifman.

Lev Manovich defined Cultural Analytics in 2005 as the analysis of massive cultural datasets and flows using computational and visualization techniques. He and his team at the Software Studies Initiative has developed visual techniques to analyse the deluge of images produced in the social net. The *Image plot* is a methodology that enables the comparison of low features from millions of images without reduction. It is aimed at localizing subtle differences inside massive cultural production. The methodologies developed in this lab have produced projects such as *Selficity* and *On Broadway*.

Selficity and *On Broadway* analyse digital media cultural production in relation to urban environments. *Selficity* compares patterns in self representation using a collection of self-portraits shared on Instagram by people in five global cities. These pictures are analysed in relation to demographics. *On Broadway* focuses on a single street in NYC and analyses images shared along Broadway on Instagram and Twitter, Foursquare check-ins, taxi rides, and selected economic and social indicators using U.S. Census data offering an interactive global view of how urban life is portrayed in social media. (Manovich, 2015)

The project addresses some of the problems exhibited in the computational analysis and visualization of our society and culture. First, these projects use to visualize isolated culture fields such as literature, music, art and social networks as complex systems evolving independently from the richness and fruitful interactions with other systems and the local spaces where these cultural artefacts are produced. Secondly, they obviate the material ground of the digital milieu, the characteristics and functioning of the techno-social systems in which these cultural contents are produced and distributed.

In this sense *Selficity* relates the content shared on the Instagram application with the demographics of the cities these are produced in, looking for the differences among contents produced in different places as a way of elucidating the characteristics of local culture. *On Broadway* examines all the media content produced around a localized geographical point to compose a big picture of the multiple on-line interactions around this place.

Lev Manovich has also studied the influence of the evolution of the digital milieu in cultural production in “*Software takes command*” and in his recent work

"Subjects and Styles in Instagram Photography". Here the evolution of picture cameras and its integration in mobile phone applications, allowing the use of photo filters and edition, is related to the democratization of photography and its conversion into a usual medium of communication.

3.2. The politics and epistemologies of Data

The use of data for the analysis of culture and human behaviour has raised concerns about the threat to privacy, the bias of big data, the way in which research is conducted, and the powerful influence that the big data studies and experiments can have on human behaviour.

The vulnerability of privacy inside social networks has been widely addressed in academic and mass media literature. Data about interactions and content shared is mined in studies and commercialized without the knowledge and consent of users. In addition to this social concern there are problems affecting the development of culture analytics. In these studies data is considered as neutral, exhaustive and capturing a phenomenon in its totality. However, data is biased. Data does not exist independently from the purposes and goals directing its gathering, the technological systems producing it, and the Collectives engaged in conceiving and managing it, in addition to the policies that regulate its management, privacy, and protection. This bias affects research that is limited to the availability of existing datasets. This implies, on the one hand, that social phenomena and relations that do not produce data are ruled out of the scope of social research. In the study *"Social Media Inequality: Definition, Measurements, and Application"* the unequal density of data produced around the geography of the city is portrayed, showing how there are places that are poorly reflected in social media. On the other hand, that research has moved from the academy to the labs of the big companies owning this data. As data remains protected under the property of companies, researchers must operate with data that they do not know how it has been obtained and, outside the open discussion that must characterize the elaboration of knowledge, the lack of openness because the results of research must be presented without the explanation of the data sources and methodologies. Finally, Schroeder identifies the capacity to manipulate audience and customer experiences on an unprecedented scale and with unprecedented accuracy as the main threat of this technological stage. Schroeder illustrates his thesis referring to the Facebook experiment Emotional Contagion conducted by Kramer. It describes how, over the course of one week in January 2012, the company altered the 'news feed' of two groups of the Facebook users. In one group, the company reduced the number of feeds with positive emotional content. Meanwhile, in the other one, it reduced the feeds with negative emotional content. After the setting up of these conditions, the

experiment followed with the emotional analysis of the posts published by both groups. The analysis of 122 million words from 3 million posts demonstrated that the emotional content of the shared text was influenced by the experiment. It became more positive in the group where the negative content was filtered, and more negative in the other group. Schroder infers from this study how data can be used to manipulate people in powerful ways. (Schroeder, 2014)

Data processing and the capacity of simulation of computers not only defines a new aesthetics and epistemology conveying the way we represent and know our world. The algorithmic management of data is being applied to the production and management of our space and determining our possible actions on it. Computing and its capacity of pre-emption is being embedded in physical space by means of the networked objects of Internet of Things. As a result, we are continuously engaged in fuzzy relational systems working outside the range of our perception. In this sense, art has evolved simultaneously into our technosociological milieu developing strategies leading to the criticism and elucidation of data processing and the intensification of space. This poetical use of data is related to the fostering of collective participation in the production of space and the proposal of new possibilities for the representation and design of our material environment.

4. The Poetics of Data

Art was engaged in the production of our technological milieu from its inception, Ken Knowlton and Stan VanDerBeek experimented with early image processors and animation packages, and Myron Krueger developed one of the first virtual reality systems. At the same time, manifestations as the exhibition “*Software*”, curated by Jack Burnham in 1970, was asking ‘What is to live in the new computerized environment?’ and focused on how programs structure reality and forms of action, putting the public in programmatic situations structured by artists. Among the works gathered was the *Composer* by Allen Razdow and Paul Conly, a synthesizer that modulates the disruptions produced by the spectators to create music demonstrating data processing as the discrete composition units of a reality that can resonate ensemble to produce new assemblages. Hans Haacke showed *Visitors Profile*, a profile from the visitors that emerges from their own contributed information that reduces them to the statistical processing of data. *Seek* by the Architecture Machine Group conducted by Nicholas Negroponte, consisted of a terrarium, where a gerbil’s colony cohabitated with heaps of building cubes and an omnipotent robotic arm. A responsive environment that senses its inhabitants and reacts to their inputs adapting itself. From then to now artist had been engaged with the materiality of data building transducers and programs able to embody

information in the environment and to transform data and its processes from a given to an interpretative experience, exploring connectivity of data processing its pragmatics and poetics towards the increase of our awareness and the promotion of new worlds.

Data Visualization can work as a tool for the unveiling and criticism of the hidden processes shaping our society and can contribute new features to existing diagrams, disrupting assumed models. At the same time, artistic visualization can produce new layouts, new metaphoric ways to spatialize data that are able to produce new meanings. Aesthetic layouts are not only concerned with the beauty, but also disrupt the analysis of data based on functional and pre-emptive applications pursuing new ways of understanding and perceiving the world.

Artistic projects uses visualization to resurface the unseen processes we are meshed shaping our quotidian spaces. In 2000 using the Rhizome contents and interactions as a data source Galloway created an interface in which a star appeared each time a new document was read; this star increased its brightness every time the document was accessed again, the actions of the community producing a *Starry Night*. The emergent collective production is also show in situated physical spaces. George Legrady installed in 2005 the work *Infoviz at Seattle public Library*. Screened in the hall of the Rem Koolhaas building, users of the service can see the evolution of the interactions with the collection harboured in the institution. Other projects combines visualization with physical computing to open new channels of communication unveiling the not perceived agents that are actuating in our ecologies. *The immaterial* project by Timo Arnall, Einar Sneve Martinussen, and Jack Schulze from BERG renders visible patterns by sensing the invisible architectures of communications as RFID, NFC and Wifi present around us. The work by Natalie Jeremijenko, *Bat Billboard*, is a shelter and communication platform for bats. It adapts to the existing billboard structure as a refuge where urban bats find a safe space to live and hibernate. Monitoring equipment inside the billboard uses voice-recognition software to map and translate the calls of resident bats, matches them to archives of various call patterns and meanings and displays the resulting messages on a screen. These technological procedures are also appropriated in collective spaces of production assembled around the Do it Yourself. The continuous prototyping carried out in these spaces allows reimagining the future, simultaneously to challenging the status quo of design, which is open to a speculative process produced in the concurrence of the molecular forces of the engaged Collective towards the exploration of the Virtual and the actualization of new affordances. In Hackerspaces visualization is conducted to expand the literacy about our datified milieu approaching

infographic and storytelling techniques, creating new datasets related to Open Data and Citizen Science and producing maps collectively.

Hackerspaces house projects for collecting data by means of browsing the web or creating sensing devices. The web can be browsed to unveil the relations between apparently unconnected events, positions of power inside corporate companies, or the structure of public institutions and their relations. This data is deployed in infographics to narrate a story. In addition, the creation of sensing devices leads to Citizens Science. It consists of the creation of easy-to-assemble and economically affordable prototypes to sense the environment that can be widely distributed among the population, which they can use to crowdsource data about environmental conditions such as the level of noise and pollution. This data is automatically reported to platforms such as Xively where it can be freely consulted and used in visualizations creating awareness of our environment. Taking part in the collecting of data, citizens become aware of the processes and bias involved in the production of datasets and their later analysis. In addition, they can create new datasets to fulfill the interstices of the global net, the black holes or unconnected places can be sensed by citizens working in these local places, translated to data and put in circulation inside the normalized procedures of the production of knowledge and challenging the global network that defines the actual geopolitical map. In addition, crowdsourced data is freely shared outside the proprietary restrictions of big companies and promotes open knowledge.

Visualization is also used inside Hackerspaces to produce maps that become platforms for the encounter of their members, where they can work collaboratively on the production of storytelling, shared knowledge about local places, and the promotion of new uses of space. The production of maps reterritorializes space outside the goal of behaviour control and as an exploration of new possibilities.

Artistic projects do not consider technological transducers as mediations working outside the focus of our attention, but deal with everything around us as agents with the capacity to “make us make”: art, when working with data, does not reduce reality to the control of processes occurring on an imperceptible immaterial plane, but shapes it as things that one can experiment with. This experimentation increases our literacy regarding the technological medium while making it appropriable, in that its components can be aimed at new Transductions with the setting, from which new capacities can emerge. Making the territories expressive and opening them for appropriation is the capacity that defines Art, its revolutionary activity consisting of the extraction of new lines-of-flight that raise the Virtual towards the realization of new

possible worlds, creating things that enter into our ecology and establishing new relations that attach new dimensions to the already existing assemblages, which mutate to constitute new dispositions of the real.

References

- Rosenberg, Daniel (2013). “Data before the Fact” at Gitelman, Lisa (ed.) *“Raw Data” Is an Oxymoron*. Massachusetts: MIT Press, pp. 15-40.
- GlobalWebIndex (2016). *Social*. GlobalWebIndex’s quarterly report on the latest trends in social networking.
- McCormick, B.H et al. (ed.) “Visualization in scientific Computing”. *Computer Graphics* 21,6 November 1987. New York: ACM SIGGRAPH, pp. 3-4.
- Wright, Richard (2008). “Data Visualization”. Matthew Fuller (ed.) *Software Studies/ A Lexicon*. Massachusetts: MIT press, pp. 78-87.
- Latour, Bruno (1986). “Visualization and Cognition: Thinking with Eyes and Hands” *Knowledge and society. Studies in the Sociology of Culture past and present*. Volume 6. Jai Press Inc., pp. 1-40.
- Cox, Donna (2007). “Visaphors: High-Definition Stereo Visualizations (2005 – 2007)” Pamela Jennings (ed.) *Speculative Data and the Creative Imaginary. Shared visions between art and technology*. Washington DC: National Academy of Sciences, pp. 14-16.
- Cox, Donna (1990) “Scientific Visualization: Collaborating to Predict the Future” *EDUCOM Review*. pp. 36-42.
- Delanda, Manuel (2011). *Philosophy and Simulation. The emergence of synthetic reason*. London and New York: Continuum.
- Underwood, Ted, Black, Michael L., Auvil, Loretta and Capitanu, Boris (2013). “Mapping Mutable Genres in Structurally Complex Volumes”. IEEE International Conference on Big Data, Oct 6-9, Santa Clara, CA, USA.
- Saleh, Babak, Abe, Kanako, Singh Arora, Ravneet and Elgammal, Ahmed (2014). “Toward Automated Discovery of Artistic Influence”. *Multimed Tools Appl* (2016) 75: 3565, Springer.
- Serra, J., Corral, A., Boguña, M. Haro, M. & Arco, J (2012). “Measuring the Evolution of Contemporary Western Popular Music”. *Scientific Reports*, 2-521
- Reinecke, K. and Gajos, K. (2014). “Quantifying Visual Preferences Around the World”. *CHI’14*, April 26–May 1, 2014, ACM.
- Cutting, G, Brunick, K., DeLong, J., Iricinschi, C. and Candan, A. (2011). “Quicker, faster, darker: Changes in Hollywood film over 75 years”. *i-Perception* (2011) volume 2, pp. 569 – 576.
- Kwak, H., Lee, C., Park, H. and Moon, S. (2010). “What is Twitter, a Social Network or a News Media?”. *WWW’2010*, April 26–30, 2010. ACM.
- Souza, F., de Las Casas, D., Flores, F., Youn, S., Cha, M., Quercia, D. and Almeida, V. (2015). “Dawn of the Selfie Era: The Whos, Wheres, and Hows of Selfies on Instagram”. ArXiv: 1510.05700v1.
- Adamic, L., Lento, T., Adar, E. and Ng, P. (2016). “Information Evolution in Social Networks”. *Proc. WSDM’16*, Feb 22, 2016.
- Shifman, Limor (2013). *Memes in Digital Culture*. Cambridge MA and London: The MIT Press.
- Manovich, Lev (2015). “The Science of Culture? Social Computing, Digital Humanities and Cultural Analytics”. on-line: manovich.net
- Manovich, Lev (2015). “Exploring urban social media: Selfiecity and On Broadway”. On-line: Manovich.net.
- Manovich, Lev (2013). *Software Takes Command*. New York: Bloomsbury Academic
- Manovich, Lev (2016). “Subjects and Styles in Instagram Photography”. On-line: Manovich.net

Manovich, Lev and (2016). “Social Media Inequality: Definition, Measurements, and Application”. *Urban Studies and Practices journal*.
 Schroeder, Ralph (2014). “Big Data and the brave new world of social media research”.
Big Data & Society, July–December 2014, pp. 1–11.
<http://www.internetworldstats.com/stats.htm>
<https://archive.org/>
<http://www.gaumontpathearchives.com/>
<http://www.rtve.es/filmoteca/>
<https://analytics.hathitrust.org/features>
<http://www.imdb.com/>
<http://www.internetlivestats.com/twitter-statistics>
<https://www.youtube.com/yt/press/statistics.html>
<http://www.statista.com/statistics/471264/iot-number-of-connected-devices-worldwide>
<http://scimaps.org/iteration/11>
<http://fernandaviegas.com/wikipedia.html>
<http://manovich.net/> and <http://lab.softwarestudies.com/>

About the author

Sandra Álvaro is Ph.D. Candidate in the Department of Philosophy of the Universitat Autònoma de Barcelona (UAB), where she has developed the thesis “PostDigital City: Aesthetics and Politics in the space of Embodied Virtuality”.

During her research, she has been visiting researcher at the Institute for Pure and Applied Mathematics from the UCLA University within the frame Culture Analytics long program. She has also been invited artist/researcher at the Laboratoire Paragraphe/CITU of the Université Paris8. She has published in academic journals, as Artnodes and Technoetic Art Journal and participated in international conferences as ISEA 2015 (Vancouver). She is also a habitual contributor to the blog of the research laboratory of the Centre de Cultura Contemporània de Barcelona (CCCB).

Letting images speak for themselves

Pilar Rosado, Eva Figueras & Ferran Reverter

Abstract

To find analogies between verbal or textual language and visual language is important in order to “letting images speak for themselves”. We know the shared common definitions of words, but this process taken to images is in danger of excessive definition. We have programmed an algorithm based on the bag-of-words model used in computer vision. Analysing the distances between the whole set of image descriptors, we are able to group them according to their similarity and these resulting groups will determine what we call “visual words”. The total number of “visual words” in a collection of images generates a visual vocabulary.

Keywords

Visual word, computer vision, bag-of-words model, data visualization, digital art.

We want to begin this article by quoting Vilém Flusser (1999), taken from his essay *About Forms and Formulae* and which answers the very question he was asking himself:

Is there perhaps a 'reality' out there that allows itself to be informed and formulated by us, but that nevertheless demands that we adapt ourselves to it?

...Our central nervous system receives digitally coded stimuli from its environment (which naturally includes our own body). These stimuli are processed by the system, using what are as yet incompletely understood electromagnetic and chemical methods, to become perceptions, feelings, desires and thoughts. We perceive the world, feel, desire and think along the lines the central nervous system has processed, and this process is pre-programmed by the central nervous system. It is written into the system in our genetic information. The world has the forms it has laid down for us within genetic information since life began on earth. This explains why we cannot impose any forms we wish upon the world. The world only accepts those forms that correspond to the program of our life.

We have managed to pull a fast one, not just once but a whole series, on the program of our life. In fact we have invented methods and machines that do something similar to the nervous system, only in a different way (p. 36).

Every language possesses structures and concepts to achieve an explanation of reality. Confronting the apparent duality between language and the world has been a fundamental part of the task of modern philosophy. The fact that language and the world share a formal dimension makes knowledge possible, experiences interchangeable.

Our intention in the present research paper has not been to establish connections between object and word, reality and language, but to attempt to link spatial forms of representation with data visualization.

1. Matter and information

Matter has a fundamental power of communication for art. Artistic practice based on technology seems to devalue the implications of the material support, but we should not ignore the expressive possibilities of graphics generated by a computer inasmuch as they facilitate our access to the enigmas of matter and simultaneously offer us new ways of thinking. As Jamie Allen (2012) says:

Matter persists in excess of what is perceived and understood - only certain properties are, or indeed can be, revealed. A further power of technical media is an increased capacity to uncover that which would otherwise be or previously was imperceptible. These are neither claims to the truth nor to a reality, but toward a mode of artistic working and thinking that seeks to divest the ornaments before it, that develops critique and analysis at the same time as exposition and synthesis (p.9).

Bits are symbols or mathematical representations of physical quantities of matter, not real fragments. The argument that when physical objects are converted into bits they are dematerialized and cease to refer to a tangible reality does not take into account that the process of digitalization has contributed to an understanding of pure information, codified into a numerical format and processed by means of algorithms.

The opportunity offered by the digital image to describe lines and shapes in mathematical terms gives us the ability to decipher the problem of meaning contained in the image.

The territory in which technology and the practice of art coincide is a fertile field of research into the connections between matter, perception and thought. The paper we present here revolves around the creative opportunities that arise from the use of data as an artistic material.

2. Meaning and images

The field of image interpretation has been contributed to by people from different fields such as computer vision, machine-learning, text mining, statistics, psychology, information theory, etc. Smeulders, Worring, Santini,

Gupta & Jain (2000) have synthesized the challenge confronting researchers into two main aspects:

1- Sensory Gap: refers to the difference between the object in the real world and the computational description of it that we derive from a digitalization of this object.

2- Semantic Gap: Refers to the difference between the information that can be extracted from the visual data and the interpretation of those same data by a user in a given situation.

Whereas the first case expresses that the interpretation of the images based on their visual content is a complex task due to the limitations involved in registering images with an abstract code, the second case underlines the difficulty entailed in making image-based interpretations.

To describe its visual properties the characteristics of an image are either defined globally, for the entire image, or locally for a small group of pixels. The most frequently used characteristics are those that describe the colors, the texture, the shape and the most relevant points of an image.

As argued by Wang, Li, Gray, & Wiederhold (2001), it is common practice to proceed using a mathematical description of regions of the image; this is due to the fact that regions of an image having a homogenous color and texture most probably correspond to a specific object or consist of the same material.

Conventional machine-learning techniques exploit the property that many natural signals are compositional hierarchies, in which higher-level features are obtained by composing lower-level ones. In images, local combinations of edges form motifs, motifs assemble into parts, and parts form objects. Similar hierarchies exist in speech and text, from sounds to phones, phonemes, syllables, words and sentences.

These techniques are able to process natural data in their raw form (such as the pixel values of an image) into a suitable internal representation from which the learning subsystem, often a classifier, could detect or classify patterns in the input. Machine-learning systems are used to identify objects in images, transcribe speech into text, match news items, posts or products with users' interests, and select relevant results of search (LeCun, Bengio & Hinton, G, 2015).

3. Finding analogies between language and visual information

In a computer, image, sound and word are located on one and the same level, that of numbers. Words are specific terms in each separate language; images and sounds have in their favor that they are more universal codes.

The conflict between writing and image is ancient. At present, there are many evidences that a return to the image is needed. To find analogies between language and visual information is important. If it has been possible to decompose language in elements and structures, why not with images?

Since the early eighties important efforts have been made in the discipline known as *Text Mining*, aiming to make computers able to carry out information retrieval, automatic learning, statistical calculations and other tasks on texts, which would represent a titanic undertaking for human beings. The *bag-of-words model* is a simplifying representation used in natural language processing and information retrieval. It is commonly used in methods of document classification. In its attempt to comprehend the texts, the method counts the words and assigns a weight to each one according to the frequency with which it arises in the complete text, finally achieving the objective of determining its subject matter. An analogous model is also being used for computer vision in image retrieval, the *bag-of-visual-words model*. The necessary premise to make this extension of the method effective is to convert an image into a bag of “visual words”. This is by no means easy because, to know the meaning of words one must know the common definitions that they share, there has to be a consensus. If we carry this process over to images we run the risk of defining their meaning excessively. Instead of “visual words”, some authors prefer to speak of “visual terms” or “vistterms”.

Considering the whole collection of images, the total collection of “visual words” will define its visual vocabulary. This model will not contain information concerning the spatial relationships among the “visual words” which make it up.

4. Visual Vocabulary Construction

We will now proceed to explain how information regarding the global characteristics of an image can be extrapolated purely on the basis of a specific group of pixels.

In 1997, the neurobiologist Keiji Tanaka, thanks to the development of non-invasive measurement techniques for examining the human brain, provided new information about the neural mechanisms of visual object recognition in

primates. There is considerable evidence showing that object recognition makes use of neurons in the lower temporal cortex that respond to features of intermediate complexity. These features are invariant to a wide range of changes in scale, location, and illumination, while being very sensitive to particular combinations of colour, texture and local shape properties.

In 2000, David G. Lowe, an expert in computer vision, described a computer vision system for performing object recognition that achieves feature integration in a manner similar to the process of serial visual attention that has been shown to play an important role in object recognition in human vision. The approach is called SIFT descriptor (scale invariant feature transform). In 2004 he found the best solution to be a compromise between performance and speed using a sample grid of 16×16 pixel gradients. The features describe local image regions around a node using a descriptor computed from a 16×16 pixels sample. Each of these small regions would summarize the information of the region surrounding the image. Considering the whole collection of images (Fig 1a), a large collection of SIFT descriptors is therefore available (Fig 1b).

We have programmed an algorithm based on the *bag-of-visual-words model* and SIFT descriptors. This approach involves placing a regular grid over the image and selecting a pixel region around each node. Dense features computed over this regular grid with overlapping patches are used to represent the images.

Thus, we could say that, through this model, the computer algorithm “cuts up” all the images in the collection into small fragments of 16×16 pixels and groups them together according to the mathematical distances between their SIFT descriptors. We call each one of the groups established a “visual word” and the whole makes up the visual vocabulary of the collection (Fig 1c).

With this information, the system is able to determine concurrences of these “visual words” in certain images. For example, in portraits, two eyes, a nose, a mouth and a forehead concur. The system will group all the images of faces together in the category “portrait”, and this category would be what we call the “latent aspect” (Fig 1d).

5. Used in art

Regarding this, we are exploring the possibilities offered by the method to bring us closer to understanding images when the vocabulary generated is used as a material for artistic creation.

In images of scenes such as landscapes, the “visual words” correspond to natural items like water, stones or sky. In more complex images that mix different subjects and consist of a great variety of different components, the “visual words” become abstract images composed of small and very varied fragments, which, however, simultaneously repeat the same underlying rhythm. Each collection of images generates a different visual vocabulary, which constitutes an inexhaustible source of material for creative purposes (Fig 2).

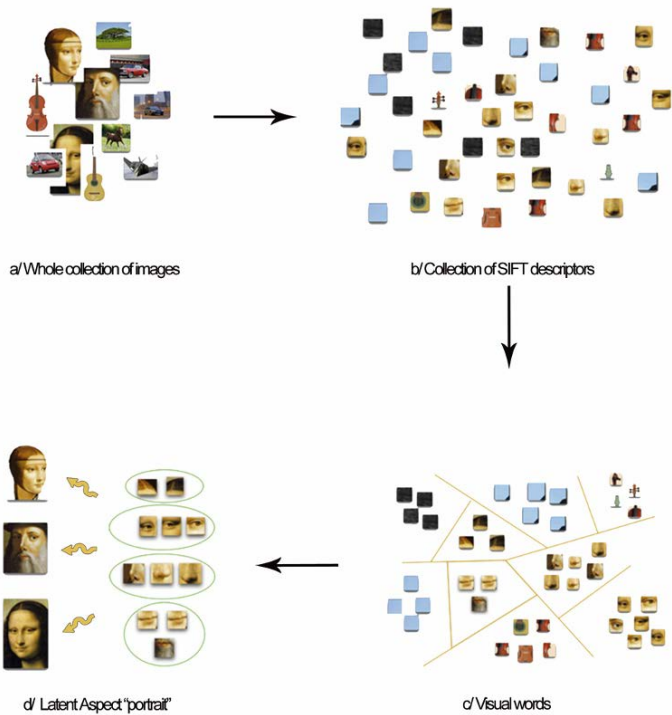


Figure 1. a/ Whole collection of images. b/ collection of small fragments of 16×16 pixels (SIFT descriptors) c/ visual vocabulary. d/ latent aspects.

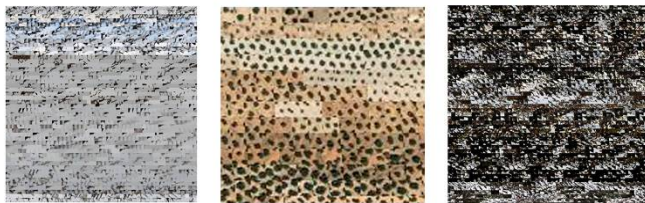


Figure 2. Examples of 3 “visual words” belonging to 3 different collections of images. © Pilar Rosado. Observe the little juxtaposed fragments of different images, generating a new image that we denominate a “visual word”. Courtesy of the author.

For the conception of her book *Epistolari d'hivern* (Winter Letters), the artist Eva Figueras used the categories that result of applying the method described. After staying in Bologna at the house of her friend Manuela Candini, also an artist, Figueras wanted to capture every corner of the house, the garden, the studio and particularly her artistic creations and widespread decorative features using a photographic camera. She took some 300 photographs that the computer then sorted into 5 categories or significant latent aspects (See two of them in Fig. 3, “workshop” and “files”). The categories and the “visual words” produced by the computer helped the artist to catalogue the images, while she became aware, in an intuitive and untidy manner, of the theme-lines that gradually arose while she took the photographs. Thus, the artist’s book finally consists of a number of postcards gathered in themes according to these categories, with the tags “workshop”, “files”, “nest”, “garden” and “treasure” (Fig. 4). The immediate possibility of capturing the places we visit nowadays by the camera in our Smartphone makes postcards play their traditional function of safekeeping our memories, subsequently usable as the support for them to be communicated on. *Epistolari d'hivern* is a vindication of the postcard, as a memorandum of our presence away from home, the desire to capture moments, sensations and experiences we are affected by and wish to preserve. On the back of the postcards appear the corresponding “visual words”, bringing about a communion between tradition and new technologies.

In the field of artist’s books, in which the images, signs and texts maintain a close dialogue, the “visual word” constitutes an enriching item at their disposal to establish bridges between the visual and the written domains. They are the starting point of the artist’s book *Deconstrucción visual* (Visual Deconstruction), by Pilar Rosado (Fig 5).



Figure 3. Two of the latent aspects detected by the computer in the collection of photographs taken by Eva Figueras at Manuela Candini's house. On the left are images that the system considered akin from a formal standpoint, and which correspond to images of Candini's workshop: still lives with paintbrushes and various containers. On the right is a group of images of chests of drawers, books and different filed materials belonging to another latent aspect. Courtesy of the author.



Figure 4. Epistolari d'hivern (Winter Letters) by Eva Figueras. Five folders with 8 folding postcards in each one. Dimensions: The folders are 13×16 cm. and the postcards are 10×13.5 cm. Courtesy of the author.

The proposal is of a small, very colorful magazine, in which each pair of opposite pages consists of the image of a single “visual word” printed full-bleed, with no border. The reader is confronted with the paradox of observing an image that is not composed with the purpose of representing anything or of obtaining an aesthetic result, but which reveals a pulse, a regular and systematic pattern.

The little “tiles” that belong to different images (see Fig 6) share a configuration that produces a hypnotic narrative rhythm that lures us and invites us to enquire into the nature of the visual content they have in common. The title, *Deconstrucción visual*, bears on the fact that the “visual words” presented in the book are the result of analytically “unbuilding” the images of a collection.

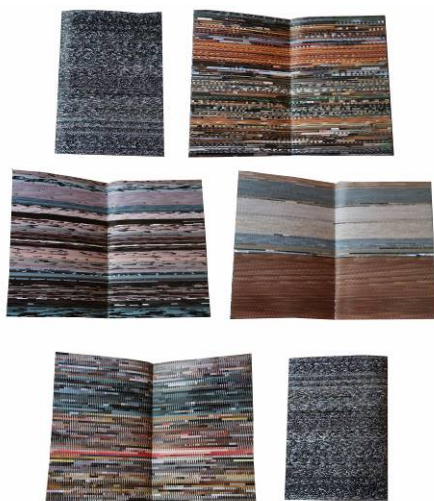


Figure 5. The book *Deconstrucción visual*, by Pilar Rosado. Courtesy of the author.

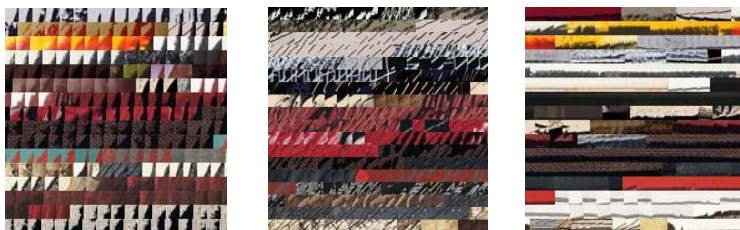


Figure 6. Enlarged detail of 3 fragments of “visual words” by Pilar Rosado. The little juxtaposed fragments in the first “visual word” show a repetition of a dark triangle in the area to the right; the word in the middle contains a repetition of oblong strokes of various sorts, rising diagonally from left to right; the third “visual word” has a darker, horizontal band towards the bottom. Although the colors change because they belong to different images, the fragments of each “visual word” share the same configuration. Courtesy of the author.

There is no struggle in this book between written and visual language. Instead, it is rather a transfiguration of the visual into the textual; the image becomes text, in sequence, without denying its own visible nature and without needing to resort to the symbols of written language. The image itself addresses us from its own deconstruction and points towards the essence of the whole, towards concepts inferred from statistics, the repetition of which makes up its meaning.

Finally, the hyperbaton is a figure of speech that consists of an alteration of the syntactic order of the words in a sentence. The work *Visual Hyperbaton* by Ferran Reverter and Pilar Rosado, is an automatic system based on live video

capture in which the spectator can select two zones of the image. The system detects the “visual word” that corresponds to each of the zones defined and carries out the transposition of one word for another. We start out from the consideration that the image we are working on, for example the face of the spectator, is a “sentence” made up of the “visual words” “skin”, “eyes”, “mouth”, “hair”, in a given order. Hyperbaton can be defined as a rhetorical device in which writers play with the normal position of words, phrases and clauses in order to create differently arranged sentences, but which still suggest a similar meaning. Likewise, *Visual hyperbaton* plays with the image in order to generate new ones. An example of english usage: "Object there was none. Passion there was none. I loved the old man" (Poe, 2013).

As we have outlined in the present article, the descriptors permit the representation of a digital image as a collection of data. At the same time they allow us to represent all the images of a collection as a collection of collections of data. Seeking for the similarities within this vast collection, we can determine types of similar data that we shall call “visual words” or visual terms. Data mining has allowed us to represent a digital image as a network of “visual words”. On the whole, out of logical continuity, similar images correspond to similar networks, but as an observer we can replace pieces of the network by other pieces following our own criteria, transgressing the continuity, generating new networks, new descriptions, new images (Fig 7).



Figure 7. Examples of visual hyperbaton.

5. Conclusions

The “visual word” intends to situate itself beyond the borderline established by oral language. It constitutes an attempt, through mathematics, to represent the content of images in units of information.

In the “visual word”, the theme, meaning or sense is not the product of a social accord, it embodies the visual resonances and synchronicities that the computer relates and links together by means of calculation.

As the image that it is, the “visual word” permits two readings; on the one hand it emulates writing in that it is composed of two discreet units placed

sequentially to generate discourse, but on the other hand our gaze can also scan it erratically as it would with a conventional image. Each tile on its own refers to no meaning in particular, but the insistence and repetition of a certain visual configuration conveys meaning upon them. What is interesting about them is that their union is what draws us to associate the totality of the group of little fragments with specific visual semantics.

In this paper we want to underline the emerging artistic value of “visual words”. It will indeed be the task of artists, in particular, to find the ways in which the obtained visual vocabulary can support storytelling, fictions or other shared collective productions.

References

- Allen, Jamie (coord.) (2012). La materia de los medios. Un nodo en Artnodes para el desarrollo de nuevos materialismos a través de los medios, el arte y la tecnología. *Artnodes*, vol. 12, p. 9-10. Doi: <http://10.7238/artnodes.v0i12.1715>
- Flusser, Vilém.(1999). *The shape of things. A philosophy of design*. London: Reaktion books.
- Flusser, Vilém (2009). *Una filosofía de la fotografía*. Madrid: Editorial Síntesis.
- LeCun, Yann, Bengio, Yoshua & Hinton, Geoffrey (2015). Deep Learning. *Nature*, vol. 521, p. 436-444. Doi: <http://10.1038/nature14539>
- Lowe, David.G. (2000). Towards a Computational Model for Object Recognition in IT Cortex. *Biologically Motivated Computer Vision*, p. 20-31.
- Lowe, David. G. (2004). Distinctive Image Features from Scale Invariant Keypoints. *Int. Journal of Computer Vision*, vol. 60(2), p. 91-110.
- Poe, Edgar Allan (2013). *The Tell-Tale Heart*. Bologna: Area 51.
- Smeulders, A., Worring, M., Santini, S., Gupta, A. & Jain, R. (2000). Content based image retrieval at the end of the early years. *Pattern Analysis and Machine Intelligence, IEEE Transactions on*, vol. 22, p. 1349-1380.
- Tanaka, Keiji. (1993). Neuronal mechanisms of object recognition. *Science*, vol. 262, p. 685–688.
- Tanaka, Keiji. (1997). Mechanisms of visual object recognition: monkey and human studies. *Current Opinion in Neurobiology*, vol. 7, p. 523–529.
- Wang, J.Z., Li, J., Gray, R.M., and Wiederhold, G. (2001). Unsupervised multiresolution segmentation for images with low depth of field. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 23(1), p. 85-90.

About the authors

Pilar Rosado, has a PhD in Fine Arts and a Master’s degree in Biology; Moreover, she is a computer systems analyst and a member of the BRAC research group (Barcelona, Research, Art, Creation) of Barcelona University. Her interest focuses on how new technologies can modify the way we look at the world and on the creative possibilities that are placed within our reach.

<http://orcid.org/0000-0001-7142-5047>

prrforma@gmail.com

Eva Figueras, Graduate of Fine Arts and Science in Education (University of Barcelona) in 1988. PhD in Fine Arts and PhD Extraordinary Award in 1992. Since 1995, tenured university lecturer at University of Barcelona. Her research activity focused on the study of Non-toxic industrial materials and recyclables in the preparation and presentation of

graphic and painting, drawing and engraving versus new procedures and materials, and Cataloging art works using automatic image annotation.

<http://orcid.org/0000-0003-4045-9062>

efigueras@ub.edu

Ferran Reverter, PhD Data Scientist at Centre for Genomic Regulation (Barcelona).

Assistant professor, Department of Statistics at University of Barcelona. His research is focused on the interpretability and visualization of the machine learning models.

<http://orcid.org/0000-0002-9489-3350>

freverter@ub.edu

Materializing depth in *Gravicells*: the potential of twenty-first-century media

Jung E. Choi

Abstract

As an artistic experimentation with twenty-first-century media, *Gravicells*, by Seiko Mikami and Sota Ichigawa, materializes virtual dimensions of our spatiotemporal experience. In particular, by inviting participants into a data-saturated environment that visualizes gravitational relations, *Gravicells* offers an affective experience of the intrinsic interconnectedness of the space and the participant's body. This paper explores this alternative spatiality through a phenomenological reconstruction of the notion of depth. By materializing the structure of depth, *Gravicells* further surfaces our understanding of the ways in which we define ourselves in relation to others and environments.

Keywords

twenty-first-century media, alternative spatiality, depth, gravity, phenomenology

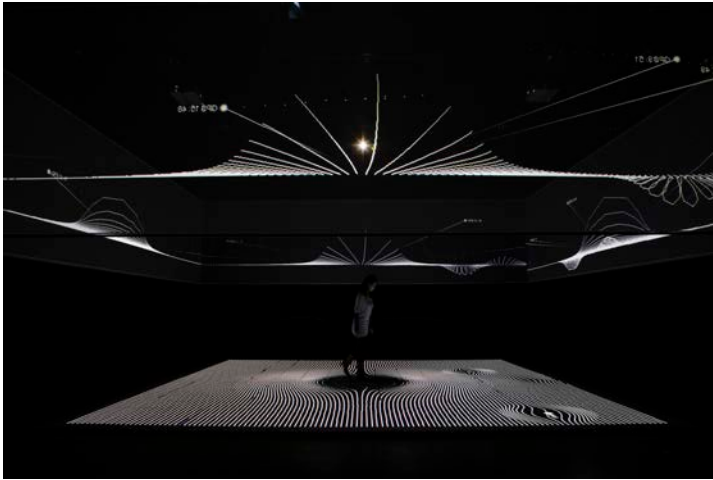


Figure 1. *Gravicells*, Seiko Mikami + Sota Ichigawa, Photo: Rynichi Maruo (YCAM), Courtesy of Yamaguchi Center for Arts and Media (YCAM), 2004.

1. Introduction

Upon entering the architectural setup of *Gravicells*, you find a space filled with a multitude of glowing lines. As you cautiously step onto the floor, the surrounding lines are pushed away, making room for your body, as if you are dipping your foot into water. The ordinary sense of bodily orientation is disrupted as space becomes warped, reacting to your weight, velocity, and

movement. The space is never preconditioned but continually transforms itself according to your physical variables. Before long, you learn to orient yourself within this space that is in constant transformation. You feel the sense of connectedness between your bodily movements and the space; you even start choreographing your movements with the space. By inviting participants into a data-saturated environment that visualizes gravitational relations, *Gravicells* offers an affective experience of the intrinsic interconnectedness between the space and the participant's body. Space, in the experience of *Gravicells*, is not space in the traditional sense—a physical container or a conceived object that is static and accessible to measurement—but rather a mode of coexistence that is constantly in flux and scarcely accessible through any conceptual framework. By dematerializing Euclidean geometric space into an interactive, flexible, and emergent property, *Gravicells* materializes the primordial spatiality that grounds the crisscrossing between bodies and space.

In this paper, I suggest that *Gravicells*, by Seiko Mikami and Sota Ichigawa, perfectly exemplifies one of the key potentials of twenty-first-century media operating at the intersection of art and technology: it allows us to affectively experience virtual dimensions of the world. Massumi (2008) argues that art “is the technique of making vitality affect felt, of making an explicit experience of what otherwise slips behind the flow of action and is only implicitly felt. It is making the imperceptible appear.” In his account, art is a medium of the virtual; it engages with the virtual dimensions of our experience, playing precisely at the juncture between the invisible and the visible as it makes these potential but invisible dimensions sensibly appear in our experience. Of twenty-first-century media, Hansen (2004) suggests that they have the capacity to broker a technical enlargement of the threshold of the present that comprises the very ground of our experience. Seamlessly (and invisibly) distributed throughout built environments, twenty-first-century media construct a field of augmented sensibility of those environments as well as opening up access to the invisible and virtual dimensions of the world by expanding our primary sensory contact with the world (Hansen, 2015). *Gravicells* epitomizes points of overlap and spaces of cooperation between art and technology that operate as experiential interfaces that place the focus on the virtual and dynamic dimensions of the world.

While Hansen's account of the potential investment of twenty-first-century media in the living present mostly implies a temporal expansion that permits access to imperceptible affective modalities in time, I argue that *Gravicells*, as an experiential medium of twenty-first-century media, achieves an ever-deepening correlation of the spatial and temporal dimensions, of the now with the notion of depth. To clarify the complex dimensions of this spatiotemporality, I

reconstruct the notion of depth in Merleau-Ponty's spatial theory as a spatiotemporal atmosphere that sustains the inter-implications between subject and world from which their relational boundaries emerge. Depth responds to the ontological issues involved in thinking space inter-relationally and offers a substantial understanding of the spatial structure of the present. *Gravicells* illustrates how twenty-first-century media, through a technological enlargement of the complex present that is both spatial and temporal, are able to materialize the virtual dimension of depth that usually operates beyond human perception.

The notion of depth further begs the exploration of two critical questions implied in the practice of *Gravicells* as it radically reframes both "sense of space" and "subjectivity." First, through technological mediation, space gains a kind of agency or sensibility that materializes depth by immaterializing itself as an emergent property that is always in the state of becoming; *Gravicells* mediates this doubling of materialization. In this process, the perception of space becomes a creative and participatory activity. Space is never a pre-given entity; rather, it is a process of transformation that is constantly defined by bodily involvement. Space reveals itself in the primordial spatiality that grounds the inter-relationship between the body and the world. I call this primordial spatiality operational depth, which is the worldly spatial structure that grounds the perception of depth in the first place. In much post-phenomenological work, depth has been considered as a dimension of human perception or as a subjective space. However, with the notion of operational depth, this study brings the focus back to the more fundamental spatiality that structures our sense of space in the first place.

Second, understanding the experience solicited in *Gravicells* through the notion of depth suggests an intrinsic entanglement between the body and the world as well as between time and space. As a source of reversibility, depth escapes the binary relationships of the world, producing subjects and worlds only through intertwining. The sense of space in *Gravicells* only emerges from the interactions between the physicality of the body (its weight, velocity, and direction) and its environmental counterpart (gravity). By creating a situation in which environmental affordances condition the delimitation of the self, *Gravicells* delivers a sense of subjectivity that is already implicated in worldly sensibility and that only constructs itself in a reversible manner.

2. Exploring Alternative Spatiality in *Gravicells*: Operational Depth

In *Gravicells*, the gravitational waves are technologically amplified and audio-visually manifested; it is a space in which gravity becomes sensibly accessible within our embodied experience. The artists designed the dynamic

technological space of *Gravicells* based on the premise that gravity is not materialized without a counterforce (i.e., resistance). The notion of gravity inherently indicates a sense of material interdependence between a subject and its environment. Gravity, first discovered by Newton, is a force that directly acts between two bodies. In Newton's theory, space and time remain as absolute and independent realities regardless of any material body that acts upon them; the space of gravity is flat. However, Einstein (1920) replaced Newtonian gravity with general relativity, understanding gravity as a curvature of spacetime; material bodies influence the surrounding spacetime.

This spacetime that is subject to change according to material bodies contradicts Euclidean geometry. Einstein explains: "The laws according to which material bodies are arranged in space do not exactly agree with the laws of space prescribed by the Euclidean geometry of solids. This is what is meant by the phrase 'a warp in space'." Space and time in Einstein's universe are no longer flat (as implicitly assumed by Newton) but can be pushed and pulled, stretched and warped by matter. It is a field of tension. Gravity feels strongest where spacetime is most curved, and it vanishes where spacetime is flat. This is the core of Einstein's theory of general relativity, which can be summed up in Overduin's (2007) words: "Matter tells spacetime how to curve, and curved spacetime tells matter how to move." The space of *Gravicells* produces a sensible curvature of spacetime around the body that usually remains imperceptible; it materializes the continuum of spacetime that is always in relationship with a material body.

Moving forward from the theory of general relativity, the experience solicited in *Gravicells* can be better articulated through the notion of depth in which the body is invited to create its own spatial level; the body enters into the voluminous sphere of spacetime. While the dimension of Einstein's spacetime is only discovered in a system of coordination in which the body is located outside, depth is a voluminous atmosphere that includes bodies inside. By allowing participants to enter the space of gravity and making the gravitational interchange visually and acoustically accessible, *Gravicells* brings our attention to the more fundamental sense of space that grounds our experience—depth. In this embodied experience of depth, the sensible and the sensed are mutually defined only in the emergent relationship. Bodies and space co-originate from and define each other in depth—the structure of the world that bodies and space share.

To clarify depth, I suggest two major reconstructions of the concept as it is conventionally and academically understood, highlighting its phenomenological dimension, comprising both distance and voluminosity. Distance reveals the

immediate link between the subject and the world, while voluminosity explains an atmospheric dimension that indicates a possibility of voluminous bodies involved in the world. In reconstructing this phenomenological dimension, I rediscover Merleau-Ponty's notion of depth as "the most existential of all dimensions" (Merleau-Ponty, 2006). Traditionally, depth has been understood as the third dimension of space that is "the result of a progression from points to other points that yield breadth or distance between them" (Mazis, 2012). In my study, however, depth is no longer treated as an abstract geometrical space that is indirectly inferred from two-dimensional retinal images; instead, it is the primary spatial medium that grounds the coexistence of the world. In other words, depth is best understood as the general milieu or primary condition that grounds the continuous inter-implication between body, time, and space; depth supports their envelopment. Moreover, by separating the perception of depth from the original dimension of depth (operational depth), I offer a phenomenological revision of the concept. As previously mentioned, depth has been considered as a dimension of human perception or as a subjective space of bodily participation. Even in Merleau-Ponty's own study of depth, the boundary between the perception of depth and depth as the primary spatiality is tricky. While, for Merleau-Ponty (1945), the essence of space is that it is "always already constituted" and thus antecedent to every experience, depth only reveals itself within a perceptual horizon. This is to some extent true, because without things or bodies around my body, one is not able to grasp depth. Nevertheless, this does not mean that depth exists only in our perception. Merleau-Ponty (1968) clearly states that the link that creates the perceptual horizon does not start from the body-subject but rather from the world that is already grounded in depth. In our everyday experience, depth is perceptually activated by our bodily participation in the world.

Gravicells, however, manifests the dimension of depth that is imperceptible but operational by amplifying and visualizing the tension between bodies and space. In the reactive space of *Gravicells*, where the technological space reflects and reacts to your very existence, what you feel, above all, is your own bodily existence that is inherently interlaced with a broader sense of spatiality. A series of infrared sensors augments bodily ability to affect and be affected by the environment, visually manifesting the interrelationship. Through this process, *Gravicells* materializes a technical expansion of "being in the present" that opens up our access to the passages of imperceptible spatial inter-relations. While the perception of depth can only arise from a bodily encounter with the field of sensibility, operational depth constructs such a field, affording the possibility of the sensation of depth. As it technologically amplifies and visualizes the affective interchanges between body and space that usually remain

imperceptible, *Gravicells* works precisely to materialize the virtual dimensions of operational depth that structure spatial experience.

Throughout the process, *Gravicells* succeeds in expanding the range of human sensibility: participants are able to sense an imperceptible dimension of the world. Mikami states: “In this artwork, it is possible for us to develop a new human sense through feeling gravity differently than usual and having new perception of body. The work provides a space with hypothetical dynamics having the opposing forces of gravity and resistance, through special devices and sensors. Walking freely in the site, visitors are able to feel gravity that they are seldom aware of, resistance to it, and the effects caused by other participants” (Spielmann, 2012). Using seamlessly distributed sensors throughout the gallery space, *Gravicells* constructs a field of augmented sensibility as well as opening up better human access to the virtual dimensions of the world. This practice well exemplifies how twenty-first-century media, by expanding the horizon of worldly sensibility, can broaden and expand the human ability to actively participate in the world.

3. Rediscovering the Hidden Dimension of Depth as the Source of Reversibility

In “Eye and Mind,” Merleau-Ponty (1964) articulates depth as the first dimension that lies at the center of the flesh of the world. Merleau-Ponty was confronted by the enigmatic bond between the near and the far as depth connects things by separating them; “it is flesh as a distance that brings with it proximity”—proximity through distance. He therefore came to acknowledge that depth is paradoxically a revelation of concealment; it is the source of reversibility. The reversibility that is inherent in—and a manifestation of—depth is well explained by Steinbock (1987): “[Depth] is the ‘rift’ disengaging and engaging figure and ground, the ‘cleavage’ by which they oscillate, they interplay.” Cataldi (1993) also explains, “depth is not simply the ‘background’ and neither is it simply a ‘hidden dimension.’ It is best understood as a source of ‘reversibility,’ as the process that generates that backgrounding of the foreground and that foregrounding of the background we can perceive whenever we perceive one or another of the ways in which ambiguous figures can come to the fore or unfold.” The relationship between the foreground and the background in depth is inherently reversible simultaneously with movements.

Enveloping movements, depth also opens up across time and space. In *Gravicells*, the virtual boundaries between bodies and space are unstable and relational. While each body always relies on its own spatiality, the spatial

configurations of the body are subject to change as the body enters into relationships with other bodies as well as changing its velocity and direction. In *Gravicells*, the sense of space emerges along continuous movements. Ströker (1965) clarifies the space of movement that grounds the “primordial and intransgressible” inter-relationship between body and space: “Through my movement...space no longer remains what it was, but [it] is immediately transformed. In a reverse manner, I am not only a receptacle for its contents but a co-carrier, and first of all a shaper of its atmosphere through my movements.” In *Gravicells*, the body and space become both sensible and sensing, and their relationship is reversible as their boundaries only become distinguished when they are inter-implicated. As the body moves, hidden spatial elements are exposed, and the body and the space work together to create certain spatial patterns or relations. In this experience, as the body moves, depth is given a “temporal extension” that accompanies the movement.

The spatiotemporal dimension of depth is well developed by Merleau-Ponty (1945) who explains that a field of presence extends in two dimensions: “The here-there dimension and the past-present-future dimension. The second elucidates the first.” Space becomes accessible only when we understand it as temporal. In his understanding, space and time are two dimensionalities of the “flesh” of the world rather than two separated entities; there is a reciprocal insertion and intertwining of one in the other. While, in Merleau-Ponty’s theory, this intertwining between space and time can only be perceptually accessed through subjective (or interior) experience, in *Gravicells*, the space that only manifests itself in temporality becomes accessible in our shared experience.

As the source of reversibility, operational depth is animated by, and is an exhibition of, the process that produces subjects and worlds through intertwining. As a spatial medium itself, depth does not lie between the subject and the environment; instead, it includes and constitutes them. Depth is internuncial; it connects matter and fills the “in-between” space of body, time, and space. It is a synapse or gap—an absence of actual things; but it is also a space of formation in its emergent state—a space of possibilities. The world is already enveloped in depth that stretches out beyond our perceptual grasp. Operational depth is a field of movement and reversibility that grounds the “possibility of a subject involved in the world” (Merleau-Ponty, 1945). *Gravicells* sensibly materializes this operational depth that manifests itself in the shared experience of the body and the world.

While the work materializes the entanglement of time, space, humans, and technology to create an experience of the complex present in the structure of depth, it also reminds us that we are objects embodied in the larger system of

the world. The collected data of the participants' movements are measured by GPS, and the locational data is simultaneously projected on the wall in visual forms. This process allows participants to see themselves as moving bodies that collectively create the sense of space. The binary structure of subject and object becomes blurred as the sense of self in mobility is driven by the point of seeing and being seen. Each moving body is continuously represented as locational data embedded in the world with a GPS position that is also dependent on the earth's movement. However, this practice differs starkly from other media practices that try to enframe users in computational networks, wherein their bodily experiences are reduced to mere data. The "objective" space of data representation as measured by GPS is continually deformed though incrementally added data as people move in *Gravicells*; the actions take place in the site crisscrossing the real and virtual space. Rather than reducing bodies to mere observable points in the data network, *Gravicells* is fully committed to reinvigorating the experience of the present by achieving second-order interactivity¹ (Couchot and Hilaire, 2004). The representational space of the data is transformed according to the participants' movements while directly impacting their movements in return; it extends both the human and the machinic autopoietic capacity, making the levels of interaction much more complex² (Maturana and Varela, 1980). In this way, *Gravicells* further achieves a larger technological enlargement of the present by deliberately creating connections between the site of the experience and the virtual space of the data.

Gravicells offers an experiential platform for understanding depth by reinvigorating the primary dimension of the living present. Depth, as the flesh of the world, suggests an encroachment between all beings, in accordance with the vectors of an ever-deepening linkage between them. Understanding depth means recognizing this intrinsic entanglement (and our own embodiment) as entirely internal to, and thus wholly dependent upon, the vast body of the world in depth of which we are a part.

References

- Cataldi, Sue L. (1993). *Emotion, Depth, and Flesh: A Study of Sensitive Space*. Albany, NY: State University of New York Press.

¹ According to Couchot and Hilaire (2004), while "first[-order] interactivity understood human-computer interactions on a stimulus-response or action-reaction model," focusing on the control of communication, second-order interactivity deals with notions of "self-organization, emergent structures, networks, adaptation and evolution."

² Maturana and Varela (1980) coined the term "autopoiesis," the reflexive feedback mechanisms in living systems. An embodied life is an open system that individuates itself in its relation to an environment.

- Einstein, Albert (1920). "Time, Space, and Gravitation." *Science*. Vol. LI, No. 1305.
- Hansen, Mark B.N. (Spring, 2004). "The Time of Affect, or Bearing Witness to Life." *Critical Inquiry* 30.
- (2005). "Embodiment: The Machinic and the Human." In *Art & D: Research and Development in the New Art Practice*. ed. Joke Brouwer et al. Rotterdam: V2_Publishing/NAI Publishers.
- (2015). *Feed Forward: On the Future of Twenty-First-Century Media*. Chicago and London: University of Chicago Press.
- Massumi, Brian (2006). *The Parables of the Virtual*. Durham, NC: Duke University Press.
- (2008). "The Thinking-Feeling of What Happens." *Inflexions* 1. "How is Research-Creation?" Accessed on May 15, 2016, www.inflexions.org.
- Maturana, Humberto, and Varela, Francisco (1980). *Autopoiesis and Cognition: The Realization of The Living*. Dordrecht, Holland; Boston: D. Reidel Pub. Co.
- Mazis, Glen A. (2012). "Merleau-Ponty's Artist of Depth: Exploring "Eye and Mind" and the Works of Art Chosen by Merleau-Ponty as Preface." *PhanenEx* 7. no 1.
- Merleau-Ponty, Maurice (1962). *Phenomenology of Perception*. trans., Colin Smith. New York, NY: Routledge.
- (1968). *The Visible and The Invisible*. trans., Claude Lefort. Evanston, IL: Northwestern University Press.
- Spielmann, Yvonne (2012). "Perceptual-responsive environments: sense and sensibility in Japanese media artist Seiko Mikami's installations." *Journal of Aesthetics & Culture*, Vol. 4.
- Steinbock, Anthony J. (1987). "Merleau-Ponty's Concept of Depth." *Philosophy Today*. Vol. 31, No. 4.
- Ströker, Elizabeth (1965). *Investigations in Philosophy of Space*. trans. Algis Mickunas. Athens, OH: Ohio University Press.

About the author

Jung Choi (Duke University) is a cross-disciplinary theorist and curator specializing in contemporary art and technology. Choi has worked as curatorial staff at renowned media art institutions including Art Center Nabi, Seoul, Korea, and ZKM Karlsruhe, Germany. She is now completing a PhD at Duke University, with a specialization in visual and media studies as well as information science and studies. Her current research focuses on different spatial productions of art and technology that diversify and deepen human experiences of everyday life. Email: jung.choi@duke.edu

What we talk about when we talk about online cultures

Annet Dekker

Abstract

Focusing on the preservation of art in the Web, this paper emphasises the importance of capturing the broader environment of platforms and social interactions in which many of these artworks thrive. Next to highlighting some of the difficulties in capturing these contexts, storytelling as a method is explored, as a way to develop and enrich an understanding of online cultures, and the function and value of art in the Web.

Keywords

Online culture, preservation, documentation.

Introduction

Since the beginning of the World Wide Web a lot of things have been said or proclaimed about art that is made online, whether it be Internet art, net art, net.art, new aesthetics or post-Internet art: how it is made, how to present it and how to preserve it. A mere two decades have passed and already many artworks that were made for the Web have disappeared due to domain name expirations, domain-name snatchers, lack of back-ups, soft- and hardware updates, and too many bugs and spam that destroy the incentive to continue. As argued by Christiane Paul (2010), the preservation, or archiving of online cultures, requires a new understanding of the archive as a 'living' environment that can adapt to the flexible requirements of the mutable works it contains. This type of collecting documents the different versions, the process and instability of an artwork that evolves over time.

In an attempt to bring back to live artworks that no longer exist, or those that will soon disappear, this paper reflects some of the preliminary outcomes of an ongoing research into the preservation of these artwork not by emulation, virtualisation or migration, but through storytelling. Such an approach requires a close reading of the process and functioning of online culture through some of the inherent characteristics of Web culture: exploration, ambiguity, ongoing process, versioning and mutation. As I will argue, such research requires methods from archaeology, ethnography and oral history together with computational and more traditional literary/visual analysis to decipher and comprehend the narratives that can be traced through e-mail list archives, interviews, presentations, and automated archiving systems.

1. Established methods, the examples of the Wayback Machine and Webrecorder

In the past two decades several attempts have been made to preserve online cultures. One of the best known is the Internet Archive's Wayback Machine. The mission of the non-profit organization Internet Archive, founded in 1996 by Brewster Kahle, is to provide free access to all kinds of digitized and digital materials, including web sites, software, games, music, moving images and books.¹ On 24 October 2001 the organization launched the Wayback Machine, a free service allowing people to access and use archived versions of past web pages, because as they argue:

Most societies place importance on preserving artifacts of their culture and heritage. Without such artifacts, civilization has no memory and no mechanism to learn from its successes and failures. Our culture now produces more and more artifacts in digital form. The Archive's mission is to help preserve those artifacts and create an Internet library for researchers, historians, and scholars.²

Looking more closely to the Wayback Machine shows they only capture time-stamped snapshots of websites. As such, it foregrounds 'single-site histories', which means that one can study single pages in a website over time (Rogers 2013, 66). In some cases, this works fine, as for example Jill Lepore, reporter for *The New Yorker*, shows in her article 'The Cobweb. Can the Internet be Archived', about how to archive the Internet. She describes the usefulness of the Internet Archive with the example of the case of the Malaysian Airlines flight crash in the Ukraine in June 2014. Merely two weeks before the crash, a curator of the Russia and Eurasia collection at the Hoover Institution, at Stanford, had submitted to the Internet Archive, a list of Ukrainian and Russian websites and blogs that ought to be recorded as part of the archive's Ukraine Conflict collection. They did, and they managed to intercept and record a screenshot of a VKontakte (a social network) post by Strelkov (the field commander in Slaviansk) that says they put down a plane. The original post was removed within two and a half hours after the 'incident'. The evidence of the original claim can still be traced in the Wayback Machine (Lepore 2015).

While this is a very good example of what a large institute can do, in most cases the Wayback Machine proves to be less reliable. As also argued by Web historian Niels Brügger, an archiving process actively shapes and determines

¹ For more information see, for example, <https://www.uibk.ac.at/voeb/texte/kahle.html> (Accessed September 2016).

² <https://archive.org/about/faqs.php#21> (Accessed September 2016).

how a website is archived and thus what kind of reconstruction or analysis is possible (Brügger 2009, 126). Not only do websites, and their copies, often suffer from temporal or technical inconsistencies, but as Brügger argues ‘the archived website is not an exact copy of the one on the live web but a *unique version* as the result of the archival process’ (Brügger 2008, 156). The uniqueness combined with the arbitrary scrawls of the Wayback Machine and possible technical inconsistencies, make it an insufficient tool for art historical analyses, let alone for the preservation of an artwork. For example, inconsistencies can be part of an artwork, but they may just be glitches, or a case of bitrot. What one does not see or know, cannot be traced by looking at random scrawls. When trying to use the Wayback Machine to see the changes over time in the website *mouchette.org* by French artist Martine Neddam, a work to which I will return below, it was difficult to determine whether specific aesthetics were intended, or not.

To overcome a single-page history the Wayback Machine introduced Memento, an API that allows you to move back in time.³ The application allows you, for example, to see the page around the time it was made rather than the present time. In 2011 the Internet Archive began to use Memento, which makes it possible to use the Wayback Machine in an ‘interactive’ mode. In the case of *mouchette.org* it provided some (unintended) interesting results. Clicking on one of the links in *mouchette.org* at a random date, shows a standardised screen and redirects to a random other part of the site and not necessarily to the one that it would normally go to (even in the past). However, in this case the misdirection is interesting because it has always been Neddam’s desire to make the navigation in the website as convoluted as possible, as she mentioned:

I wanted to get the viewer lost in a very complex navigation, where the placement of the links was invisible or unexpected (Dekker 2008, 66-8).

Another example, for which I used Memento’s ability to recall history, is the work by Slovenian artist Igor Stromajer. In 2011 Stromajer began to delete his earlier net art pieces. Announcing the project *Expunction* and its process of deletions on Facebook and other social media, some of the reactions expressed concern: ‘Igor !!!!!!! Can’t you do something else to go through your mid-life crisis ???? !!!!!’.⁴ With Memento I tried to trace his deleted works in the Wayback Machine. With a few exceptions, I merely got redirected back to his present project page of *Expunction* – even in the past I couldn’t revisit earlier instances

³ For more information see, <http://mementoweb.org/about/> and <http://timetravel.mementoweb.org/about/> (Accessed September 2016).

⁴ Annick Bureau, <https://www.facebook.com/intima/posts/144916102244400> (Accessed 21 April 2011).

of his work. I was stuck in a circular present, no past no memories, just the never-ending present. Fortunately, what still can be found are the conversations, and the discussions about the deletion of his works.

However, these discussions are not saved on the Wayback Machine, since Facebook is a closed system and the data of individual users cannot be cached.⁵ Stromajer made his own screenshots of the discussions that are still available on his own website. Recently, other tools have been developed to document social media platforms. One of them is the Webrecorder created by Rhizome a non-profit organization based in New York. As Dragan Espenschied, one of the developers, mentions:

Current digital preservation solutions involve complex, automated processes that were designed for a web made up of relatively static documents. Webrecorder, in contrast, can capture social media and other dynamic content, such as embedded video and complex javascript (Espenschied 2016).

Indeed, Webrecorder is a good tool to capture social media platforms, it records the postings, the likes and the comments that are made by other users and the replay functions as if you're browsing the live site. Except that you cannot add anything or make any comments as one normally could do. For example, one of the recordings is of Amalia Ulman's project *Excellences & Perfections* (2014). For five months and in almost 200 posts, Ulman acted out a scripted performance that culminated into an extreme makeover, which she performed on Instagram and Facebook. Playing on the cosmetics culture and as a comment on the social media demands on users looks and experiences, Ulman convinced many of her followers and (artist) friends that what she was doing was real. The Webrecorder team recorded the whole performance on Instagram, including the interface of Instagram to create a faithful re-performance of the context in which the photos and comments were embedded. At the same time, Ulman reposted everything to Facebook where the discussion and comments were more intense. As Amelia says in an interview:

People got so mad at me for using fiction. That was the main critique: 'It wasn't the truth? How dare you! You lied to people!' (Smal 2015).

Due to less private-friendly settings in Facebook, Ulman felt reluctant to record those statements. As she mentions: 'No one really knew I was performing (...) It would be really complicated to archive that and keep the privacy of people'

⁵ See: <http://www.techcomet.com/2011/05/facebook-profiles-alternative-to.html> (Accessed September 2016).

(Goel 2014). The decision to record only the actual performance and not all the discussion around it is understandable from a privacy point of view, however, an important part of the work – her comment on the conventions on many social media platforms – can foremost be found on Facebook, but is likely to be lost soon.

1.1 ‘Amateur’ examples

Stromajer documented the context of his project as best as he could by making screenshots and copying some of the comments that were made on his process that can now be found on his own website. With initiatives like the Webrecorder anyone can now document all kinds of (privacy sensitive) data. Potentially this could serve as a way to capture the context of online projects as well as the performance, which means a broader and more ‘democratic’ view on art history, as also mentioned by media art curator and critic Domenico Quaranta:

In the Digital Age, archiving and collecting are no more just an act connected with power, institutions and authority: people can be involved in it with what they choose to save on their hard disk, and to share again online; they can, if not complete, at least cooperate with institutions in the effort of preserving ephemeral artworks that have been distributed online at some point in their existence, but that are not online anymore. Your hard disk, for the future archivist or art historian, may be a resource as valuable as a museum’s digital collection (Quaranta 2014, 233).

In the past several attempts were made to capture the context of how users experience the web. For instance, the *Net.ArtDatabase* project initiated by Robert Sakrowski and Constant Dullaart aims to move beyond the technical specifications and the interaction model of the artwork. They try to capture the reception of net art in an environment in which it was originally perceived. As Sakrowski explains, “the context, the private atmosphere, and the hardware interaction defines a large part of the ‘net art activity’” (Spreeuwenberg 2011, 4). The project makes clear that documentation needs to move beyond a single method of photography or video and that one should focus on various points of view to illustrate what net art is. Although attention is given to the ‘natural’ surrounding of interacting with net art, the formal requirements for the set up are very static, leaving little room to manoeuvre.

Other examples try to focus on the ‘spirit’ of the network. A theme that is prominent in Olia Lialina’s project *Summer*. Initiated in the summer of 2013, the work is basically a GIF (a Graphics Interchange Format), but it is a GIF that moves according to the speed of the various networks. Looking at the address

bar reveals that each frame connects to a different address, all featuring the extension /olia/summer. The work is distributed across twenty-five websites, all hosting different interlinking frames. *Summer* is initiated by Olia Lialina but it keeps functioning and moving by 25 others and the swing moves according to the connection speeds of the particular websites. On the one hand Summer thematises the network, on the other hand it reflects on the dispersive nature of the net and unstable condition of preservation that needs a networks of many to succeed.

In other cases the network emerges and evolves from the conceptual premise of the artwork. A good example is *mouchette.org* by Martine Neddam. Created in 1996, *mouchette.org* is an interactive website (initially) by a pseudonymous character who calls herself 'Mouchette'. Over the years the project developed and evolved – additional pages were added and other physical offline projects and events were organised. After many years of well-kept secrecy in 2010 Martine Neddam decided to reveal herself as the author behind the work. Today as in 1996, on the home page the visitor is welcomed by a large bright flower and a small stamp-sized photo in the upper left-hand corner showing a young girl looking down – presumably a picture of Mouchette. Mouchette claims to be almost 13 years old, an artist, and living in Amsterdam. Neddam uses some web characteristics in intricate ways to emphasise the drama and enigma of the story. For example, hyperlinks create confusing circulation; interactive possibilities produce several layers of information; and, identity play is performed in various ways. For instance, by allowing users to use the website for their own projects, users even have their own space in the *mouchette.network*, or someone can build on or re-use Mouchette in their own space, as was done for example by Curt Cloninger in 2001 when he started *Mouchette Has A Posse*, a collection of collaborative visual hacks that can be re-used. This malleability of the work is probably one of the reasons for the project's success, as several Mouchettes have been created over the years. At the same time, as the project branches into several directions, a dispersed but active community follows the work.

These different communities became crucial at several points. For example, when in early 2002, Neddam had launched a quiz that compared the Mouchette characters from the film and the website, and within a few months Mouchette received a summons from Bresson's widow to take down any reference to the 'original' film *Mouchette*. After announcing the 'news' on her website and through her e-mail lists, immediately several independent organisations mirrored the project on other websites, where in most cases it can still be used today – almost fifteen years later. This means that users not only influence and assume ownership of the work but they also take care of it – at least to a certain

extent. The extent to which this happens will most likely shift in time and through different networks because like the work itself such a process keeps evolving.

These examples show the importance of collectivity in networks – in both technical and conceptual ways. Analysing the underlying structures of networks, by seeing the individual and the group as entities that influence each other and together constitute a constant process of becoming, helps to think about the preservation of these works. Such community-driven strategies could be seen as ‘networks of care’.⁶ A network of care is a social construction, and this ‘social life’ of the project is important for conservators. It is something that they will have to take into account and can benefit from. As Kathleen Fitzpatrick argues, a future preservation of digital objects may be less about

new *tools* than new *socially-organized systems*, systems that take advantage of the number of individuals and institutions facing the same challenges and seeking the same goals (...) Context is equally important, and equally volatile, in shaping our understanding of the production, circulation, and preservation of digital texts (Fitzpatrick 2011, 126).

While Mouchette’s network of care is still closely connected to and controlled by Neddham, a network of care or the social life of the project can also expand and disperse in multiple directions that are often unforeseen. This is particularly visible with the *Geocities* project.

The free web hosting service Geocities was founded in July 1995 and it soon emerged as one of the most popular and inhabited places on the web and remained so until the late 90s. At the peak of dot.com fever in January 1999 Yahoo! purchased Geocities – for 3 billion dollar. However, rather quickly Geocities became synonymous with old fashioned aesthetics and basically bad taste. At the same time people drifted to social network profiles. In April 2009, Yahoo! announced that it was shutting down Geocities in six months. During these months the *Archive Team* managed to rescue almost a terabyte of Geocities pages, in six months and with about 100 people. And on 26 October 2010, marking the first anniversary of Geocities’ closing, the Archive Team released a torrent file archive of 641 GB, which consists of approximately 1.2 million accounts.

As mentioned by digital archivist Jason Scott

⁶ For more information about networks of care see Dekker (2014).

Geocities arrived in roughly 1995, and was, for hundreds of thousands of people, their first experience with the idea of a webpage, of a full-colour, completely controlled presentation on anything they wanted. For some people, their potential audience was greater for them than for anyone in the entire history of their genetic line. It was, to these people, breathtaking.⁷

As a symbol of the amateur web Geocities is a trace of how the web was used at the time. This was one of the main reasons that on 1 November 2010, net artists Olia Lialina and Dragan Espenschied bought a 2-TB disk and started downloading the largest bittorrent file of all time. In January 2011, they were able to start unzipping the first files, a process which lasted until the end of March 2011. After downloading, storing and sorting the 16,000 archived Geocities sites, which took another year, they came up with the idea to redistribute the GeoCities homepages through the Web. This was done in different ways: an automated Tumblr blog that updates every twenty minutes, and which is now an ever growing series of front-page screen captures. The screen captures with the most reposts and likes from their Tumblr followers are then presented next to related research on their blog *One Terabyte of Kilobyte Age*, and again distributed through Twitter.⁸

The Geocities archive became a spiral in which Olia and Dragan reflect on the Tumblr-archive of the torrent-archive of the Geocities-archive, people reblog, retweet, like and save it, and it just keeps going on. While Geocities was almost a forgotten world in the Web, due to several enthusiasts and thousands of followers and users it became not only visible but also an important marker in the history of the Web, and through liking, sharing and redistribution Geocities keeps circulating, popping up in new contexts.⁹ Next it introduced a whole new folksonomy through tagging – for example, ‘alive’ and ‘under construction’ – of how this new archival material could be categorised and analysed (Lialina 2012). The project by Lialina and Espenschied provides all kinds of information on how Geocities was used and misused, in terms of frames, banners, navigation elements, GIF’s etc. Whereas the results of the home pages say much for the humour that still drives online culture, and the project provides a means of archiving over 500.000 screenshots of homepages, it says little about the

⁷ See, <http://ascii.textfiles.com/archives/2720> (Accessed September 2016).

⁸ See for the Tumblr page <http://oneterabyteofkilobyteage.tumblr.com/>, the blog <http://blog.geocities.institute/>, and the Twitter page https://twitter.com/geocities_txt (Accessed September 2016).

⁹ Often circulation is described as a process of distribution and liking (see, for example, Steyerl 2013). Although this is certainly part of the process, circulation is also inherent in the system – hyperlinking, sharing, execution processes that move beyond performativity. For more information see, for example, Mackenzie (2005).

original contexts from where these screen captures came from and even less so about the original owners of these sites. What does this say about the possibility of preserving online cultures?

2. Online cultures and the value of stories

In her article ‘Contemporary Museums of Contemporary Art’, Jill Sterrett, head of conservation at SFMOMA, suggests an approach to the preservation of complex artworks that is based on ‘planting finds’, which she describes as documents with information value. Since the material of artworks has changed, she suggests the museum professionals need to adapt to a new situation:

Taking into account the transitory nature of ephemeral materials, built-in physical variability and the performative elements that characterize so much of the art of the last fifty years, the work of a contemporary art museum is not business as usual (Sterrett 2009, 227).

Sterrett was inspired by methods in archaeology, where ‘finds’ are constantly and repeatedly placed in new context. However, she suggests using the mechanism of the ‘find’ in reverse – not as an end point for something new to emerge – but as a method to trace the engagement with an artwork and to reveal its life over time. As Sterrett says, it allows to ‘seeing and seeing anew’ (Sterrett, 227). Such a method would account for the variables – or malleability and instability – that are inherent qualities of many contemporary artworks. Potentially this could lead to a new situation where museums would need to re-assess their finds each time from a new context. What does it mean when the preservation of artworks is thought of in terms of (re)production or creation systems instead of ‘fixation’? In this sense, preservation practice, as well as the examples I have mentioned, will capture more or less the content, form and aesthetics of a project, thus indeed following Paul’s plea to focus on a ‘living’ environment that adapts to the flexible requirements of the mutable works it contains (Paul 2010). However, one of the main drivers of online culture is overlooked: the stories, myths and fictions that survive through analogue means and perdure in human memory. In other words, the context around these projects is still missing.

In an attempt to capture her online footprint, Greek/English artist Erica Scourti asked a ghostwriter to write her (online) memoirs. It was a first attempt to assess her digital material – from URL histories to Amazon recommendations, Facebook archives and all other information that is freely available online – and see how her online identity was constructed through various machines. Each millisecond, numerous digital documents are sent around e-mail servers or shared on social platforms. Aided by the cheap data

storage, easy access and distribution mechanisms these acts of blogorrhea – the excessive, compulsive or stream-of-consciousness blogging over trivial things – provide unprecedented access to private lives, and it offers opportunities of erecting large digital collections. Scourti wanted to understand the influence these often invisible computational systems have over her data. As she mentions:

(...) giving my private data and online presence to a ghostwriter to fashion into my fictional memoir, could be seen as enacting a wider societal fear of digital violation and identity theft, even just the fear that someone else could access your emails (Dekker 2016).

The result was a novel *The Outage*, short blurbs of texts that are interspersed with screenshots of online material. Together forming a narrative that involves the death of the protagonist. The whole process gave Scourti a lot of insight in what happens to someone online data, while leaving her with an uncomfortable feeling, as she describes:

It was a feeling that I had been objectified, made into an image that I wasn't in control of; and as the book's narrative involves a sort of death, there was a feeling that 'my' data body had been killed off in some way, an experience that was both exhilarating and stressful (Dekker 2016).

Employing an outsider to speculate on and fabricate their 'version' of her biography, also reflect Scourti's interest in life-writing as essentially performative rather than descriptive act:

we don't just tell *the story* of our lives, as if there is one singular story that exists prior to its representation in literary or photographic form, but through the telling of that particular story, make it a reality (Dekker 2016).

The act of storytelling as a way to preserve and pass on information, customs and cultures from generation to generation has a long history. Also in preservation several people have argued to include methods from oral history and ethnography in the practice. In some cases, to capture the expedience of an artwork (Muller 2008, Roms 2008), in other cases, to communicate and decide on what strategies to take (Wharton 2012). Similarly, artists ensure their legacy through discussions, the best know example is perhaps Tino Sehgal.¹⁰ These practices show the importance of oral transmission, and more generally, of audience participation in the practice of preservation. As argued by Wharton, 'participatory conservation has the potential for critical dialogue on how material culture is preserved, presented and used' (Wharton 2005, 202).

¹⁰ For more information see Van Saaze (2013) or Von Hantelmann (2010).

As mentioned, an important medium to capture the context of the life of an artwork is video. From the beginning when video became more cheaply and readily available, artists and others used the format to communicate and broadcast but also to self-archive (Jones 2010). These practices collect and describe not only the actual artworks, but also all kinds of information that informed the work.¹¹ Since a few years, artists also adopted this strategy to document their work. For example, rather than documenting his work via methods as mentioned before in this text, Constant Dullaart made several short documentaries about his work *The Possibility of an Army* (2015). Similar to Scourti's work, *The Possibility of an Army* is a work about online identity. Rather than tracing his own life and analysing the impact of online algorithms and other software that are used by many companies to track someone or use their information for other purposes, Dullaart poses the question if we want to measure cultural value simply by the figures that a profit-maximizing company collects and prepares.

Commissioned by the Schirn Kunsthalle Frankfurt *The Possibility of an Army* is a performance on Facebook. For the performance Dullaart asked volunteers to open Facebook accounts with the names of soldiers that were part in the 'Hessian Army', a German army of mercenaries that was hired by the British government in the eighteenth century. The performance was a comment to the way social relationships are (ab)used on many social network sites. For instance, by reducing users to metrics (popularity and popularity is measured by the number of followers, likes and comments) and the employment of bots that interact with human users, often accepted as part of the social fabric. In short, digital identities have become the currency of multinational enterprises. By setting up the mercenaries' fake Facebook profiles, Dullaart starts his own war against the exploitation of users' profiles by Facebook.¹²

As mentioned, the work is explained in several short videos: the viewer is informed about the history of the work, its process and how the topic of the work is explained in the media, while keeping, both conceptually and

¹¹ For more information about preserving these contexts see Jones (2010), and about the importance of preserving online paraphernalia see, among others, Winget 2008.

¹² According to a press release of the museum, 'due to extended press coverage (*Guardian*, *Hyperallergic*, *BBC*, *Vice Motherboard*, and many more) about 70% of the first regiment of Hessian Facebook identities have been discovered and blocked. About 10% of the casualties have now been brought back to life' (<http://www.e-flux.com/announcements/the-possibility-of-an-army-by-constant-dullaart/>).

aesthetically, in the spirit of the work.¹³ Besides, and next to a written declaration about his project, Dullaart gave a presentation at the 32th Chaos Communication Congress (CCC) in Berlin, which provided even more information about the quickly changing context of the work.¹⁴ For instance, an interesting detail was that many of the new profiles showed photos of Indian faces, which were now connected to German names, a combination that was unlikely to happen in the eighteenth century. At first trying to mention this ‘falsification’ of history, Dullaart soon was too embarrassed to bring up the subject of ‘political correctness’ to his volunteers and instead made it part of the project. Some of this information could be very useful for conservators to understand the context and implications of the work: why were decisions made and what does one need to (re)use to present the work in the future. All the information together shows that a combined preservation method is needed that at least includes knowledge about (historical) technology, history and online culture to get the story as complete as possible. Moreover, it shows the importance of ‘storytelling’ – it was not until seeing Dullaart’s presentation at CCC, that I came to understand the broader context and implications of the project.

3. Storytelling and ambiguity as a strategy

With the previous examples I have tried to show the importance of storytelling as, perhaps, a key notion in understanding the value of many net artworks. However, such a dialogical context view is never straightforward. For example, stories can encourage myths, which are sometimes purposely employed to deceive, at other times they provide a glimpse of how a culture developed or what its intentions were. In this sense, stories are often ambiguous – a strategy that is used by many artists in multiple ways. Artists may engage in ambiguity to create suspense, to go against the grain, to counter existing power and knowledge structures, or to obfuscate systems by purposely inserting breaks and interruptions. A good example is the origin of the term net.art.

In 1997, Shulgin explained the origin of the term ‘net.art’ in a post on the e-mailing list Nettime-I. According to this statement, the term net.art emerged through happenstance. It was an unplanned technical misinterpretation: an

¹³ See the video on Vimeo and the website of the Schirn Kunsthalle Frankfurt: <https://vimeo.com/145450925> and <http://www.schirn.de/the-possibility-of-an-army/> (Accessed September 2016).

¹⁴ The video is available on You Tube: <https://www.youtube.com/watch?v=jh6mk5sMcZ0> (Accessed September 2016).

‘incompatibility of software’ (Shulgin 1997). Shulgin uses the underlying immediacy of the event to his benefit by posting the message on a popular e-mailing list, where artists had already made statements about the origin of the term. Unlike other accounts, Shulgin’s e-mail message lingered, and it was even successfully engrained in many art history accounts. However, a close-reading of the message reveals other layers of information; for example, Shulgin makes the statement that net.art is a ‘readymade’, thereby reinforcing the ambiguity of the message. To comprehend the story the ‘decoding’ of the message depends on understanding the sociocultural discourses that are implicitly woven into the text, maximizing the distribution and circulation of information on the Web.

Another approach to use storytelling as a method to preserve the context of a work is by making the context part the work. In some way, this is what Dullaart does with *The Possibility of an Army*, realising that his work will not survive long on Facebook, and not relying on people’s memory, he made several different but complimenting videos that narrate the project and its context. Earlier mentioned Erica Scourti, inspired by the result of *The Outage*, in her more recent project *Dark Archives* (2015-6), explored the (im)possibilities and effects of online archiving using various narrative methods. Speculating on what a future, or rather present, online archive could be, for the project she uploaded her entire fifteen-year personal media archive, consisting of daily photos, videos and screenshots, to Google photo. Next to archiving users photos, Google Photo has something called ‘assistant’. Assistant searches for similarity in someone’s photo collection. For example, often people take several photos of the same moment or object, Assistant manages to trace all these instances, and brings them together in an animation. It also can detect images that are similar and when possible stitch them together to create panoramas. Of course, nowhere it is mentioned what is done to detect and search the images, nor other things the programme may have done. The collection is then parsed by auto-editing, classification and tagging software, resulting in many videos, collages and animations to be automatically generated. Interestingly, *Dark Archives* draws not only on the artist’s individual collection but implicitly also on the millions of other user media that tag, or link to her images and video.

In general the term ‘Dark Archive’ is used to indicate a repository for information that can be used as a failsafe during disaster recovery – it is some sort of copy of an archive but consists only of meta-data and it is not for public use. However Erica, is particularly interested into another type of Dark Archives, the information in an archive that cannot be seen. For example, Amazon could be seen as a very ‘light’ archive. Their business model is based on retrievability, which means that everything can be found and is accounted for. Amazon has to battle against the forces of darkness, which threaten to

make things in the archive un-findable. This could be spam or things that have very similar titles; such duplications are rapidly increasing with algorithmically produced content. Thus, there is a need to keep things retrievable otherwise the content of the archive can fall into darkness: they are available but one cannot find – or sell – them anymore.

Scourti is particularly interested in how visibility and invisibility - or darkness - relate to archiving and archives. After producing the automatically generated videos her final step was to involve elements of staging, scripting and fictionalizing. She invited a group of writers to speculate on and caption what they imagined to be the missing set of media that somehow evaded classification within the archive; the false negatives, the misclassifications, the media that fell outside of Google's definition for that search term. By asking the writers to imagine the way an algorithm works, the project was trying to get at the core of what perhaps a non-human way of thinking or logic could be. These captions were used to create a new series of videos, to feed into the work that visitors can access on their smartphones.

This action relates to identity and memory and Scourti's interest in what and how others can see that she doesn't, 'and how the technologies that we are entangled with are recording and archiving our lives' (Dekker 2016). On the one hand, this refers to notions of how identity and memory are constructed, but as she mentions: it also relates

to different types of control strategies in terms of implanted memories or remembering things that did not happen; having memories wiped and not being able to retrieve memories, what would that mean to a human, to not be able to retrieve their memories (Dekker 2016).

As well, it relates to a different way of inscribing knowledge.

Next to challenging notions of data collecting, shared authorship and individual memory, taking her own life and documents as an example Scourti explored the (im)possibilities of online archiving and how this relates to the way identities are constructed, while questioning the optimisation of online production and distribution. The project showed how the significance and meaning of identity and memory, derive from technical infrastructure and production. It also showed that an online archive is never stable – at least when using automated editing systems or even certain platforms – the archive never stays the same, it is not static, it is always added to, depending on the search the archive changes. So, there is the archive and potentially limitless constellations within it, which always has an unfinished or semi-fictional quality. The project clearly brings out the challenges preservation is facing, rather than worrying about missing

information and dark holes, such 'loss', through narration, may generate a productive quality that focuses on retelling, which, in the process, might also do more justice to the artwork.

4. To be continued

In this paper I emphasised the importance of understanding the different contexts in which many contemporary artworks thrive in the Web. I discussed some of the difficulties in capturing these contexts, and explored and described how storytelling as a method can be used to develop and enrich an understanding of online cultures: from analogue artists books (Erica Scourti, *The Outage*), performances and lectures (Constant Dullaart, *The Possibility of an Army*), to more speculative archival strategies based on distribution (Olia Lialina and Dragan Espenschied, *One Terabyte of Kilobyte Age*), and (re-)interpretation (Erica Scourti, *Dark Archives*). The stories mention some of the things we talk about when we talk about online culture: the stories that happened during unexpected encounters or the myths that exist around names, titles, photos, people and projects. While preservation is no longer just an act connected with power of institutions and authority, as can be seen in the shift to artists and audience members that are actively involved in documenting online culture, the question remains as to how 'storytelling' as a method can be used effectively in preservation. This paper suggests that preservation may learn from methods developed in disciplines that are already invested in 'storytelling', such as archaeology, oral history or ethnography. Such a perspective understands preservation not as following the traditional ideal of completeness and fixed knowledge, rather it emphasises the production of knowledge that appears through acts of copying, repetition and retelling.

References

- Brügger, Niels (2008). "The Archived Website and Website Philology: A New Type of Historical Document?" *Nordicom Review*, Vol. 29, Nr. 2.
- Brügger, Niels (2009). "Website History and the Website as an Object of Study." *New Media & Society*, Vol. 11, Nr. 1-2, pp. 115–32.
- Dekker, Annet (2008) "In Search of the Unexpected." In *Navigating e-Culture*, edited by Cathy Brickwood and Annet Dekker. Amsterdam: Virtueel Platform, pp. 65-73.
- Dekker, Annet (2015). "Networks of Care, or How in the Future Museums Will No Longer Be the Sole Caretakers of Art." *Digital Research in the Humanities and Arts*, edited by Anastasios Maragiannis. London: University of Greenwich.
- Dekker, Annet (2016). "Archiving Our (Dark) Lives. Interview with Erica Scourti." *Het Nieuwe Instituut*, January.
<http://archieffinterpretaties.hetnieuweinstituut.nl/en/archiving-our-dark-lives-interview-erica-scourti> (Accessed September 2016).

- Espenschied, Dragan (2016). "Rhizome Releases First Public Version of Webrecorder. A New Perspective in Web Archiving." *Rhizome*. 9 August.
<https://rhizome.org/editorial/2016/aug/09/rhizome-releases-first-public-version-of-webrecorder/> (accessed September 2016).
- Fitzpatrick, Kathleen (2011). *Planned Obsolescence: Publishing, Technology, and the Future of the Academy*. New York, NJ: New York University Press.
- Goel, Vindu (2014). "A Dynamic New Tool to Preserve the Friendsters of the Future." *The New York Times*, 19 October. http://bits.blogs.nytimes.com/2014/10/19/a-new-tool-to-preserve-moments-on-the-internet/?_r=0 (accessed September 2016).
- Jones, Caitlin (2010). "Do It Yourself: Distributing Responsibility for Media-Arts Preservation and Documentation." In *Archive 2020: Sustainable Archiving of Born Digital Cultural Content*, edited by Annet Dekker. Amsterdam: Virtueel Platform, section 4.0.
- Lepore, Jill (2015). "The Cobweb. Can the Internet be Archived?" *The New Yorker*, 26 January. <http://www.newyorker.com/magazine/2015/01/26/cobweb> (Accessed September 2016).
- Lialina, Olia (2012). "Still There." <http://contemporary-home-computing.org/still-there/> (Accessed September 2016).
- Mackenzie, Adrian (2005). "The Performativity of Code: Software and Cultures of Circulation." *Theory, Culture & Society*. Vol. 22, No. 1, pp. 71-92.
- Muller, Lizzie (2008). "Towards an Oral History of New Media Art. Montreal: Daniel Langlois Foundation." <http://www.fondation-langlois.org/html/e/page.php?NumPage=2096> (Accessed September 2016).
- Paul, Christiane (2010). "Context and Archive: Presenting and Preserving Net-based Art." In *Netpioneers 1.0 – Contextualizing Early Net-Based Art*, edited by Dieter Daniels and Gunther Reisinger. Berlin: Sternberg Press.
- Quaranta, Domenico (2014). *Possible Futures. Art, Museums and Digital Archives*. In *Possible Futures. Art, Museums and Digital Archives*, edited by Giselle Beïguelman and Ana Gonçalves Magalhães. São Paulo: Editora Peirópolis Ltda., pp. 224-38.
- Rogers, Richard (2013). *Digital Methods*. Cambridge (MA): The MIT Press.
- Roms, Heike (2008). *What's Welsh for Performance? An Oral History of Performance Art in Wales*. Cardiff: Samizdat Press.
- Shulgin, Alexei (1997). "Net.Art – the origin." *nettime-l*, 18 March.
<http://www.nettime.org/Lists-Archives/nettime-l-9703/msg00094.html> (Accessed September 2016).
- Smal, Rachel (2015). "Amalia Ulman." *Interview*. 14 October.
<http://www.interviewmagazine.com/art/amalia-ulman/#> (accessed September 2016).
- Spreeuwenberg, Kimberley (ed.) (2011). *Documenting Internet-based Art. The Dullaart-Sakronski Method. Culture Vortex. Public Participation in Online Collections*.
http://aaanet.net/wp-content/uploads/2015/09/Documenting-Internet-Based-Art_FINAL.pdf (accessed September 2016).
- Sterrett, Jill (2009). "Contemporary Museums of Contemporary Art." In *Conservation Principles, Dilemmas and Uncomfortable Truths*, edited by Alison Richmond and Alison Bracker. Oxford: Butterworth-Heinemann in collaboration with Victoria and Albert Museum London, pp. 223-8.
- Steyrl, Hito (2013). "Too Much World: Is the Internet Dead?" *e-flux Journal* #49, 11.
<http://www.e-flux.com/journal/too-much-world-is-the-internet-dead/> (Accessed September 2016).

- Van Saaze, Vivian (2013) "In the Absence of Documentation. Remembering Tino Sehgal's Constructed Situations." In *Performing Documentation in the Conservation of Contemporary Art*, edited by Lúcia Almeida Matos, Rita Macedo and Gunnar Heydenreich. Lisbon: Instituto de História da Arte, pp. 55-63.
- Von Hantelmann, Dorothea (2010). *How to Do Things with Art. The Meaning of Art's Performativity*. Zurich / Dijon: JRP | Ringier Kunstverlag AG and Les Presses du Réel.
- Wharton, Glenn (2012). *The Painted King: Art, Activism, & Authenticity in Hawai'i*. Honolulu: University of Hawai'i Press.
- Wharton, Glenn (2005). "Indigenous Claims and Heritage Conservation: An Opportunity for Critical Dialog." *Journal of Public Archaeology* 4, pp. 199-204.
- Winget, Megan A. (2008). "Collecting the Artefacts of Participation: Videogame Players, Fan-Boys, and Individual Models of Collection." In *Digital Media. Technological and Social Challenges of the Interactive World*, edited by Megan A. Winget and William Aspray. Lanham: The Scarecrow Press, Inc., pp. 27-72.

About the author

Annet Dekker (adekker@uva.nl) is Assistant Professor Media Studies: Archival Science and Cultural Information Science at the University of Amsterdam, and Visiting Lecturer at the London South Bank University, Centre for the Study of the Networked Image. She is also a freelance curator, <http://aaaaa.net>.

Preserving born digital art : lessons from artists' practice

Conor McGarrigle

Abstract

This paper looks at the complex nature of developing effective and appropriate strategies for the preservation of born digital art, in particular networked art. These issues are approached from the perspective of artist practitioners, focusing on a case study of the preservation of a net art project by the author. It is suggested that any preservation strategy begins with artists and the conservation practices that are inculcated into the very act of creation. The paper proposes that for institutional digital art conservation initiatives to be successful they must originate from a pre-existing culture of preservation within digital art communities

Keywords

Net art, born digital art, digital conservation, data art.

1. Introduction

Initiatives for the preservation of digital art in museums and other cultural institutions will by their very nature always come later. Once the relevant significance of particular artists, their works and associated art movements has been identified and these works collected then, often at a time of crisis, the work of conservation can begin. However, with born digital work this can be too late. If the work no longer exists no strategy can preserve it. If artwork is no longer viewable as the software or hardware required is obsolete or otherwise unavailable, unless there is a clear technical description of the correct functioning of the work supplied any preservation effort is going to be guesswork. I propose that initial preservation of born digital work must emanate from artists' practice. This requires artists to think about preservation strategies at a early stage with this effort being supported by institutional initiatives, even before works are deemed worthy of preservation. Selective preservation, no matter how exhaustive or detailed, will always fail to convey the context of the work, of the networks and discourses that formed around a work's creation that are made explicit in other works of the period. A broad based preservation strategy additionally leaves open the possibility for re-evaluations by scholars at a later date to redress bias in the original analysis which is not possible when works do not exist.

1.1. Preservation Strategies

Institutional strategies then need to be founded on a deep understanding of the issues that matter to artists in the preservation of their work, and to be

conversant with the issues that mitigate against successful preservation strategies being adopted at an early stage by digital artists.

Experimental digital art working at the forefront of emergent technologies, developing new approaches and 'misusing' technology is by definition precarious. Networked art with its dependence on third party platforms, software, external links and servers requires additional vigilance. Simple events like letting domain names expire and failing to pay hosting fees can result in the permanent loss of internet based work. With complex distributed work that appropriates online content (McGarrigle, 1999), that involves activist online and unauthorized interventions (Cirio, 2013), or leverages third party platform APIs this is compounded as these elements are not under the control of the artists.

While preservation strategies correctly focus on maintaining the correct functioning of the work according to the artists' wishes (Depocas et al, 2003; Rinchardt, 2007; Rosenthal, 2010) this is not the sole factor. This paper suggests that preservation of historical networked art raises complex issues that extend beyond problems of purely technical preservation to include the context of the work's production and original presentation. While it is technically possible to preserve and view a net art work from 1999 in 2016, is it also necessary to convey something of the context of the work and the critical dialogue surrounding it? If so, how might this be achieved, and how can this process inform decisions that can be made now to aide in the preservation of current generations of born digital art with more complex interdependencies?

Through a close examination of one 1999 net art work by this author contrasted with a recent work I hope to shed light on the myriad decisions that need to be made by an artist in order to develop a self-initiated preservation strategy for an artwork. It is intended that this will assist in developing a deeper understanding of the challenges that artists face in preserving born digital art and the impact that these will have on the availability of work for future preservation initiatives.

2.0 Preserving Networked Art

2.1. Geocities and the Archive

In considering the preservation of historical net art it is imperative to establish the context of individual project's production and reception and the wider ecosystem of web 1.0 that framed these works. Geocities the much loved – in hindsight anyway – 1990s free web hosting service is a good starting point as it is representative of the pre-web2.0, internet and its demise highlights the

vulnerabilities of early internet based work. Geocities, in many ways, represented the hopes for the internet in that period; it was a space for self expression and creativity, netizens were producers not only consumers, and significantly a space where the power relationships of real life were not necessarily mirrored. The \$3 billion Yahoo takeover of Geocities in 1999 marked the end of this dream for many, it can be argued that it was a major step in the corporatization of the internet that led inexorably to domination of the big five¹ today.

Geocities was coextensive with the 'heroic' period of net art and, along with its competitors Tripod and Angelfire, enabled the 1990s weird-internet that formed the backdrop for the birth of net art. By 1999, when my project *Spook...* was made, this was still a largely dial-up network. Metaphors of cyberspace, internet portals and Geocities homepages framed understanding of what the internet was, and how it might be used, misused and indeed shaped by its users. Users, including net artists, still mattered (Oudshoorn and Pinch, 2003) as the emergent technology of the internet found its mass audience. The environment within which net art of the period was produced is pivotal to understanding this work. Geocities and its clones defined the material culture of the late 1990s internet as surely as IOS and Android do today. This influence is embodied in the work of the time to the extent that it is difficult to fully understand it without a knowledge of internet culture from this period. Geocities is central to this knowledge. Founded in 1994, it was acquired by Yahoo in 1999, and shut down in 2009. Its 38 million user built webpages were deleted with only six months notice. If such a sizable part of internet history can be erased so casually, what confidence can there be for works built on any number of platforms central to the web today that are subject to unpredictable future events?

The case of Geocities starkly connects the preservation of born digital networked art to wider issues of the archiving of the internet. When seemingly stable commercial platforms can disappear on a corporate whim this introduces a precarity to all legacy platforms and systems that form the infrastructure, direct or indirect, of networked artwork. Networked art leverages a range of tools, systems and media with extensive interdependencies that are outside of the direct control of the artist or the institution. This includes systems that are directly required for the correct functioning of the work; APIs, remote databases, linked resources, scripts and plugins, proprietary file formats, as well as external components that serve to contextualize an individual work. Efforts

¹ The five corporations that dominate the internet; Amazon, Apple, Facebook, Google , and Microsoft

to archive and preserve born digital work are always then interdependent on research and approaches toward the archiving of the internet itself, and informed by emerging techniques and standards in this field. While the internet has been archived since 1996 by Brewster Kahle's Internet Archive and made available by the Wayback Machine². This collection amassed using webscraping is uneven, especially pre-2000, contains unintentional country bias (Thelwall and Vaughan, 2004) and generally requires knowledge of the original URL. While it can fill gaps archiving is not the same as preservation, archives require that the object be available whereas preserving artwork has an additional requirement that the work be viewable in as close to the original intent of the artist as possible. The archive quality has improved in recent years and archival methods for the preservation of websites have been developed that can handle a complex combination of file types. The Internet Archive .ARC file format and its successor the .WARC format have become the standards for preserving internet crawls and associated metadata in a single archive file.³ The Geocities archive was partially saved in an effort led by Archive Team⁴ that resulted in a partial copy of Geocities. This was released as a 640gb torrent file, currently available and being seeded by two people on the Pirate Bay. A number of mirror sites exist⁵ and notable art projects, *One Terabyte of Kilobyte Age* by Olia Lialina and Dragen Espenschied, and *Deleted City* by Richard Vijgen, have been built on the saved archive.

2.2. Preserving Networked Art

Since the early 2000s many international museum-level initiatives for the preservation of media-based and performance art have been developed. These include the Variable Media Network at the Guggenheim in 1999 , Capturing Unstable Media at V2 Rotterdam in 2003, PANIC at the University of Queensland Brisbane, Database of Virtual Art (now the Archive of Digital Art) at Humboldt University, Emulation as a Service at the University of Freiburg, Resurrection Lab at IMAL Brussels, initiatives at Ars Electronica and ZKM, and the Rhizome Artbase.

Of most significance is the Variable Media method with its approach toward considering a work's behaviors and strategies independently of medium. This

² See <https://archive.org/web/>

³ For more detail on this file format see <http://www.digitalpreservation.gov/formats/fdd/fdd000236.shtml>

⁴ For an account of the process see http://www.archive-team.org/index.php?title=GeoCities#The_GeoCities_Project_and_Friends

⁵ See <http://www.oocities.org/> and <http://www.reocities.com/neighborhoods/>

introduced a critical flexibility that allowed for a variety of preservation strategies including storage, emulation, migration and reinterpretation that overcome problems of obsolescence allowing works to be preserved as living works, achieving “permanence through change” (Depocas, Ippolito, Jones, 2003). For net art the Rhizome ArtBase approach emanated from an embedded position with the net art community from the 1990s, this allowed for insights in this very specific area of digital art practice that were unavailable to other art institutions. Rhizome's Artbase set out to preserve works of net art that were deemed to be "of potential historical significance." (Fino-Radin, 2011) Initially open to artist's submissions the Artbase consisted of linked objects – linked to works that were located on servers not under Rhizome's control - and cloned objects where copies were made on Rhizome servers (Fino-Radin, 2011). The model is transitioning to contain only archived works selected by a curatorial process that leaves the status of linked objects unclear. One of the strengths of the Artbase was its broad inclusion of work and its central position within the net art community. It remains to see how broad the Artbase will cast its net or whether it will adopt a museum approach and concentrate on preserving significant works only. While understandable from a resources point of view the danger is that if it focuses on a small number of selected works the broader picture of a community of practice will be lost.

The case of Geocities highlights the fragility of the web as an infrastructure for work. If the artwork, as artist Mark Napier suggests (Depocas et al., 2003), can be considered as an algorithm or design built on a technical support, this infrastructure can then be replaced as it ages preserving the work and its function intact. While undoubtedly true in some cases this doesn't hold universally. I suggest that artworks also depend on the artistic context of their production, can require access to non-art elements that no longer exist and can't be emulated, can be intrinsically bound to specific external material and technical conditions that once they are no longer available cause the work effectively to cease to exist.

3.0 Spook...

I want to now turn to a discussion of the preservation of a specific net art work that outlines not only the process of preservation but also the decisions that led to the work being preserved. *Spook...* was a distributed net art work originally created by this author in 1999. It existing primarily as a web site and later as a CD-ROM version designed for offline exhibition. As an online art work it garnered large audiences with over a million visits in its first year alone. It received considerable attention in the mainstream media with articles in the Guardian, The UK Independent on Sunday, The Irish Times, Spain's El Pais,

USA Today and was Netscape's "Cool Site of the Day". The project was exhibited internationally including at SIGGRAPH New Orleans, Art on the Net Tokyo, the Boston CyberArts Festival, FILE Sao Paulo and at Barcelona's Fundacio la Caixa Surveillance in Art series in 2003. It has additional art historical significance as an early and relatively rare example of Irish net art and was exhibited extensively in Ireland. Despite this the project was only preserved because of the actions of its author. Had I decided to let it expire it would be permanently lost with only a few screenshots online and in catalogs as a record of its existence.

The project had a central conceptual premise; a US military server identified as "gate1.mcbbutler.usmc.mil" was recorded to have visited my website at the time, this was identified as originating in Marine Corps Base Camp Smedley D. Butler in Okinawa Japan. The project came from an interest in surveillance practices on the web, an important topic for artists at the time. This project predated not only Edward Snowden but also the European Parliament's 2001 report into Echelon, a precursor of the NSA PRISM operation, and a favorite topic for conspiracy theorists of the time. The project used a web bot to trace every other website this US military server had visited and constructed *Spook...* as a portal through which the user could recreate this journey through the web undertaken by an imagined Marine Corp surfer in an attempt to discern a pattern in a seemingly random pattern of surfing (see figure 1).



Figure 1. *Spook...* entry page viewed on a CRT monitor

Spook... consisted of a website and a series of performative actions undertaken on the web. Technically the project was quite a simple project and claimed no great innovation. It was a website constructed using standard HTML code, employing HTML framesets and pop-up navigation windows typical for that period, it also used javascript, embedded flash animations as .swf files, java applets and a php based off-the-shelf message board.

Essentially *Spook...* consisted of seven content pages supplemented by five informational and help pages. These content pages provided a contextual framework, which framed the web as seen by the imagined surfer of Camp Smedley D. Butler, through a tightly curated interface. This linked to the project's appropriated material while capturing them within the frameset of the project interface to present a seamless user experience. In effect *Spook...* constituted a re-performance of the original actions on which the project was based. This re-performance was framed as a critical inquiry into surveillance on the web, but the question arose as to how this differed from the original actions? This ambiguity was at the heart of the work raising complex questions on the culture of surfing and an emerging practice of internet surveillance just beginning to come to attention through the European Parliament's ongoing inquiry into Echelon. In hindsight this was prescient stuff indeed.

The project included constant surveillance of the server logs recording all visitors to the site, to identify all new .mil domains. The domain of each new visit – and there were many – were in turn visited and indexed by a web bot, identified as Spook-Bot in server logs. This in return caused more visits and so on in an escalating cycle of web bot tit-for-tat performance. This aspect of the work was not visible to a site visitor, it was tracked through server logs and discussed in presentations of the project. It was however a crucial part of the project as it actively engaged the subject of the work – US military surfers – with the work itself. Even if not readily visible it mirrored online surveillance activities that were knowable only through analysis of server log data. This performative aspect of the project was difficult to document and posed significant preservation problems.

3.1 Developing a Preservation Strategy

Considering *Spook...* from a digital conservation perspective the issues it presents can be broken into four areas. The first is conveying its context as a net art project embedded in the web culture of 1999, this encompasses issues of the native look and feel and user experience and how that might be conveyed on contemporary computers with high resolution screens, fast internet connections and new browser standards. The second is the preservation of linked websites hosted on a myriad of servers subject to link rot over which the

author has no control, as these constitute over 99% of all the content this is crucial and difficult to overcome once the linked sites have been lost. The third aspect is the preservation of the authored core and structure of the website; this is relatively unproblematic requiring upgrading of code to meet new standards. The final issue is how to convey the time based web bot performances that took place over the first year of the project's existence especially since there was no record kept of these.

A final overarching issue is the question of whether the work should be preserved at all. When so much of a work's content is dependent on the network environment at the time of its creation can a preservation strategy be developed that can successfully convey the context so essential to the understanding, appreciation and critical sense of the work? Net artist Igor Stromajer made this argument forcibly in his 2011 work *Expunction* when he deleted 37 of his early net art works claiming that “all initial net art works lost their «natural environment», because the Internet 1.0 has already gone. It is impossible to preserve the net art works in their original form” (Stromajer, 2011)

My initial view on *Spook...* was that this was an ephemeral work, a temporary intervention into the fabric of the web that would be of its time and would slowly erode and fade away. In its early stages I documented the work with a series of screen captures that conveyed the physical look of the site with a selection of the pages that were linked to from within the *Spook...* framesets (see figure 2).



Figure 2. *Spook...* screen capture, *Guerrilla Solar*

This idea changed with a demand to produce an offline version for exhibition venues that couldn't guarantee an internet connection, a not uncommon demand for exhibitions in the 2000-2002 period. As I considered this request and how it might be achieved new aspects of the work were revealed. Not only did it work as a conceptual project about surveillance it also seemed to map out a thematically connected network of interconnected sites that spoke to the culture of surfing the web. It effectively mapped out networks of interest that formed around the activity of thematic surfing with nodes of web urls and edges of thematic and conceptual connections. This aspect so central to networked culture 1.0 was even at this point changing, if only to preserve an example of this activity *Spook...* in its widest sense, including external linked sites, seemed worth preserving. How this might be achieved was not so clear.

In building a preservation strategy for *Spook...* its context as a net art work from this period of time was essential in order for any successful preservation strategy to convey an authentic sense of the work. This included the materiality of the equipment used, typically desktop computers, CRT displays with screen resolutions of 1024 x 768 pixels or more typically 800 x 600, connected to the internet by dial-up modems. The affordances of the Netscape and Internet Explorer browsers, with their default behaviors such as permitting pop up windows, also set the scene as effectively as a white cube gallery does for contemporary art. Context also extends to the idealism of web 1.0 culture that still retained utopian hopes of, for example, the democratic potential of the digital public sphere though even at this time the writing was on the wall with mounting concern over surveillance through ECHELON. There is doubt whether this context, so crucial in the development of this work and in its reception can ever be fully understood today by anyone who had never experienced it. Any preservation strategy must decide to what degree the work depends on this context.

3.2 Network as Site

I invoke the notion of site specificity to consider the broad context of early period net art. Site specificity refers broadly to “practices which, in one way or another, articulate exchanges between the work of art and the places in which its meanings are defined” (Kaye, 2000, p1). It is an evolving concept that ranges from a determinist relationship between site and artwork, espoused by artists such as Richard Serra, that holds that a sculptural work has such a specific relationship to its site that it is effectively destroyed once removed (Deutsche, 1998: p257), to socially engaged practices that seek to bring art out of the gallery to “integrate art more directly into the realm of the social” (Kwon, 2002 :p.1). Thinking about networked art as site specific is not new (Berry, 2001; Glesner, 2003; Paul, 2003, Thomson-Jones, 2016) with a broad sweep of

interpretations from consideration of the sites of telematic performances such as *Hole in Space* (Galloway and Rabinowitz, 1980) and the *Plissure du Texte* (Ascott, 1983) to physically located (locative media) networked art that offers critical readings of site enabled through the network (McGarrigle, 2013). I suggest that site-specificity can act as a useful method of considering networked artworks – both in a historical net art context but also for future works where complex relationships with cloud storage, crowd-sourcing and specific algorithmic and software processes may lie at the heart of the work. With the growing interest in the materiality of the network and evolving notions of the stack of planetary computing (Bratton, 2015) site has the potential to encompass elements of the work beyond a narrow definition of the parameters of the artwork.

Spook... in this sense was a site specific work situated at the center of a conceptual network with 99% of its content consisting of appropriated web pages directly linked and enframed within the project's structure, the internet as ready-made as it were. As with site specificity in the expanded field we can consider some net art works to be so dependent on its relationship with site that the work effectively ceases to exist once this connection has been broken. Rafaël Rozendaal's website works, Etoy.com, Hell.com, many Yes Men projects, Igor Stromajer's deleted works and this author's Irishmuseumofmodernart.com site hijack being examples of works that cease to function once they are removed from their URL. With *Spook...* the site was the rich network of interconnected websites linked initially by the fact that they had been visited from one specific server but at a higher level through a multiplicity of layered thematic links and associations. In order to preserve the project in any meaningful way it was obvious that these multi-layered associations would also need to be preserved in any conservation effort.

I extend this reading of site to include the social and artistic exchange that formed around net art works. This includes debates on listservs such as Rhizome Raw, 7-11 and Nettime. It also includes net art projects that are no longer available by artists no longer active. The problem with histories of net art are that they show the highlights but fail to convey the ephemerality of the movement. We don't read about the artists who moved on, the works that inspired and influenced but can no longer be seen. However, these too constitute the site and their absence hampers a complete understanding of net art as an engaged critical art movement rather than a historical one. A culture of self-preservation amongst artists, facilitated and supported by institutions would go some way to address this lack. Digital preservation initiatives should, I suggest, go beyond the master works paradigm by adopting an economy of plenty through capturing a larger section of the ecosystem that works deemed

to have historical significant came from. This will thus permit multiple readings of the historical record and provide the raw material for future re-evaluations should they become necessary.

3.2 Saving Spook...

The first step in preserving *Spook...* was the most urgent. Even after less than a year links had started to erode and the prospect was that critical parts of the project would soon be lost. This involved creating an offline version of the site that went beyond the core project to include external links to as great a depth as possible. This required making complete copies of the file structures of not only the core site but all the externally linked sites and the sites linked from them to three levels of depth. This necessitated saving all HTML files, images, scripts and other media and completely replicating the website structure so it could be viewed offline. This was achieved through the use of a downloading script that followed links, downloaded all files, images and scripts reconstructing the entire structure of the linked pages from the project's core framesets and rewriting links as necessary. In effect it created a snapshot of the project's "site" encompassing both pages that were directly implicated in the project but also extending beyond the confines of the project.

Spook... encouraged a free-form practice of surfing, to replicate the experience the archive had to be kept as open as possible. My intent was that the viewer would be free to surf while remaining trapped in the confines of the project's frameset potentially making the entire web part of the "artwork". The work of the project was to provide an initial point of entry or mode of approach that would shape this experience of surfing the web, thus making available an alternate way of seeing. With *Spook...* it turned out to be a wonderfully convoluted web of conspiracy theory at the highest level, from thought-stealing military mind-rays to black choppers menacing citizens outside Huntsville Texas (See Figure 3).

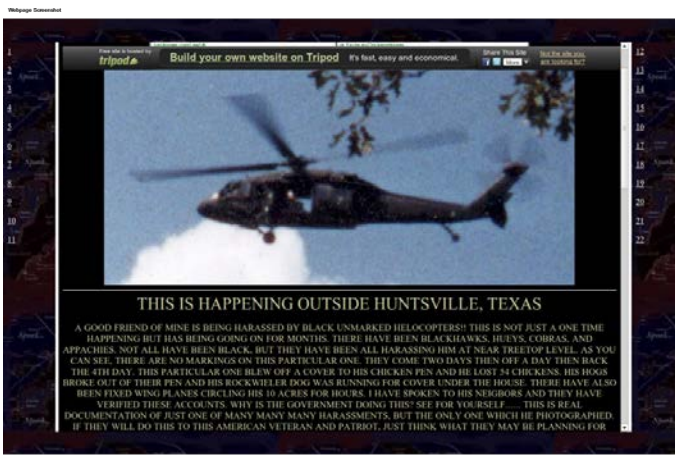


Figure 3. Spook... screen capture, black choppers outside Huntsville Texas

To replicate this experience, it was necessary to provide as deep a level as possible, but this needed to adhere to practical limits such as how much data could fit on a CD-ROM and the limited resources available to download a sizable chunk of the web which exponentially grew with each additional degree of depth requested. In the end the project saved 22,138 files or 415.3 MB (see figure 4), in 1999 terms very substantial. This replicated the structure of the external servers even to the point of including the banner ads. Most of the externally linked pages were hosted at free services like Tripod which included intrusive banner ads, removing them would have altered the experience, even when that experience was a negative one.

3.3 From Offline to Online

This saved version constituted the offline version which was used as a fallback for exhibitions where networked connection was not assured. Once the viewer reached the end of the saved material the disk would seamlessly connect to the network if it was available or display an error message. This version was problematic as it presented a networked artwork in an offline state, however it was a necessary pragmatic compromise to be used only when there was no alternative, with the number of copies of the disk strictly controlled and accounted for. This archive became the preserved snapshot later used to conserve the work. Within two years of this action approximately 50% of the content was no longer available even at alternate URLs. This statistic is a sobering one, for no preservation strategy no matter how effective can deal with the speed this project began to erode. This highlights the necessity of artists working with networked media being the first line of preservation in

order to maintain functioning projects that can be the subjects of broader preservation initiatives at a later date. As the links from *Spook...* began to erode in a significant way the project hit a crisis point. Either it could be left continue to rot until there was little or no content left, this would involve a shift to a documentation mode of the original project detailing its trajectory and gradual demise. This was an approach I took with a later work *The Bono Probability Positioning System*⁶ (2006) which ceased to exist when Dublin City Council closed access to the live traffic cameras underpinning the project. There was no clear path to upgrade or remaking the project as it was a parasitic project that built on a hidden infrastructure of cameras that were accessed via a back-door in the city website. I deemed it to be an ephemeral interventionist project that was dependent on a specific set of circumstances that no longer existed, as such the work itself ceased to exist.

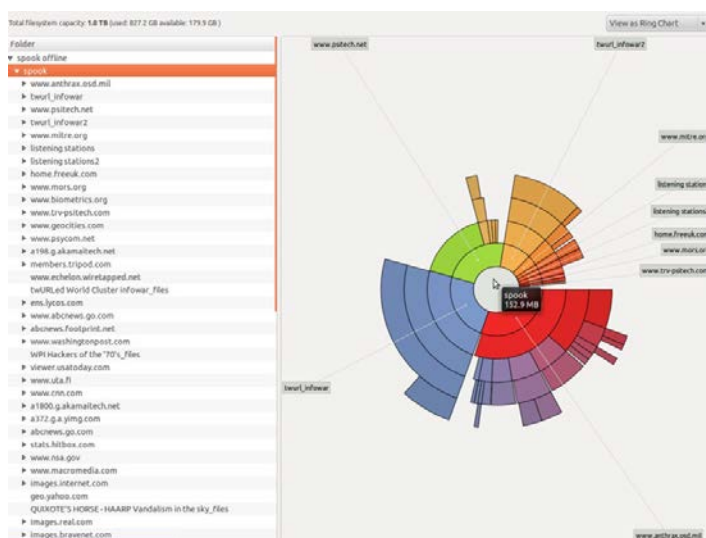


Figure 4. Visualization of the file structure of one portion of the saved *Spook...* site

With *Spook...* I took the decision to begin to gradually replace significant links as they began to fail. This involved firstly updating URLs if the content simply moved. This presented no problems as networked art is always dynamic and subject to change. The second option was to replace websites that ceased to exist with archived copies hosted on the *Spook...* server recreating that portion of the web even after it ceased to exist online (see figure 4). This happened with a website central to *Spook...*, psychicspy.com, an extensive resource for all

⁶ See http://conormcgarraile.com/google_bono.htm

things conspiracy run by a former US military intelligence officer that was unexpectedly deleted. This event highlighted the advantages and drawbacks to this approach. On one hand a portion of this site as it pertained to *Spook*... was preserved and is still accessible. However, the replacement is only partial and the depth of material saved and re-hosted effectively removes the option of diving deep into its world of conspiracy as part of the *Spook*... experience.

The files downloaded are exact copies of the original files, identical in every way except in their hosted URL, links followed from each page have been adjusted to account for this in some cases. When the user reaches the end of the downloaded portion of the site she can continue to surf seamlessly by connecting to the absolute urls contained in the original HTML. Of course, these links are subject to link rot and many have moved or are otherwise unavailable. This is a compromise, rather than the project making connections to a heterogeneous collection of websites sited on multiple servers in a variety of locations for a myriad of reasons we are presented with a single body of work. On the surface it looks the same but it is a facsimile not the real thing. Ultimately this matters.

4.0 24 Hour Social and Data Art

Spook... was essentially a data-driven artwork with a database which by today's standards is quite modest. I would like to contrast the experience of preserving it with that of a contemporary project by this author that works with a database more than 200 times that of *Spook*.... *24 Hour Social* is a generative multi-channel video installation work that shows a full day of videos appropriated from the Vine video sharing platform, with each video algorithmically synced to the time of its original creation (see figure 5). The project was created by scraping a full day of Vines – six second looping videos from the social media platform - shared on Twitter. The videos were accessed using the Twitter API, file locations extracted and the videos downloaded and saved. The project shows a video for every second of the day, 86,400 in total from a larger database of over 120,000, over a 24-hour period. Videos are shown alongside their accompanying metadata. For this project a decision was made to capture and store the videos locally as the volume and pattern of traffic of a live version would make exceed rate limits and cause the project to be shut down quickly. From a preservation point of view this is fortuitous as it brings all the components of the work under my control, thus simplifying the process.

The project consists of a database of over 100 GB of six-second mp4 videos. These videos are played over a 24-hour period with each video played at the exact time of its creation. When multiple videos exist for a specific time a

random selection is made, introducing variability into the playback. The project is run in Processing,⁷ the open source software sketchbook and language designed for the visual arts. Processing is not essential to the project, it is simply a method of displaying the videos according to the project's logic. If Processing was to become unavailable in the future, it would be relatively simple to migrate it to another environment, the techniques it uses can be easily replicated. However, processing is a good choice as it is open source and has built up a strong user base that tends to add future-proofing. The principle area of vulnerability are the videos themselves. While mp4 videos encoded with the widely accepted H264 codec are unlikely to become obsolete in the near future, this cannot be guaranteed over an extended period of time as standards change in video. Videos can, of course, be transcoded to a new format but with over 120,000 this is quite an undertaking. Storage is another area of concern. This is ensured against through multiple backups held on separate hard drives in different locations.



Figure 5. 24 Hour Social Installation view

Even if all videos were lost the project is not about these artifacts, the work is more significantly about a day of self-expression on social media and the data it generates. As long as Vine exists I am confident it can be replicated. If Vine ceases operations, it will be replaced by a similar updated service and a new version of the project could be made that will fulfil the same function. The

⁷ See processing.org

project is reproducible using a variety of methods and this is the best strategy for its preservation beyond simple storage. In this way it is completely unlike *Spook...*, whereas *Spook...* was about a specific moment in the life of the internet that needed to be preserved exactly with all related artifacts, *24 Hour Social* addresses the creative impulse of social media which is constantly renewed in updated forms.

In my practice, building on my experience with *Spook...*, questions of preservation are part of the process of making new work. I decide early on whether a work will be preserved or not. This informs my decisions on methods and tools and documentation strategies. In thinking about preservation it is important to note that not everything should be, or needs to be, preserved.

The important factor is that these decisions are built into the process by the practitioner so that they can inform the making of the work.

5.0 Conclusion

The *Spook...* project was preserved almost by accident. If a certain set of circumstances had not required an offline version at a specific moment in time it would have been lost. While the project has been mostly preserved for posterity I argue that the work does not function as originally intended. In 1999 *Spook...* was a contemporary project, designed for the latest generation of hardware it reflected a current look and feel of the internet. Today its design is anachronistic, perhaps even nostalgic, harking back to the golden era of the web. Designed for a screen resolution of 1024 x 768 pixels it sits in the corner of today's high resolution screens. It makes liberal use of pop-up windows for navigation and content, but these are automatically and invisibly blocked by web browsers rendering this aspect invisible to many. Although still online it increasingly represents a snapshot of the 1999 internet more likely to be admired as a work belonging to a past era of the web than as a critical work of art. At one level this is a question of materiality, of screen resolution and original equipment. One approach to resolve this issue, adopted with mixed results by the Digital Revolution exhibition at London's Barbican in 2014 and the Electronic Superhighway exhibition at the Whitechapel gallery in 2016, is to show net art on original hardware from the period of the work, even throttling the internet to dialup speeds when necessary. The balance between preserving networked art authentically, so that future generations can view it as it was when it was created, and in this process highlighting its separation from today's network, and evoking a sense of nostalgia for a lost web, is a difficult one.

However, this debate can only be argued if the original work is preserved. I argue that this task in the first instance falls to the artists but needs to be supported by institutions in pre-preservation outreach programs. Recent initiatives like the Rhizome DIY Webrecorder⁸ are promising for web based work but more are needed that address critical issues such as migration from obsolete file formats, secure backup file storage, and methods of recording correct and desired function of works. Of course the unexpected can still happen, for example, Apple's 2015 OSX 10.10 update blocked the viewing of any glitched images, thereby unintentionally wiping out an entire school of digital art. An unofficial workaround was quickly found and distributed in the glitch community, but it is illustrative of the risk inherent in creative misuse. As artists create work with an increased complexity, leveraging multiple platforms, methods and techniques in ways that can have unexpected and unpredictable outcomes. The precarity of the work increases with its interdependencies and necessary ceding of control over constituent parts. To counter this the preservation conversation needs to happen earlier, it needs to be built into artists' methods and supported by institutional initiatives that identify generalized methods rather than significant works. Successful preservation needs more than a selection of well chosen works but cross sections of artistic ecosystems, sites rather than individual works.

References

- Berry, J. (2001) *The Thematics of Site-Specific Art on the Net*. (Doctoral Dissertation) University of Manchester. Manchester, UK.
- Bratton, B. (2015) *The Stack*. Cambridge, MA: MIT Press.
- Cirio, p. (2013) *Loophole for All*. (Artwork) Retrieved from <https://www.paolocirio.net/work/loophole-for-all/>
- Depocas, A.; Ippolito, J.; Jones, C. (2003) *Permanence Through Change: The Variable Media Approach*. New York, Guggenheim Museum Publications.
- Deutsche, R. (1998) *Evictions Art and Spatial Politics*. Cambridge MA: Graham Foundation/MIT Press.
- European Parliament (2001) *Report on the existence of a global system for the interception of private and commercial communications (ECHELON interception system)* (2001/2098(INI)).
- Fino-Radin, B. (2011) *Digital Preservation Practices And the Rhizome Artbase*. New York: Rhizome,
- Glesner, J. (2003) Internet Performances as site-specific art (pp. 275-288) In Sprengard, K.A.; Gropp, P.; Ernst, C. (eds.), *Perspektiven Interdisziplinärer Medienphilosophie*. Bielefeld: Transcript Verlag.
- Kaye, N., (2000) *Site-Specific Art*. London, New York: Routledge
- Kwon, M. (2002) *One Place After Another*. Cambridge MA: MIT press.
- McGarrigle, C. (1999) *Spook....* (artwork) Retrieved from www.stunned.org/spook
- McGarrigle, C. (2013) Augmented Resistance: The Possibilities for AR and Data Driven Art. *Leonardo Electronic Almanac*, 19 (1). 106-115.

⁸ See <http://rhizome.org/editorial/2016/aug/09/rhizome-releases-first-public-version-of-webrecorder/>

- Oudshoorn, N.; Pinch, T. (2003) *How Users Matter: The Co-construction of User and Technology*. Cambridge MA: MIT Press.
- Paul, C. (2003) *Digital Art*. London: Thames and Hudson.
- Rinehart, R. (2007). The Media Art Notation System. *Leonardo - Journal of the International Society for the Arts, Sciences and Technology*, 40(2), 181-187.
- Rosenthal, S.H. (2010). Format obsolescence: assessing the threat and the defenses. *Library hi tech*, 28(2), 195-210.
- Stromajer, I. (2011) *Expunction – Deleting www.intima.org Net Art Works*. Karlsruhe: ZKM.
- Serexhe, B..(2013) *Preservation of Digital Art: Theory and Practice. The digital art conservation project*. Vienna: Ambra Verlag.
- Thelwall, M.; Vaughan, L. (2004) A fair history of the Web? Examining country balance in the Internet Archive. *Library & information science research*. 26(2) 162-176.
- Thomson-Jones, K. (2016) Art and the Information Society (pp375-386). In Floridi, L. (Ed.) *The Routledge Handbook of Philosophy of Information*. New York: Routledge.

About the author

Conor McGarrigle is an artist and researcher working at the intersection of digital networks and real space. His work is concerned with the integration of location-aware technologies into the everyday and the spatial implications of ubiquitous data collection regimes. His work has been exhibited widely internationally including the 2011 Venice Biennale, the St. Etienne Biennale, EVA International, Fundació La Caixa Barcelona, SIGGRAPH, Site Santa Fe and FILE São Paulo. He is a lecturer in Fine Art at the Dublin Institute of Technology. conor.mcgarigle@dit.ie

At angle C: instability poetics. Participation aesthetics through the work of Julio Le Parc and the Groupe de Recherche d'Art Visuel (GRAV)

Andrea Sosa

Abstract

This paper examines participation aesthetics in modern Interactive Art perspective of the work of artist Julio Le Parc and the Groupe de Recherche d'Art Visuel (GRAV), in the 1960's, and from the theoretical perspective of Marta Zátanyi, Gilles Deleuze, Giorgio Agamben, Umberto Eco, among others.

Taking the GRAV program as a starting point, the concepts of 'activated spectator' and 'instability' are analyzed, together with the notion of 'moving artwork.'

Keywords

Poetics, Media Art, Participatory Aesthetics, Instability, GRAV

1. Introduction

In my view, technological elements are no guarantee of quality artistic production. The use of new technology is justified when the result is actually strong, effective, moving, artistic or poetic, when it creates a relationship or awakens interests in the observer, rather than simply submerging them into a wasteful excess of technological elements.

Julio Le Parc

With the global exponential proliferation of technological devices and bits in only a few decades, the new techniques have reached a very diverse set of practices in all cultural spheres.

In terms of the relationship between technique and language, Marta Zátanyi's thought (2007) delves into the articulation among the different dimensions: *"If we imagine a triangle with angles A, B, and C, we may consider that Angle A corresponds to the empirical and spiritual needs of man in a particular historical and social moment, that Angle B corresponds to the technical, technological and scientific conditions provided or under investigation, and that Angle C corresponds to the aestheticization of the other two. This is not an act of addition but of constitution: it is only through this aestheticization that they may be configured into a new artistic genre. Angles A and B in our decades refer very specifically to digitalization (with all its media, platforms, applications, etc.) But what about Angle C, their aesthetics, their path to become Art?"*

The question about Angle C has become essential, even more so as digital devices become frequent platforms for artistic production. There is an observable trend: the denominations for these practices focus on Angle B, i.e.

the technical, technological and scientific conditions, while Angle A and especially C are frequently unexplored and remain questions to be addressed. One of the notions that have spread widely since the advent of computing devices is that of interactivity. Where there used to be a spectator, now there is, progressively, an interactor, a user, a participant.

The notion of *hypertext*, born in the 90's, and its massive use since the arrival of the *World Wide Web*, has put this new situation on the agenda.

It is often suggested that the advent of digital media has given birth to these new configurations. However, some artists and works showing similar features as those thought of as exclusive to the new media may be tracked to before the adoption of digital technologies.

2. GRAV (Groupe de Recherche d'Art Visuel)

The GRAV group was established in the 60's in Paris. GRAV would have a precise work plan, a clear position regarding the artistic practice, and a continuous reflection on research goals.

The notion of *spectator activation* would be central to their research, and *instability* as a value in relation to the work of art would become the counterpoint that would give shape to the new propositions. Julio Le Parc (1962), as a member of GRAV, stated: *"In the circuit of conception-realization-visualization-perception, a new state is added to regulate the whole: 'modification'. This idea leads us to the notion of instability. The notion of instability in visual art responds to the condition of instability in reality. We try to materialize it in realizations that transcribe it by means of their essential characters."*

In *"Continuel Mobil"* (1960-1978), one of the first productions, the factor which introduced instability was fed by the physical properties of the materials, their layout in space, and an external factor for driving movement: air.

The notion of movement would be key for the start of those investigations. In a writing called *"Propositions sur le mouvement"*, the group clarified the way it understood movement, which could be handled in two ways: gratuitous agitation or a progression for organizing a new visual situation. The group would favor the latter approach, and would systematically and continuously justify each of the operations put into practice as manifestations of a program, embracing contingency and scorning arbitrariness.

In *"Déplacement"* (1963-1987) the movement, openness and instability of the work focused on the spectators and their spatial movement instead of an external environmental contingency.

In "*Salle de Jeux*" (1963-1968) a multiple set of experiences converged into a single space, combining translation, movements and direct handling of items. In the case of "*Miroir en Vibration*" (1981), a switch actioned an engine which activated the movement of a polished plate. By changing from concave to convex and vice versa, the spectator's reflected image was subject to all kinds of deformations.

Another set of works would invite the spectator's direct manipulation of the items that constitute the work, without any mechanical mediation, so that the resulting movement would be a direct consequence of the interrelationship with the activated spectator. Works like "*Éléments à essayer*" (1965) or "*Lunettes à vision autre*" (1965) would make the spectator's physical participation the center of the experience.

The work "*Rubans au Vent*" (1988), which we consider of special interest, is an interactive installation, described as such by the Daros Latinamerica Collection in terms of gender. This installation is particularly interesting because it introduces two types of spectators who need to cooperate with each other in order to exist: one who enables and watches the experience, and one who undergoes the bodily experience. Due to the spatial configuration, they cannot be reduced to a single person. Thus, not only is there an interactive space generated, but also a dialogical situation which implies the coordination and agreement between participants. The variety of configurations exposed in the prolific work of GRAV implies the exploration of different situations. As Julio Le Parc explained (1962): "*Without going into critical considerations, a whole series of new work-spectator relationships may be observed, from mere contemplation to the spectator as a work of art, going through the 'stimulated spectator', the 'spectator-movement', the 'activated spectator', the 'spectator-interpreter', etc.*"

Action and interaction would constitute key notions for the creation of variable, transformable, and dialogical objects and installations.

3. The stoic event

The approach to works as events rather than things -with a focus on action-becomes the footprint of a mechanism for analyzing Angle C in these practices. Gilles Deleuze (1994) in "*The Logic of Sense*" asks himself, when analyzing the Stoics' world view: "*What do the Stoics mean when they contrast the thickness of bodies with these incorporeal events which would play only on the surface, like a mist over the prairie (even less than a mist, since a mist is after all a body)?*". The opposition between non-bodily events and the thickness of bodies is resolved in favor of events: "*Mixtures generally determine the qualitative and quantitative states of affairs: the*

dimensions of a group, or the red of iron, the green of a tree. But what we mean by "to grow", "to diminish", "to become red", "to become green", "to cut" and "to be cut", etc., is something of an entirely different class: these are no longer states of affairs—mixtures deep inside bodies—but incorporeal events at the surface, which are the results of those mixtures."

While the proposition "the green of a tree" emphasizes the adjective and noun, the proposition "to become green" includes the full power of the verb. *To become green* turns green into a continuous and unstable process, but *the green of a tree* makes it a stable state without mention of its temporariness or evolution. The way Stoics understood the universe—three centuries before Christ—finds correlations with our present and the practices that challenge established artistic practice standards. Jorge Luis Borges, back in 1941, by means of lineal grammatical structures, observed the multiple potential futures and events through the universe of Ts'ui Pên, in his short story "*El Jardín de los Senderos que se bifurcan*" (The Garden of Forking Paths).

Events, actions, verbs. Between the tangibility of materials and the density of bodies stands the world of events and participatory actions, an intrinsically intangible dimension. As Deleuze describes (1994): "*To the extent that events are actualized in us, they wait for us and invite us in. They signal us: 'My wound existed before me; I was born to embody it.'*" In interactive works, *events* exist before the subject only in the field of possibilities, as virtual actions that the actual interaction and participation of the public may update and materialize.

4. Genius

So far we have discussed the figure of the revised spectator and the work, but it would also be interesting to detail the position of GRAV regarding the author-artist. Among the notions identified by Alexander Alberro (2013): "*One concerns a refusal of the romantic figure of artist-creator, the 'solitary genius' who Vasarely had already deemed outdated.*"

Giorgio Agamben (2005), in his book "Profanations", dedicates one chapter to examining the notion of Genius and the close relationship between genius and generate, which is emphasized by an etymological observation. Agamben notes that for Latins, Genius is the god who presides over birth. "*But this most intimate and personal of gods is also the most impersonal part of us, the personalization of that, within us, which surpasses and exceeds ourselves. If he seems to identify himself with us, it is only in order to reveal himself immediately afterwards as something more than ourselves. To comprehend the concept of man which is implicit in Genius, means to understand that man is not only 'I' and individual consciousness, but that from the moment of his birth to that of his death he lives instead with an impersonal and pre-individual component."*

This god who reminds us what exceeds and goes beyond us is probably being strongly invoked in interactive manifestations and could constitute a differential feature. If Genius is the one *"who breaks apart the pretext of the 'I' that it is sufficient for itself alone"* (Agamben, 2005), a work of art which is partly the result of its creator's activity and partly the result of environmental contingencies or the public's subjective interactions, would incorporate an element exceeding the personal sphere, even though in this case it would not be referring specifically to what exists before, but to what is beyond the artist's volitional act. The presence of genius may lead us, through the etymological path, to the ability to generate, reaffirming the relationship between Genius and new interactive practices.

In the field of art using computers, in 1965, the notion of *"Generative Art"* emerged to describe the work of the German digital artist George Nees. The removal of personal intention or individual aesthetic decisions may be analyzed through the lens of the impulse of that impersonal and pre-individual component. The artist's concession of control over the final form—though defining the initial parameters that are subsequently updated in the work—would respond to the overwhelming force of Genius. Algorithms and human manipulation of the materials would incarnate this force in the borders of concrete reality and the density of bodies. As regards the artist, we could base our analysis on Agamben's words (2005): *"We need therefore to see the subject as a field of tensions, whose antithetical poles are Genius and I."*

5. Movement and arbitrariness

The notion of movement established by GRAV—a constituent part of their research—coincides with Umberto Eco's description, from 1962, of a particular type of open work: the work in movement, characterized by an invitation to give it material shape in a cooperative dialog between author and recipient. However, Eco would add (1995) that the work in movement only constitutes a work if it is not a chaotic agglomeration of elements. Using different words, Le Parc (1962) also makes reference to this ledge participatory aesthetics traverse: *"...an extreme desire to make the spectator participate may lead to putting them in front of a blank canvas on an easel and inviting them to use a box of oils or to reinvent the writing machine as a work, asking the spectator's active participation for the creation of a poem."*

In the case of GRAV, a rigorous thought about the ways of being of a work emerges along its production, based on the initial objective of effectively producing a new visual situation. In relation to movement itself, they did not consider all movements are equivalent in terms of their aesthetic potentialities.

Marta Zátanyi (2007) states: *"Difference and repetition are the two powers, the two realizing conditions of the essence. They are inseparable and correlative. The being is a subject only in the unrelenting repetition of his continuous differentiation. Without this, an act will not be creation, because when repetition does not follow the path of auto-differentiation, the fact is reduced to an accumulation of clones."*

The proliferation of clones or quasi-clones in new media art is often the rule more than the exception. This problem was emphasized in a discussion which emerged in the blog called "El Arte en la Edad del Silicio", during September 2013, when the notorious similarities between the work *"Nanodrizas"* (2006) by Mexican artist Arcángel Constantini, and *"Vessels"* (2013) by Sofian Audry, Stephen Kelly, and Samuel St-Aubin, led to questions about the boundaries among plagiarism, appropriation, and ignorance.

A work including virtuality opens a whole set of resolutions which—though similar by definition—are never repeated in all their terms. There is no absolute similitude. Updating virtuality offers a set of multiple forms which are similar but never the same. Variability and instability of shape may promote an illusion, diffusing the limits between repetition and difference.

Gilles Deleuze (2002) says: *When the work of art is reclaimed by the virtuality into which it falls, it does not invoke a confused determination, but a completely determined structure which forms its differential genetic elements, virtual elements, embryos. The elements, the varieties of relations, the singular points coexist in the work or in the object, in the virtual part of the work or the object, without one being able to assign a privileged point of view to the others, a center which would be unifying the other centers."* He also points out that *"these four terms are synonymous: actualize, differentiate, integrate, and solve. For the nature of the virtual is such that, for it, to be actualized is to be differentiated. Each differentiation [différentiation] is a local integration or a local solution which then connects with others in the overall solution or the global integration."*

This relationship between update and difference as a local integration may conceal the scope and the properties of global integration, the embryonic differences of every participatory work. In this sense, GRAV's proposition is illuminating in that, for example, what generates significant effects is not the presence of movement itself—with the various shapes it may adopt through the public's participation—but the particular way of understanding movement. For instance, the acceleration introduced by an unconventional relationship

¹ <http://blogs.elpais.com/arte-en-la-edad-silicio/2013/09/plagio-apropiacionismo-o-desconocimiento.html>

between what the public experiments as movement outside the work and within it.

In another sense, just like Le Parc integrated the notion of instability into the work, another factor subject to instability may be identified in artistic production with technological media: the techniques themselves. In a material sense, this instability manifests itself in different planes: in the fragility of information flows, and perhaps more relevantly for the artist's work, in the unrelenting renewal and obsolescence of tools, which generates the need to constantly keep pace in order to master the technique.

If competencies in Angle B consume a considerable amount of energy -living with the fear of errors or malfunctioning- we may understand why Angles A and C are left suspended, floating in uncertainty.

Consolidated artistic disciplines contain -to a greater or lesser extent- materials that, even when including a certain degree of openness, have a technical evolution pace that is slower and more serene. In those cases, the poetic gesture has time to acquire a certain shape and to *be*. In art using new technologies, the difference among the properties of the technique—as operations that are consubstantial with its existence as such—not only shortens the distance between the technical operation and the poetic gesture, but also may even flatten that difference and make it unnoticeable. Without distance or proximity, the territory of what may be said runs the risk of folding into itself, and this same process may cause the artistic activity, with all its creative power, to lose its voice before the seductive fascination of novelty for the sake of novelty itself.

6. Conclusion

If a work was only Genius, content purely derived from impersonal and pre-individual elements, the articulating creator would disappear completely, just like creation understood as a conclusive and stable act would lose that power, the primitive tension that constitutes human experience.

The fact that poetics does not emerge directly from technology, even when this technology engenders poetic potentialities, is highlighted by the investigations of Julio Le Parc and the GRAV.

Perhaps the exploration of and reflection on Angle A—and the empirical and spiritual needs of man in a particular historical and social moment—may, in cooperation with deep knowledge of Angle B, complete the triad and give rise

to Angle C. Thus Angle C, pivoting between stable and unstable movements, would turn digital technologies, not into a space of guaranteed impact—which would foster the reproduction of clones—but into a platform with room for development of poetics, allowing the expression of that which, in our time, could not be said in any other way.

References

- Agamben, Giorgio. (2005). *Profanaciones*. Buenos Aires: Adriana Hidalgo editora.
- Alberro, Alexander. (2013). *Julio Le Parc, el Groupe de Recherche d'Art Visuel y la inestabilidad en la década de 1960*. Río de Janeiro: Colecao Daros Latinamerica.
- Deleuze, Gilles. (1994). *La lógica del sentido*. Barcelona: Planeta-Agostini.
- Deleuze, Gilles. (2002). *Repetición y diferencia*. Buenos Aires: Amorrortu/Editores, Buenos Aires.
- Eco, Umberto. (1992). *Obra Abierta*. Barcelona: Editorial Planeta.
- GRAV. (1963). *Proposición Para un Lugar de Activación*. [En línea: http://julioleparc.org/es/text_detail.php?txt_cat_id=3&txt_id=49]
- Hans-Michael Herzog. (2013). *Conversaciones con Julio Le Parc*. Río de Janeiro: Coleção Daros Latinamerica.
- Landow, George. (1995). *Hipertexto: la convergencia de la teoría crítica, contemporánea y la tecnología*. Barcelona: Paidós.
- Le Parc, Julio. *Continuums Móviles*. [En línea: http://www.julioleparc.org/es/artwork.php?aw_cat_id=4]
- Le Parc, Julio. *Sala de Juegos. Movimiento-sorpresa*. [En línea: http://www.julioleparc.org/es/artwork.php?aw_cat_id=8]
- Le Parc, Julio. (1962) *A Propósito de: Arte-espectáculo, Espectador Activo, Inestabilidad y Programación En El Arte Visual*. [En línea: http://www.julioleparc.org/es/text_detail.php?txt_cat_id=1&txt_id=1]
- Le Parc, Julio. (1960). *Proposiciones sobre el movimiento*. [En línea: http://www.julioleparc.org/es/text_detail.php?txt_cat_id=3&txt_id=44]
- Sánchez Vázquez, Adolfo. (2005). *De la estética de la recepción a una estética de la participación*. México: UNAM.
- Zátonyi, Marta. (1998). *Aportes a la Estética. Desde el Arte y la Ciencia del Siglo XX*. Buenos Aires: La Marca Editora.
- Zátonyi, Marta. (2007). *Arte y Creación. Los caminos de la Estética*. Buenos Aires: Capital Intelectual.

About the author

Professor at Multimedia Design Department, Faculty of Fine Arts, National University of La Plata (UNLP), and the Transdepartamental Area of Multimedia Arts at the National University of the Arts in Buenos Aires. Email address: correo.andreasosa@gmail.com
Educator, Researcher, Media Artist. Graduated in Multimedia Design and Filmmaking, she is currently a Ph.D. candidate in Contemporary Art at the FBA-UNLP. Her works on media art theory have been selected in different festivals such as 404 International Festival of Electronic Art (Argentina), FILE 10 (Brazil), ISEA 2010 RUHR (Germany), FILE 2013 (Brazil), RENEW Festival (Denmark), ISEA 2014 (Dubai), Computer Art Congress (Brazil), SIGRADI (Uruguay), ISEA 2015 (Canada).

Konrad Zuse: enabler of computational arts?

Andrés Burbano & Esteban García Bravo

Abstract

Konrad Zuse is known for building a programmable binary computer as early as 1941 and for designing and implementing the first high-level programming language called Plankalkül. However, his ideas and advanced projections about the potential of computer-aided art are still unknown among many new media researchers and media archaeologists. In this paper, we argue that the artistic use of Zuse's Graphomat Z64, one of the first flatbed drawing machines available, was not a coincidence, but rather a part of Zuse's original intent when he designed them. This study unveils rare manuscripts found at the Konrad Zuse Internet Archive, revealing the scientist's insightful thought about the future of computers in the arts. In writing, Zuse asked himself: Will technology spawn a new art movement?

Incidentally, around this time, pioneering artists such as Georg Nees, Frieder Nake and Jens Harke started to experiment with the Graphomat Z64. The fact that these artists and Zuse both saw the artistic potential of the machine independently of one another leads to an important question: Do notable developments in art occur because artists see opportunities within existing technologies? Or because creative scientists such as Zuse enable art through their machine designs? Zuse's participation in "Impulsos: arte y ordenador," a 1972 symposium and exhibit on computer art, at the Instituto Alemán in Madrid, also gives an account of Zuse's long-standing interest in the intersection of art and technology.

In this paper, we raise questions about innovation through technology and art and discuss how both are articulated in the origins of computer graphics. We trace the work of engineers, artists, technologists and mathematicians that converge at the dawn of computational arts.

Keywords

Graphomat Z64, Konrad Zuse, Georg Nees, Frieder Nake, Computer Graphics, Computer Art

1. Zuse's computers

Konrad Zuse's work, while well documented, had always played somewhat of a secondary role in the predominant narratives in the history of computing. However, in the last few decades, Zuse has received a renewed attention for the revolutionary contributions that he made to the development of informatics and computer culture in the 20th century (Rojas, 2002). Revealing documents have revitalized interest in Zuse's computer designs, thanks to the digitization of primary source materials at the Konrad Zuse Internet Archive. According to the Archive, his impact might have been downplayed "due to WWII, for a long time only few people knew about Zuse's work" (Konrad Zuse Internet Archive,

Accessed August 31, 2016). For this paper, we used rare manuscripts and images from the Konrad Zuse Internet Archive collection and complemented them with secondary sources to aid in the understanding of these materials.

Most are not aware of Zuse's pioneering role in computing, or that he built the first functional, programmable computer. Zuse's Z1, created at the end of the 1930s, was fully mechanical, demonstrating that Charles Babbage's idea of a mechanical computer was in fact possible. Later on, based on the use of telephone relays, Zuse built an electromechanical working computer called the Z3. This machine utilized a punched film stock system, a system developed by Zuse to enable the user to store information and input code. The Z3 also shared aspects of what later became known as Von Neumann computer architecture -for instance the separation between processor and memory (Burbano, 2014). As his work progressed designing computers after WWII, Zuse focused on ways to be more efficient in controlling the machines he created. He thus implemented what is recognized as the first programming language: the Plan Calculus or Plankalkül (Bauer, 2002). In 1949, Zuse founded the ZUSE KG in Berlin, a company that would develop new computers for industry applications (Zuse, 1993, p 119).

2. Graphomat Z64 impact in the early computer art in Europe

In his autobiography Zuse describes his teenage years as being undecided between studying engineering or fine arts. During this period he made several sketches on paper and attended painting classes and art openings. Also during this time period, after seeing the film "Metropolis" in 1927, Zuse was inspired to design his own city for a school project. In Figure 1, we see Zuse's almost premonitory design, bridging engineering with aesthetics through what could arguably be a prototype for an algorithmic visualization. Zuse ultimately chose a career in engineering - he explains, "In the end, the engineer in me won out" (Zuse, 1993, p. 10). Still, in spite of his ultimately decided career path, we are able to see his general tendencies toward artistic visualization.

Many years later, Zuse would intently design a machine for systematic drawing. In 1961, the ZUSE KG released the new Graphomat Z64 at the Hannover Fair (Horst 2016) & CompArt). This machine embodies Zuse's creativity applied in computer graphics specifically. At the beginning of the 1960s, the field was incipient, and the applications for industry were yet to be envisioned. Still, Zuse was particularly interested in the relationship between machines and the visual arts: "What we today call computer graphics would not be popular for a long time and was discussed and practiced only by an interested few." (Zuse, 1993, p 130).

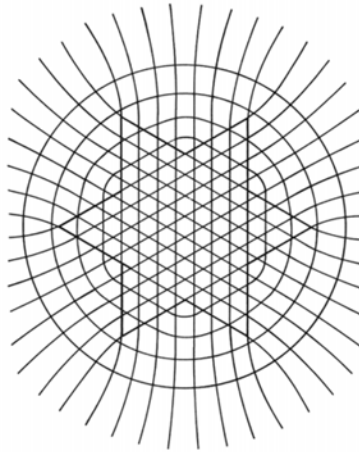


Figure 1. Zuse's City design. © Konrad Zuse

The Graphomat Z64 introduced Computer Aided Design (CAD) in Europe for diverse fields such as geodesy, meteorology, and road construction. Later on, it was used in the textile industry (according to Horst Zuse's site accessed in 2016). Mittelsten-Scheid, a carpet manufacturer, approached Zuse in 1961 to automate the control of carpet looms. In his own words, Zuse explains his philosophy towards computer tools for artists:

"He (Mittelsten-Scheid) wasn't particularly excited when I suggested including the artistic design of the pattern in the automation process. This was the only way I thought I could do the work. It never would have occurred to me to want to make the artist superfluous. On the contrary, I just wanted to place a new tool in his hand" (Zuse, 1993, p 130).

Although Zuse himself explains the machines were originally "developed primarily for technical ends," he explained that "the method can also be applied to artistic objects" (Zuse, 1969). For the sake of context, it is important to highlight that in 1961, graphic and text output was "literally peripheral" to computers as they did not necessarily provide the user with a screen or a printer (Patterson, 2015). Concurrently, in the United States, CalComp was manufacturing some of the first computer pen plotters. CalComp rendered graphics through a process that involved calculations within a mainframe computer. In contrast, the Graphomat Z64 constituted an ingenious apparatus that was able to both process and draw within the same machine. The

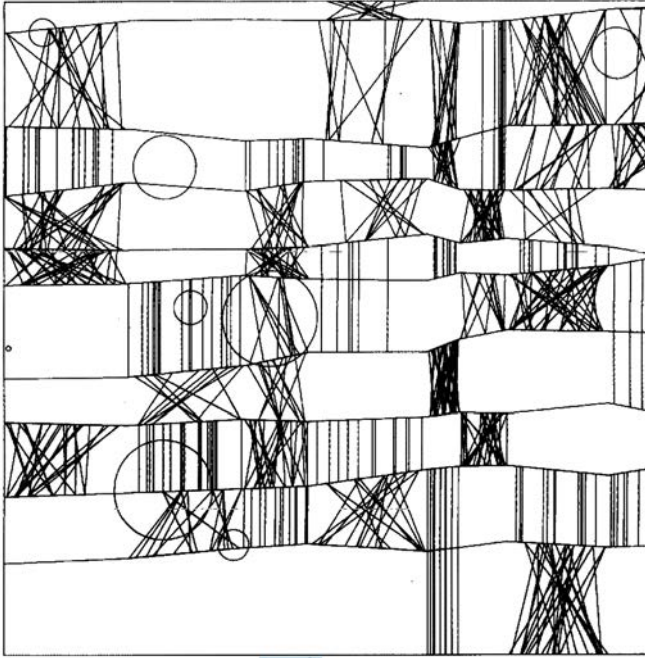


Figure 3. *Hommage à Paul Klee* , © Frieder Nake 1966

Evoking the lyricism of Klee’s sensible geometric abstraction, “Klee” exemplifies how Nake used generative algorithms to achieve aesthetic forms. Other examples of Nake’s work include painted over plots, using China ink.

3 Documents by Zuse about computers and the arts, design, and architecture

Rare manuscripts found at the Konrad Zuse Internet Archive raise deep questions about Zuse’s original intent with the Graphomat Z64. The first document is a fourteen-page facsimile, typewritten in German, with a title that translates to “On the use of program-controlled calculating machines in the domain of graphics and the applied arts”(see Figure 4). Written in 1964, three years after Zuse launched the Graphomat Z64, this document clearly exposes Zuse’s ideas and intentions regarding the possible interactions between visual arts, plotters, and computers. It should be noted that at this time there is no evidence that Zuse was aware of Nees and Nakes’ artistic endeavors with his Graphomat Z64 (Zuse, 1964).

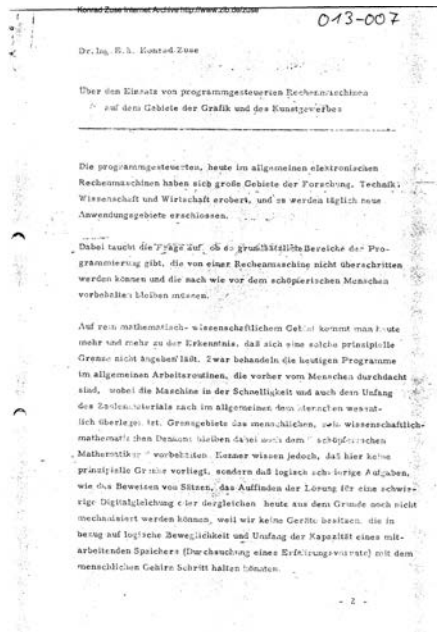


Figure 4. "On the use of program-controlled calculating machine in the domain of graphics and the applied arts", 1964

The text is composed of five sections which discuss respectively: (1) the relationship/conflict between creativity and computation; (2) the areas within the applied arts and design where computers could have a place; (3) detailed capabilities of the Graphomat Z64; (4) proto-generative art ideas; and (5) other possibilities of interaction between computers and the arts, for instance, the use of TV screens and glass.

In the first section, Zuse explains that computer machines could perform operations thought before to be unique of human intellect, including those reserved for creative people. Zuse emphasizes that many of the tasks considered part of human thought, like calculations, are already performed by machines. He explains that placing this question in the creative arts scene is polemic, and therefore focuses on examples that could be relatively more familiar connecting computers with creation: in particular, music composition and electronic music. Zuse mentions that despite the fact that there was some work on computational creativity, examples such as music composition were not necessarily convincing because the creative element seems to be missing. According to Zuse, those compositions described are essentially based on

statistical processes that are nurtured with random numbers, and have an additionally programmed “irregular” element..

In the second section, Zuse quotes texts that anticipated questions about computers and the arts such as: "Computers and Automation" and "Computer Art Concert." He goes back to the ontological question of “What is art?”, arguing that in principle, it is a controversial discussion, and is therefore a fertile ground for new ideas. Zuse identifies more specific fields in the visual arts where there is a clear interaction between arts and mathematics, such as pattern design. Zuse analyzes tasks that could be performed with software, which would play a supplemental role in the execution of creative ideas. Additionally, he explains why software design could be essential in this role, more so than the hardware.

In the third section, Zuse introduces his Graphomat Z64, the device he conceived, designed and produced, which works in combination with a computer that is controlled by punched tape. Zuse describes the technical implementation and the properties of the machine such as accuracy and speed. According to Zuse, the Graphomat Z64 could plot with different colors and draw patterns or mosaics. Zuse focuses on describing the characteristics of the graphics when plotted with the device, such as hue, brightness, shape, fill, border, line width, curves, and mosaic-like composition. He emphasizes the potential use of perspective systems and projections of 3D shapes to represent graphics in a 2D plane. He imagines practical applications of the Graphomat Z64, such as drawing patterns for carpet and wallpaper design, and even programmed abstract art. One of the most interesting points is when Zuse describes basic generative possibilities that could be applied to the visual arts with these machines. He explains that the designer would still develop the shapes to a certain extent and control the combinations based on variable parameters. Additionally, he talks about concrete uses like drawing arbitrary curves and use the computer to perform the necessary interpolation calculations.

The last section describes other possibilities in the interaction between computers and images. Zuse compares the Graphomat Z64 with other products recently available in the market such as printers explaining that though the printers were conceived to work with characters, they can be used to draw patterns too and envisions the possibility of displaying images in Braun tubes or TV screens. This possibility was more unusual than plotting the images on paper, given that those devices would display images in an invisible grid. Probably the most premonitory example is the idea of using the patterns to create colored windows with the glass and other transparent materials

producing unusual visual effects. By today's standards LCD and LED displays are an ubiquitous form of presenting "digital" images. It is important to consider that raster, or pixel-based images were not accessible until the early 1980s, when the first color displays came out to the market (Garcia Bravo, 2015). In other words, Zuse's ideas in relation to computer graphics were about twenty years ahead.

A second manuscript found at the Zuse archives was "The Computer as a Tool for the Artist." This short text was published in 1969 in the journal *Umschau In Wissenschaft und Technik*. Unlike the aforementioned text written in 1964, this paper is not directly related to one of his machines or products and instead presents information about new technical advancements and equipment in general. Zuse introduces his arguments explaining the extended use of computers in several aspects of research, especially engineering. Alternatively, Zuse introduces again the idea of computers in the arts, and he exposes two clear options to explore this relationship. The first is the possibility of generative processes in human computer interaction and the second one refers to the use of the computer as tool by the artist, focusing on computer-assisted practices that we now call CAD. In regard to these points, Zuse explained that; "the first case is related to define aesthetic laws, or parameters, formulated mathematically to design the artistic product" and that "the computer, with some peripherals, is used by the artists as a series of technical extensions and is used as a new tool by the artist" (Zuse, 1969).

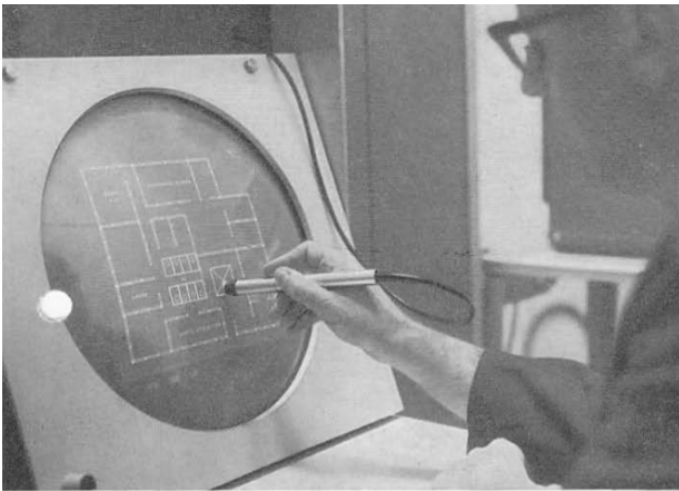


Figure 5. "The Computer as a Tool for the Artist", 1969

Zuse stated the purpose of this text was to describe in depth the second possibility and not the first. It is unfortunate that the first possibility was not further explored, but he likely took this approach so it would sound more familiar and less esoteric to the reader. Still, it is apparent that he was interested in the generative/parametric aspect. The text exemplifies his reflections with the novel interaction with visual, touch interfaces. The article is illustrated with a photo of Zuse interacting with an architectural plan displayed on a screen with an optical pen in his hand. According to his words, he was “collaborating” with the computer, and he reminds the reader that this kind of interaction could happen not only architectural plans, but also with artistic objects. At the technical level, Zuse considers this process as a dialog between the human and the computer in which the user can configure, complement and change the drawings, hence “working together” with the computer.

Zuse envisioned the many things an artist could do such as visualizing different perspectives of an architectural plan, or defining with a program the basic parameters of a visual composition. The artist could determine the rules and the amount of randomness to combine strokes in the best way possible. Zuse argues that the computer representations are not artworks in their own right, pointing to the limitations of the available plotters and other instruments of that time. Independently of software and hardware limitations of only drawing lines, dots and curves, he envisioned that a new artistic movement could emerge from these experiments. For this to happen, it would be necessary for people who understand visual representation to learn programming, and to have the time to adapt to it. Another limitation that he discussed was the costly equipment and the fact that it was still in development. Zuse also pointed out the absence of a market interested in those kind of experiments.

The tone of Zuse’s words and his descriptions of the possibilities, always in future tense, shows that he was not aware that an artistic movement was already emerging, and that some of the artists, capable of visual representation were learning programming at the same time. He was also unaware that artists like Nees, Nake and Harke were actually using his Graphomat Z64. By 1969, the use of computers in the arts had already proliferated, although modestly, in diverse nodes such as in research centers and Universities in the United States, Tokyo, Madrid, Stuttgart, Zagreb and Brazil.

Whether Zuse did or did not know that there were in fact visual artists who programmed software when he wrote that article in 1969, he eventually became a participant of the computer art scene himself. In 1972, he made part in a pivotal computer art event in Madrid called “Impulsos: Arte y Ordenador.” The event was organized by the Centro de Cálculo de la Universidad de Madrid

(CCUM) and it took place at the Instituto Alemán (German Institute) of Madrid (Castaños Alés, 2001). The event consisted of a symposium and an art exhibit. Zuse was invited to give a presentation at this event. His talk was titled “Del computador a los grafismos de computador” (From the computer to computer graphics) and it took place on February 28 of 1972 (Castaños Alés, 2001, p. 120). The art exhibit gathered some of the most recognized pioneers of computer graphics in the world, including works by Charles Csuri, Herbert Franke, Kenneth Knowlton, Georg Nees, Manfred Mohr, Frieder Nake, Michael Noll and Lillian Schwartz among many others. In the exhibit catalog, Zuse contributed a text that summarized the history of computing from Charles Babbage to modern day. He also establishes a distant connection with the first calculating machines from the 17th Century, towards the development of binary code. Zuse explains the idea of a “universal algorithmic language” capable of algebraic operations, introduced in by him 1945. It consists of a language that did not literally speak the machine code, but was mediated by a compiler that translated the information typed by the user. Since 1955, these concepts are familiar for anyone who uses computer languages to design software. In his manuscript, Zuse emphasizes on the importance of software design towards human-computer interaction. At the very end of this text, Zuse revisits his three ideal methods of “collaboration” between man and machine: 1. Formal languages, 2. Visual light displays (like TVs) and 3. Automatic drawing devices (such as the Graphomat Z64) (Zuse, 1972).

4. Discussion: reflecting on the origins of computer arts

The story of Zuse’s Graphomat Z64 and his visionary approach towards graphics demonstrates a paradox in the way that artists approach new technologies. Two standpoints may be theorized about this relationship: on one hand, there is the view that artists discover a new aesthetic vocabulary, having been presented “misusing” or “bending” technological systems to produce unintended effects (glitches). (Blais & Ippolito, 2006). This approach takes into account artists who work only after the technological artifact is ready for public distribution. On the other hand, there is a perspective that technologies can emerge as the result of an art-science collaboration and fulfill an innovation cycle. One example of this dialogue could be appreciated at the Bell Labs in the beginning of the 1960s. Bell Labs, emphasized on interdisciplinary research between artists and scientists to design and create satellite communication, digital photography and incidentally, another branch of Computer Art.

Neither of these claims about the relationship between the artists and the technology is absolute, and should not eclipse each other. In fact, in our view, neither of them describes accurately what happened with the Graphomat Z64.

Historical accounts on how computer art emerged often narrate a story of creative use of uncreative technical equipment. This was the case of Zuse's Graphomat Z64 as described on the CompArt site, a comprehensive and respectable database of digital art published by the University of Bremen:

"The ZUSE Graphomat Z64 was a flatbed drawing machine of high precision. Its engineer, famous computer pioneer Konrad Zuse, had originally intended it to be used for the production of maps and land registration purposes. Both Georg Nees and Frieder Nake did their first computer art pieces on the Graphomat. This historical fact may be seen as a case of an unintended use of technical innovation." (CompArt Center for Excellence Digital Art, Accessed March 3, 2016).

Other texts have also addressed the "unintended use" theme with the Graphomat Z64. As one example, Rhonda Bowlin explains: "A digital artifact like the Z64 is rather meaningless without the context of human intent for its use, especially when notable use diverges the original intended use."

After analyzing the found texts by Zuse in the topic of Computer Art, it is evident that the narrative of the "unintended use" of the Graphomat Z64 must be challenged. Our position contradicts the view that the use of the Graphomat by artists like Nees and Nake was simply an unintended use of technological innovation - but how do we tell the story again? Nake himself discusses the complex relationship between artists and engineers as social actors. He is clearly aware of the importance of redefining this relationship, focusing on an emerging production of art by people who were not necessarily trained as artists (Nake, 2009). Zabet Paterson explains that "the rhetoric of the day emphasises this: there were artists on one side and engineers on the other, and their collaboration was the result of fortuitous encounters. Yet this binary is a drastic simplification if not an outright historical falsification" (Paterson, 2015 p. xv).

There are some possibilities to re-think this inclusion in the origins of computer arts. One way is the idea that it was a fortuitous event that allowed computer art to happen. This school of thought would argue that despite the fact that Zuse did have artists in mind and built machines to facilitate graphics, the use by artists like Nees and Nake could have still been a mere coincidence. Two different practices and views interacted indirectly and somehow by chance, allowed a new artistic movement to be born. This is supported by the fact there is no evidence that Nake was aware of Zuse's writings about artists when he created his first plots in 1963 (Nake, 1968). There had not been an interaction between them except the one mediated by the Graphomat Z64. Zuse's

manuscript one year later, reveals that apparently he was not aware of the computer art movement that was gestating at the University of Stuttgart (Zuse, 1969). This view is reminiscent of Jasia Reichhardt's concept of "Cybernetic Serendipity," the title of a seminal exhibit of computer art from 1968. We often focus on the phenomena that directly show connections but in this story, paying attention to the broken links is equally important. In this case there are, in fact, two broken links: an engineer who built the machine who wrote about the potential artistic uses, but did not know about the artists using his equipment for such a purpose at that time; and a group of artists who cleverly used the machine and did not know about the engineer's texts or intentions. In our opinion, we are dealing with an inexplicable communication process facilitated and led by the Graphomat Z64, the artifact itself.

It is possible that the design qualities of the Graphomat Z64 itself helped to open a tangible door for the artists to approach computing. Although this view can point to technological determinism, (where art history would be explained only by the evolution of the technological devices), we believe that there is enough supporting information to claim that there were specific qualities of the Graphomat Z64 (like the accessibility, the versatility, the compactness and the transparency of the core functionalities) that aided the apparition of an avant-garde artistic movement. Was there somehow a discourse engraved in the machine that eventually artists such as Nees and Nacke could read? Is it there an inherent discourse in the technological tools?

Given the conscious effort of Zuse in facilitating graphics through a combination of hardware and software, it is possible to argue that Graphomat Z64 provoked the artists. Our final thought is that the Graphomat Z64, constituted by its material configuration and its software implementation, served as a medium in an unusual, yet not accidental manner, enabling engineers' and artists' common intention of connecting machines to human thought, intentions and expression.

Acknowledgements

We would like to thank the Konrad Zuse Internet Archive, Luis Bustamante, Juan Pablo Sosa, Franziska Gromzig, Diego Mellado and Enrique Castaños Alés for their help with this research.

References

- Bauer, Friedrich. (2002). *The Plankalkül of Konrad Zuse - Revisited in The First Computers History and Architecture*. Rojas, Raul and Hashagen, Ulf (Eds). Cambridge, MA: The MIT Press.

- Blais, Joline and Ippolito, Jon. (2006). *At the Edge of Art*. London: Thames & Hudson. p. 17
- Bowlin, Rhonda. (2010). *The Zuse Z64 Graphomat as Utilized by Artist Frieder Nake*. Interactive Design and Media Application.
- Burbano, Andres. (2011). *Between Punched Film Stock and the First Computers in Re:Live Media Art Histories*. Cabitt, Sean and Thomas, Paul (Eds). Cambridge, MA: The MIT Press.
- Candy, Linda, and Ernest Edmonds (2002). *Explorations in Art and Technology*. London: Springer.
- Castañón Alés, Enrique. (2000). Los Orígenes del arte Cibernético en España, Doctoral Dissertation. Alicante: Biblioteca Virtual Miguel de Cervantes
- CompArt Center for Excellence Digital Art. (Accessed March 3, 2016) [URL] *ZUSE Graphomat Z 64*, <http://dada.compart-bremen.de/item/device/5>
- Franke, Herbert. (2012). *Computer Graphics — Computer Art*. Springer Science & Business Media.
- García Bravo, Esteban. (2015). *Photo and Palette: Early Pixel-Based Computer Art*. Acoustic Space, 14, pp. 105-112.
- Kane, Carolyn L. Chromatic. (2014). *Algorithms: Synthetic Color, Computer Art, and Aesthetics after Code*. Chicago: University of Chicago Press.
- Konrad Zuse Internet Archive (Accessed August 31, 2016) [URL] *The Konrad Zuse Internet Archive Project*. <http://zuse.zib.de/project>
- Medosch, Armin. (2016). *New Tendencies: Art at the Threshold of the Information Revolution*. Cambridge, MA: The MIT Press.
- Nake, Frieder. (2012). *Personal Recollections of a Distant Beginning in Explorations in Art and Technology*. Candy, Linda, and Ernest Edmonds (Eds). London: Springer.
- Nake, Frieder. (2009). *The semiotic engine. Notes on the history of algorithmic images in Europe*. *Art Journal* 68,1.
- Nake, Frieder. (1968). *Notes on the programming of computer graphics*. Cybernetic Serendipity. Special Issue of Studio International, London.
- Nees, Georg. (1968). *Programming stochastic computer graphics*. Cybernetic Serendipity. Special Issue of Studio International, London.
- Nees, Georg. (1969). *Generative Computergraphik*. Siemens AG.
- Patterson, Zabet. (2015) *Peripheral Vision*. Cambridge, MA: The MIT Press. p. xv.
- Reas, Casey, and Ben Fry. (2007). *Processing: A Programming Handbook for Visual Designers and Artists*. Cambridge, MA: MIT Press.
- Rojas, Raul. (2002). *The Architecture of Konrad Zuse's Early Computing Machines in The First Computers History and Architecture*. Rojas, Raul and Hashagen, Ulf (Eds). Cambridge, MA: The MIT Press.
- Walter-Herrmann, Julia, and Corinne Büching. (2014). *FabLab: Of Machines, Makers and Inventors*. transcript Verlag.
- Zuse, Horst. (Accessed March 3, 2016) [URL] *Z64*, <http://www.horst-zuse.homepage.t-online.de/z64.html>
- Zuse, Konrad. (1964). *Über den Einsatz von programmgesteuerten Rechenmaschinen auf dem Gebiete der Grafik und des Kunstgewerbes*. Berlin: Konrad Zuse Internet Archive.
- Zuse, Konrad. (1969). *Der Computer als Hilfsmittel des Künstlers in Umschau In Wissenschaft und Technik*. Frankfurt: Umschau-Verlag.
- Zuse, Konrad. (1972). *Las ciencias y las máquinas calculadoras*, in: Impulsos Arte y Ordenador [Art Catalog] Madrid: Instituto Alemán, pp. 8-16.
- Zuse, Konrad. (1991). *The Computer My Life*. Berlin: Springer-Verlag.

About the authors

Andrés Burbano holds a Ph.D. in Media Arts and Technology from the University of California, Santa Barbara. He's an assistant Professor in the Department of Design at the Design and Architecture School at the Universidad de los Andes, Colombia. He's also a Leonardo Education and Arts Forum International Representative. His current research projects are the following: James Bay Cultural Atlas, an audiovisual on-line database of the Cree communities from the James Bay in Northern Quebec; Sonorization, Visualization and Materialization of Biodiversity Data. FAPA, Grant for assistant professors at Universidad de los Andes, where he is the project leader.

Esteban García Bravo explores computational arts as a researcher, a practitioner and as an educator. He earned his MFA from Purdue University in 2008, and a Ph.D. in Technology, also from Purdue, in 2013. His research on computer art history and digital media art practices has been featured in the annual meetings of international organizations such as SIGGRAPH (2011,2015), ISEA (2012, 2013, 2014) and Media Art Histories-MAH (2013). His artwork has been displayed internationally in media art festivals, gallery exhibits, museums and artist-in-residence programs. Esteban is currently an Assistant Professor in the department of Computer Graphics Technology at Purdue University, where he teaches digital imaging, visualization and computational aesthetics.

The Latin American digital heritage: methods of digital art archive construction and the retrieval of immateriality

Reynaldo Thompson, Tirtha Prasad Mukhopadhyay & Frank Dufour

Abstract

In this article we examine the problems facing archival preservation of digital art categories from Latin America. Latin American digital art history should incorporate references to the achievements of such globally renowned artists as Eduardo Kac (Brazil) or Gilberto Esparza (Mexico) as also a bevy of lesser known artists like Martha Minujin (Argentina), Loraine Pinto (USA-Mexico) and from all over the subcontinent, all of whose contributions make Latin America and indeed the Ibero-American group of countries - one of the largest producers of digital art after North America, Japan and Europe. We suggest that archival information for such a large group of artists affiliated by ideology and cultural values could only be successful when a broad *network* of information is built around what comprises the history of pioneering technological art and its later digital applications in Latin America. The proposed archive should be based on systematic labeling techniques that could help encode the data for a hyperlink based catalogue for such arts. It is believed that a digital catalogue could have the form of an accessible database of digital art heritage in Latin America.

Keywords

Networking, digital archive, digital catalogue, heritage, pioneers, virtual museum

1. Digital art archive: problems and challenges

The Latin American digital art heritage is comprised of a wide variety of genres. It includes installation art, multimedia, kinetics, video-mapping and hybrid robotics, to name just a few. Like digital art heritage elsewhere this body of arts is essentially tangible but also temporary in nature (Levy 1998; Gibson 2004). Long-term archival projects intended to preserve, what Cameron calls, “replicants” (Cameron 2002) of such digital exhibits have to compete with technical problems such as cataloguing, preservation and migration through generations of upgraded hardware (Manovich 2001; Lee et al 2002). Digital preservation depends on availability of storage space and resources of computer generation. But on another level archivists have to contend with the more fundamental *humanist* problem of selection of material and references and consequently building databases and networks, which could subsequently make the information on heritage available for search and reference. Again, what appears to be the problematic part of heritage resource management (in economically challenged countries of Latin America) is the financial issue of introducing something like the concept of a ‘virtual museum’ which was first theorized by Katherine Jones-Garmil (Jones-Garmil 1997; Cameron 2007).

Virtual museums implicate questions of technological and economic viability for nations trying to preserve digital heritage. In essence such museums are destined to preserve more temporal art and culture heritage like those that appear in film or television, or in museums dedicated to digital art and multimedia. Jones-Garmil suggests that such ‘museums’ may indeed not constitute an economically feasible space for several underdeveloped states and societies (Jones-Garmil 1997).

Building electronic catalogues require a completely transformed architecture that differs from methods necessary for conventional museums (Cameron and Kenderdine 2007; Witcombe 2007). Digital art involves a time-bound audiovisual engagement of spectators with the art-work. It functions like an assembly of items and connections, and may not be retrieved in its future. Digital art is therefore more like an ‘art-event’ as it represents a diachronic and kinetic mechanism based on electronically modulated systems. Again it may be either non-interactive or interactive depending upon the nature of the program that runs it, hence posing another dimension of the problem of retrieval and preservation. And since it does not have the more materially durable characteristics of conventional “solid” art it is by definition ‘short-lived’ (Saltz 1997), ‘illusory’ (Paul 2003; Crowther 1998) and realized as non-local phenomenon (Crowther 1998). However we suggest that this ‘ontologically’ ephemeral character could be saved in an electronic format with first, a video report of the actual work and second, catalogue information on the individual heritage items. The replicant mode of the digital art-work could be captured in what Jones-Garmin called ‘virtual museums’ (1997), or Walsh, following McLuhan calls the post-photographic museum (Walsh 2007).

1.1. Latin America

Keeping in mind the necessity of hi-tech architectures of preservation we could now consider the problems facing preservation of digital art in the Latin American context. Latin American digital art history should incorporate references to the achievements of such globally renowned artists as Eduardo Kac, Rafael Lozano-Hemmer or Gilberto Esparza as also to a bevy of lesser known artists from all over the subcontinent in countries like Cuba, Colombia, Peru, Argentina, Brazil or Mexico and elsewhere. Considered from the perspective of actual productions Latin America and the Ibero-American group of countries comprise one of the largest promoters of digital art after North America, Japan and Europe. Yet the preservation of digital heritage in Latin America raises also the “ecological” issue of resources that make it possible for this kind of virtual and immersive art to emerge in this subcontinent at all (Forte 2007; Levy and Galanter 2003). Study of ‘the socio-technological base’ of such art-events *is* a difficult proposition in the face of political realities and

socio-cultural values and above all the economic and technological statistics of Latin America (Chandler 2000). What are the conditions, including (a) the technological advantages and shortcomings of the continent and (b) the state of information flow or networking in these locations - that make a very tangible but 'immaterial' virtual objects to be perceived, evaluated and preserved in the context of a globally emerging market driven culture (Jones-Garmin 1997; Witcomb 2005)? Issues of heritage in relation to tourism and built heritage promotions have been raised and discussed in several contexts (Levy 1998; Bruce 2000; Manovich 2001; Gibson 2004; Scarpaci 2005; Bailey 2015). But its implications specific to digital heritage in Latin America needs to be discussed and projected as an important heritage preservation issue in the context of the continent's socio-economic strengths and crises.

2. Neglect of art historical studies on Latin America

The research for building a theoretical framework for digital preservation project at the University of Guanajuato, Mexico started with an impulse of self-esteem and pride, because of a pre-ordaining awareness that

Latin America has been a region where *art* has been produced for millennia yet most of its artistic expressions and contributions have been systematically underrated and neglected by Western culture. The reason for this is the lack of capital-driven engagement with high art. At other times we have encountered the unavoidable reality of fragmentary archival practices resulting from indifference and distraction in a politically disturbed continent (Debord 1998; 2012; McDonough 2004). Latin American art, including *contemporary* art, has been a victim of market dynamics in the twentieth century (Casey et al., 1996) as also a bearer of the general notion of a 'decline'-prone and 'inferior' South American culture, which Mignolo so effectively discusses in the *The Idea of Latin America* (2009).

Even in an interconnected world artistic movements in economically influential nations have spread more quickly around some cultures while other countries trying to follow the trends of more economically aggressive cultures have been left behind. Cuauhtémoc Medina, a writer and curator from Mexico, who has been located mostly in Mexico and contiguous nations of the continent, explains the phenomenon:

...the perception of the 'artist' of peripheral countries during the 1970s and 1980s was one of backwardness, as if they were born out of a temporary irradiation of artistic perception in countries of the *center* - a center which you could assume lying, even by today's standards, somewhere in Midtown New York; it all seemed as if artists in the periphery received the information late

and were trapped in a process. So, there appears to have been a double-bind situation different from the one that we are *beginning to see* in contemporary times. (*our italics.*, Medina 2009)

At present artistic products no longer needs to wait for appraisal in a connected world. This is what Medina says “we are beginning to see”, yet the problem of differential engagement with peripheral cultures persists (ArSstegui and Buchrucker 2001; Gutierrez and Gamboa 2008; Mignolo 2009). This cannot be truer in any other case than that of heritage preservation - and it is especially true of documentation of contemporary digital culture, which is more enriched in technologically advanced regions. There is also a lack of serious digital art criticism in countries of Latin America, although some efforts are underway. The *Dictionary of Modern and Contemporary Art* (Chilvers and Graves-Smith 2009) has no entries for Latin America. Similarly in a project like *A network framework of cultural history* (2005) (Schich 2004; 2005) a data-visualization model ends up representing artistic dissemination in Latin America in a poorer light. This is due to a lack of information in the consulted sources of the project, some of which include well-known bibliographical indexes such as Freebase.com, the General Artist Lexicon, and the Getty Union List of Artist Names (ULAN). Schich’s representation of these database sources reveal a lower statistics of appearance or citation for Latin American artists when compared with European or American counterparts from the same time-frame.

An archival effort should therefore try to encompass exhibits and an exhaustive list of art works from Latin America, especially in the last twenty years. Keeping in mind these discrepancies in information about digital art a group of scholars and students decided to start a departmental archival project on digital art at the University of Guanajuato, Mexico. So far information on almost 600 artists have been collected and few international publications are through. This University could however be tested as a prototype for any larger archive 0 yet the beginning was made and by and large scholars and critics from various countries have started contributing to a small but seminal process.

The small-scale framework for a *Digital Art Archive of Latin America* or (henceforth) DALA in short, grew out of our recognition of the lack of archival information on contemporary Latin American art in comparison to the same kind of art archives in Europe and North America. The DALA recognizes the economic disparities that affect archival projects in developing countries, and the lack of resources that impedes collection of bibliographical information on artistic and cultural objects from respective societies. But the DALA is trying precisely to compile an archive so that it could be possible to encompass major themes in the digital arts experience of this continent.

Schich's (Blumm et al 2012; Schich 2014) create unwanted ranking scales for social categories like 'art' and 'knowledge'. Artist profiles derived from selective and artificially generated datasets are often misleading. They fail to capture several subtle cultural-psychological nuances of art (Blumm et al 2002). Compilation of a digital art archive - especially for the under-sponsored Latin American digital heritage, indicates toward a more acute crisis of cultural heritage preservation in less industrialized nations (Rush 1999; Gallo 2004). A more inclusive approach is therefore in order.

On the other hand not all information could be accepted. There should be a *critical* process at work for the more preferred categories of digital 'art' - since 'art' in this case presumes a set of styles and assumptions that differ from commercial expression. Further, global politics and ideology create a perspective for art that is taxonomically distinctive and needs to be recognized. Digital art including illustrations and digital photography from Cuba, Mexico, Peru and Colombia embodies a left-wing political message that redefines the form and extent of the art that would have to be included for such countries (Mariategui 1984; Zea 1993). Artists from Argentina, Brazil as well as Mexico have created experimental digital art and music on various allegiances - incorporating bioethics, environmentalism and ideologies of protest against immigration issues, surveillance and freedom, and almost everything else that falls under the rubric of arts in a global electronic age (Gallo 2004; Bailey 2015). Discerning, critical and educated focus on Latin America is thus essential. Sources like the *Pago en Especie* of the *Secretaria de Hacienda y Crédito Público* (an incentive in the Mexican tax payment system under the *Sistema Administrativo Tributario* [SAT] or the Tributarian Administrative System) that gives the option to artists of submitting art works instead of real-money tax demonstrates the complexity of this process. An agency like the *Pago en Especie* is involved in archiving an enormous amount of material art data which is almost impossible to be duly organized by a single agency within a relatively short period of time. Consequently the *Pago en Especie* now comprises a database which is too large and unwieldy, and too difficult to handle for any single group of critics. It reflects the titanic burden of the task involved in preservation of cultural objects on a digital platform. In the DALA we delimited the project to names of digital artists from South America whose works have been repeatedly exhibited and appreciated in discussions and references, and on the basis of feedback from a panel of experts in the academy. Exhibition information, podcasts and relevant bit stream information on such artists were used as evidence of their work. A *geoheritage* map of artists should include reference to the most visible and admired artists working on the intersections of art, science and technology for any country in Latin America - but the value of these art works has to be tested against the available critical literature on media and

aesthetics, some of which are cited in the bibliography (Brea 2002; Vercelli 2004; Monatagu et al 2004; Thomas and Lalouf 2004; Brea 2007; Taylor and Pitman 2007; Cuadra 2007; Jasso 2008; Brea 2010; Pitman and Taylor 2013).

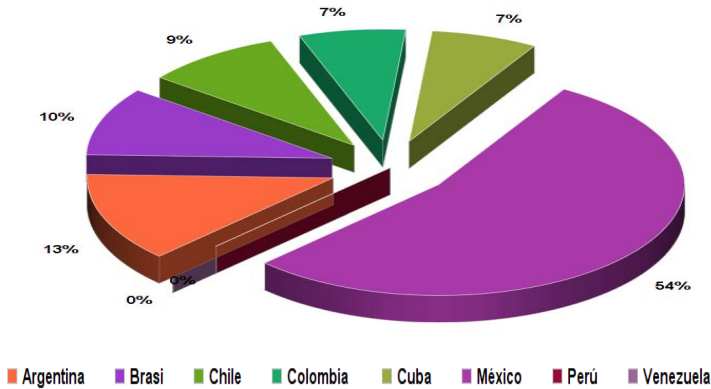


Figure 1. The graph is indicating country-wise record of achievements in digital art and technology. This graph is derived from information collected from various sources and is an evolving picture of the progress of research on the archive, and not in any way a reflection of the volume of digital art produced.

A digital database for the technologically inspired electronic arts provides an impetus for new artists working under less financially privileged contexts. DALA could well represent the creative superstructure for a more depleted and conflict-ridden continent and propose a reference for creators, artists, scholars, innovators in a region. The legacy is already strong, though not yet valorized or appropriated by the present-day liberal free market system. Starting with such women artists as Geraldine Pinto from Mexico who exhibited during the 1968 Olympics at Mexico City, or Argentinian born Julio Le Parc who created the *Groupe de Recherche d'Art Visual* in Paris 1960, a whole group of recent iconic artists have emerged. It includes names like Eduardo Kac (Brazil), Guillermo Gómez-Peña and Alfredo Salomon (Mexico), Martha Minujin and Tomas Saraceno (Argentina), Rodrigo Castaño, Carlos Santa (Colombia), Juan Capote, Abel Barroso (Cuba) and Alberto Torres (Peru). More recent iconic artists are Raphael Lozano-Hemmer (Mexico-Canada) or Ignacia Edwards (Chile) - all of whom have been engaged in the last forty years since the inception of interdisciplinary formats, to create a vast body of works. The DALA likewise engages scholars and critics who could identify and promote the aesthetics of alternative digital expression, such as the heritage artists just mentioned. Some of these artists are already famous, but others still need to be recognized and

represented in the context of markers in other parts of the world. The DALA updates and records innovations by Latin American artists who continue at this moment to contribute to such forums as the *New Media Arts Festival* in Japan, the *ISEA Conferences* held at UAE, Colombia and other places, Paris-based *CAC*, *Ars Electronica* (Austria), or the *Venice Biennial* (Italy). This information from such festivals could be supplemented to information on the artists exhibiting in the continent itself. Some of these local Latino exhibitions are the *Transitio* (Mexico), the *Habana Biennial* (Cuba), and the *Festival de la Imagen*, Colombia, *Behance* in Argentina, the *Alta Tecnología Andina* of Lima, Peru and finally the *Itan Cultural* of Rio de Janeiro, Brazil.

2.2. DALA board and volunteers

Again a DALA executive board constituted by an international academic community was in order for the project. Indeed DALA as it now stands, is like some of its precursors in other countries. It consists of an international group of art historians, artists and scholars who already have expertise on archival databases. So far the DALA is constituted by expert members from Argentina, Brazil, Colombia and México but also experts from the USA (including its collaborator the University of Texas at Dallas), Germany and Austria where scholars and artists have been already involved for several years with similar efforts of digital heritage archival and retrieval. Many Latin American digital artists have been exhibiting more in Europe and the USA or Canada - so the information is available on resources that have been generated in these northern latitudes rather than in Latin America. The international American and European collaborators are therefore making inputs to the project, ones that are both qualitative as well as informative.

DALA is in this sense a Latin American counter-proposal for such existing projects such as *l'Observatoire Leonardo des Arts et des Techno-Sciences* (OLATS), *Europeana*, a data base for the Cultural Heritage of Europe as well as from the former Database of Virtual Art now known as the *Archive of Digital Art* directed by the art historian Oliver Grau and the *Latin American Electro Acoustic Music Collection* made by Ricardo dal Farra, a collection now hosted at *La fondation Daniel Langlois pour l'art, la science et la technologie* in Montreal, Canada. In each of these database projects the task of cataloguing assumes primary importance, followed by the construction of a network of hyperlinks germane to the information on individual works by artists. Any archive of this kind could activate direct viewer-art, i.e. viewer-*replicant* interface, as well as provide a sort of guided tour through the names or categories in that language-game. The links are based on country, or nationality. Hence we get a picture of how the information may be visualized for the complex history of the growth and

ramification of digital art in the individual countries in Latin America and in what kind of production-relation they stand to each other.

3. History of Latin America and sources of database information

On a historiographical level the modern annals of Latin America reveal a rising curve of dictatorships and militarist governance, like in so many others nations that had been former colonies. Communication between Ibero-American countries themselves, at moments, became difficult and conflicted (Frank 1967; Thorp 1998; Medina 2009; Renouvin *et al* 2000). The arts did not have any better chance to escape this post-colonial turmoil. Intra-operator militarism in colonized territories may have also triggered the impulse for some of their arts, especially in Latin America (Getino and Solinas 1970; Cere 2016). Like a Nietzschean category the sweep of war and art may just have been the same - this is reflected in the origin-story of some of the tools used in contemporary art in Latin America. In this part of the world the soil has been fertile for both destructive and creative use of military tools, including the use of an airbrush for example - which resembles a gun and is used by an iconic artist like David Alvaro Siqueiros to construct meaning on the mural, and indeed to paint guns - as on the canvas titled *America Tropical* (1932)- to depict violence on peasants, perpetrated by colonizers of a New World. The conflicting history of digital heritage in near recent Latin America follows on this paradigm. The presence of military dictatorship in Argentina, Chile, Central America and even Brazil has paradoxically been detrimental to mainstream culture, yet some of the neo-liberalist policies in Chile for example - in the 1990s - have favored the growth of a global technological art. Co-existence of dictatorship and neoliberal technology-based art is reflected in the history of Argentina. Just as the regime of Pinochet (in Chile) from 1973 to 1990 coincides with some digital art production (Figure 2 (a) -

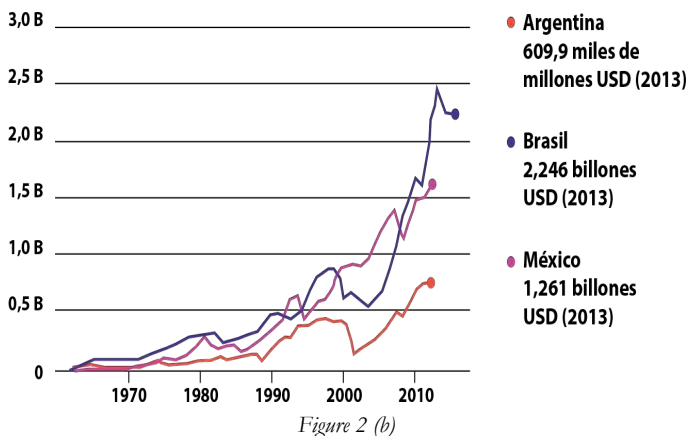
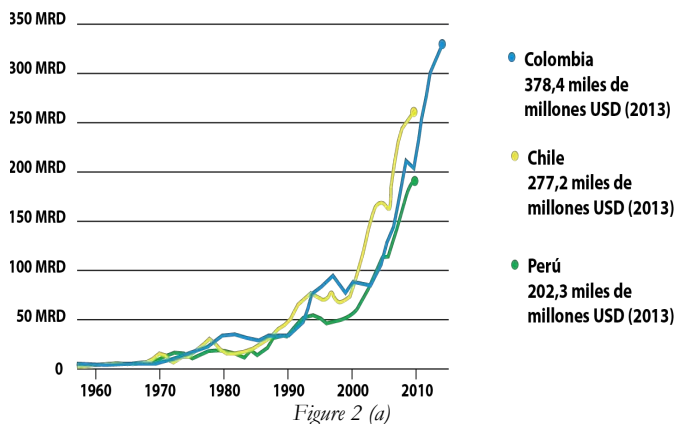


Figure 2 (a) and (b). Graph indicating distribution of exhibitions on digital art in Latin America, 1950 to 2010. The distribution is based on World Bank Databank reports for GDP in Billion Dollars recorded during the period 1960 -2010. The exhibition statistics is similar to the findings of the DALA archive. The growth curves of individual countries are based on information from the museums, festival contacts, academicians, actual artists and correspondences and the Internet.

Technology (see Figure 2 (a) and (b)); in Argentina the same characteristic transformations in artistic output could be traced through the early decades of dictatorship after the nineteen fifties, when pioneers in digital technology were just beginning to make their art works.

3.1. Information from pioneers of art and technology

The project would have aimed to gather and store information on digital art by starting from the art produced by art-and-technology *pioneers* in the field (Malina 1990; Thompson 2015) <http://creativedisturbance.org/people/reynaldo-thompson/>. Figures like Manuel Felguerez, Andrea di Castro, Humberto Jardon, Monica Mayer, Rafael Lozano-Hemmer, Gilberto Esparza from Mexico; Joaquin Fraga, Francisca Benítez from Argentina and many others from Brazil, Chile Colombia and Peru had opened up new perspectives that would anticipate the arts of the digital era.

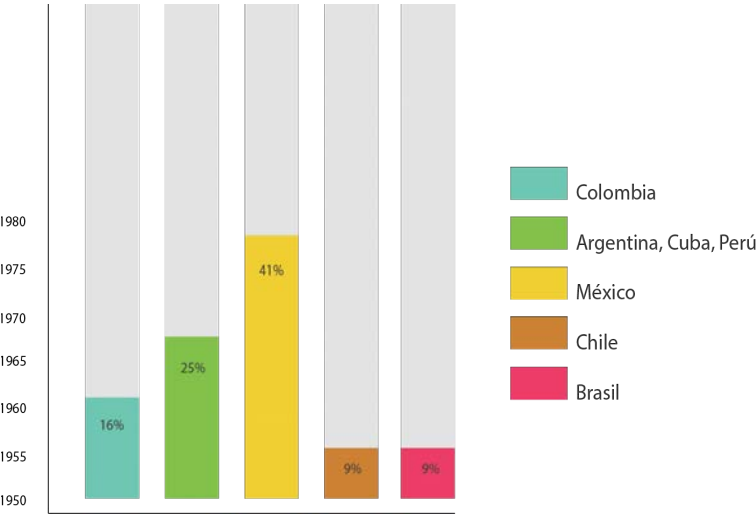


Figure 3. Pioneer artists on art and technology with respect to the countries of origin of art works, as calculated on the basis of findings in the DALA database.

Neither does the period in which they started to work with technology reflect the state of the economy. The early technological arts in Latin America only reveals the openness of government or military rulers who were permissive to new forms of artistic expressions and allowed its development. For instance in the late fifties Argentina witnessed an early development of art and technology thanks to the private support of the Instituto Torcuato di Tella. Julio Le Parc (b. 1928) for instance, started exploring in 1959 light effects projected on Plexiglas, and later in 1960 and 1961 the effects produced from rotation and random movements of colored light. In México, combined art and technology

experiments received official support for the first time from Carlos Salinas de Gortari who created the *Centro Nacional de las Artes* (CENART) in 1994. Let us not forget that Manuel Felguerez (b. 1928), the pioneer computer-art artist started his explorations in the early seventies with his *Máquina Estética*, a project completed during his academic assignments at the Autonomus National University of Mexico (UNAM). In Chile Carlos Martinoya and Nahum Joël, (<http://abierta.cl/cinetica/>) - the first a physicist engineer and the other a crystallographer, were exploring the effects on colors and light produced on the viewers and created the *Abstractoscopio cromático* in 1960. In Brazil Abraham Palatnik (1928) was investigating the effects of color from a different perspective, one that deals with physical movement. The pioneers of kinetic art in Latin America started out experimenting with color and its ramifications, for a visual arts oriented departure from tradition. In these years artists were more interested in the effects of light, color and form and the wider possibilities the technology could offer for artists, perhaps the heavy history of painting that seemed to persist was too hard to bypass. Engagement with such artists is a very important task - and provides a perspective for the DALA archive for information on the inception of a new kind of art.

3.2. General sources of database

Statistically it would appear that larger the human resources dimensions in a country, the bigger is the number of artists engaged in the intersections of art, science and technology in a considerable variety of media, subjects and focus. To find out the artists and scholar who can represent each region in the DALA project which otherwise represents a total population of 625 millions for the whole Latin American region is not an easy task. It is true that with new communication technologies the information exchange is easier but the information is not always available online or is reliable. In Mexico there is already a database made by *Transitio* (<http://transitiomx.net/es/artists>) - an electronic art festival organized every two years in Mexico City. *Transitio* started hosting exhibitions in 2005. In their archival web page names of participants are uploaded along with other information such as the artist's place and date of birth as well as a brief bio; the information is good enough to start a research on the artist's trajectory and any recent activity in case that the artist was still active. Other important sources for information have been the *Fondo Nacional para la Cultura y las Artes* (FONCA) [<http://fonca.conaculta.gob.mx>], the *Laboratorio de Arte Alameda* (<http://www.artelameda.bellasartes.gob.mx>) and the *Centro Nacional de Investigación, Documentación e Información de las Artes Plásticas* (CENIDIAP) which is affiliated to the renowned and prestigious *Instituto Nacional de Bellas Artes* (INBA), (http://www.cenidiap.net/biblioteca/libros/Videoarte_en_Mexico.pdf) and

most recently the *Centro de Cultura Digital* which was created in 2000 for promotion and exhibitions of technological art (<http://www.centroculturadigital.mx/>.) Some of the important institutions and organizations from other parts of Latin America are *Festival de la Imagen* of the University of Caldas, Manizales, the *Multiplicidade Imagem Som inusitados* (<http://www.multiplicidade.com/2016/>) which is a festival of new media art held annually in Rio de Janeiro, Brazil, and the *Festival de Arte Digital* -FAD Belo Horizonte, and the Circuloa Agency for Dissemination of Contemporary Art (<http://www.circuloa.com/>) Brazil. The DALA has successfully involved organizing and editorial members from some of these festivals and exhibitions in Latin America - who have thus come up so far to make inputs and select an authentic cross-section of the representative arts, as good as it could get to be within the existing paraphernalia of the emerging genres.

3.3. International initiatives and support for archival collection

Some major international congresses, festivals and events had focused on different areas of the digital and electronic arts, though not on a regional basis. SIGGRAPH itself, which started in 1974, had special interest in Computer Graphics while ISEA was oriented towards interdisciplinary projects cutting through the humanities and the sciences and technologies - the first festival was organized in 1988 in Europe. What SIGGRAPH has finally succeeded in doing was to gel the activities artists from various regions - including Latin America. But the process of integrating the Latin American experience could be taken a step further with a special emerging section dedicated to the artists in these under-represented countries. The process has just begun to take some shape (Thompson and Mukhopadhyay 2014; 2015), in such articles as *Los progresos de la ciencia, las artes y los pensamientos* by Julio ArSstegui, Ana M. Fernandez Garcia and Glicerio Sanchez Recio (ArSstegui and Buchrucker 2001; Dal Farra 2004; 2006). Emerging datasets should be coupled with critical analysis and writing for the discourse on contemporary electronic art. But perhaps the most significant event in the history of dataset collection was initiated in Cuba, in a radical progressive effort, to create a sense of identity for Latin American art.

The *Havana Biennial* (1984) was instrumental in re-directing our attention toward under-represented countries of the so-called third world. In recent years, other initiatives for the promotion of Latin American art started coming in from the Guggenheim Foundation entitlement *Under the Same Sun* (Leon de la Barra 2014). The *Art from Latin America Today* segment of Guggenheim funds places emphasis on a Global Art Initiative MAP of the subcontinent which also

includes Latin America. (<http://www.guggenheim.org/guggenheim-foundation/collaborations/map/latinamerica/artist/claudia-joskowicz#artists>).

4. Methods of data collection and coding

The task of setting information link for each artist in a template of Latin American artists in the database had to be first defined with a personalized ID for each person or institution that we had to enter into the database. This constituted the main DALA ID based on which all other information could be stored.

It is also the obvious choice for knowledge representation of information on any database made up of individual names or registers, wherein each register is associated with a unique reference number or URN by which each register - or artist name - is identified. Needless to say that ID referencing already exists for several artists; there are some on the more popular Internet names of artists. Of all ID systems currently in use among archival projects the most well-known ones are of course, those maintained by multinational organizations having commercially operative databases, mostly on the Internet. Such are ULAN (USA), RKD (Netherlands) and similar digitized library ID databases such as LCCN (USA), GND (Germany) or SUDOC (France). Generally archivists would choose and definitely also store and reference all art related IDs from these commonly available unique reference numbers which are all relevant and valuable for search-commands and information association. For DALA it was better to choose a URN of its own, and then collecting information on that artist from the other databases mentioned above.

Wikipedia perhaps provides a ready information source for all networking information available in relation to artist-names. It was decided to add the Wikidata ID for the person/institution, see here for example: www.wikidata.org/wiki/Q325148. This is very practical, because it is from Wikipedia reference indices that most of the external IDs of the artist are obtainable. Also the Wikipedia language versions that exist for that individual artist become accessible. All this helps in creating a relational structure for datasets. This is precisely the objective of DALA as records for datasets tagged to each idea or category for the artist – namely DOB, Country of Birth, Exhibitions, Contact Information, Individual Artwork catalogue information *etc.* could all be in sync with hyperlinks for other reference categories and *vice versa*. So for any particular artist we have a *record* or *categorical reference* of his or her works in another data entry. The ID or unique reference for the artist could be linked to this other record, which may be the name of the country of the artist, or the major works, or date wise catalogue of exhibitions and so on. The

whole idea is to link objects by means of embedded coding that relate one entry category to another.

Sociologically this creates a tangled web of information networking and flow in which the available information creates an overall and yet a detailed picture of the state-of-the-art achievements of artists and the relations that these achievements have in a broader framework of references. In our case this framework pertains to digital artists from Latin America and the global references which comprises the context in which their works get exhibited and valorized. Just as Wikipedia maintains a completely open source approach to information storage it could be possible for archivists of virtual museums to generate an architecture of information on the web, just as in this case an attempt is being made to bring the digital art history of Latin American countries to the fore. Wikipedia provides a good starting point, since it has the advantage of discourse perspective in allowing multiple language resources and storage. In case of DALA both Spanish and Portuguese language databases could therefore augment and connect information with other globally available web resources in English. The DALA would naturally be a collection of artists whose first language is Spanish, but the web archive should primarily be maintained in English for an international audience and a global market based approach to digital art exhibition and consumption.

5. Conclusion

The initial selection of artists has not been easy, the databases consulted in México include names of artists that have won a scholarship but sometimes had not continued with their artistic carriers; yet others had exhibited their work in selected exhibitions. It is an important time in the cultural history of the digital arts because some of the pioneers are still living. Even in some of their twilight days they could provide information on the development of technological art. This is exactly also the content of a series of MIT podcast interviews on pioneering technological-kinetic artists in Latin America that have developed so far. The MIT podcasts shall supplement the initial phase of the DALA database that has collected information on nearly 600 artists from the entire continent.

Latin American digital art presumably exhibits the most exemplary components of intellectual, social and technological integration, even if selectively, in the larger context of transforming aesthetics into bits and projections of a new humanism. The model of perfection and enrichment of stimulus is central to the methods of assessment and research for the archive as a whole. On the whole the format may give indications in a geo-referential manner; leading a hyperlink connected branching characteristic of electronic aural and video

genres, and one that could be easily accessible on common international servers. Digital art was pioneered in Latin America in the context of this ideology and search for a new technological *niche*; perhaps a love of culture, finesse, indigenization and sensitivity to establishment hierarchies are all implicit in the digital arts. Above all there is a concern for the environment which is instinctual for the genetically futuristic artist of this millennium only because Latin America contains one of the most biologically megadiverse environments of the whole world. Digital and new media experimental artistic praxis was defined by pioneering programs in Argentina, Mexico, Brazil and Colombia. Today the TRANSITO exhibition in Mexico City, among other foundational organizations and sponsors like the *Fundación Telefónica* of Peru, Brazil's FILE, and *the Festival of Images*, Colombia, are some examples of the way that the new art and experience is being celebrated and memorialized.

References

- Alonso, R. (2005). Hacia una des-definición del video arte. ISEA Newsletter, (100).
- ArSstegui, J., & Buchrucker, C. (2001). El mundo contemporaneo: Historia y problemas.
- Bailey, D. R. (2015). Creating Digital Art History: Library, Student, and Faculty Collaboration. *The International Journal of New Media, Technology, and the Arts*, 10(2), 1-10.
- Blumm, N., Ghoshal, G., Forró, Z., Schich, M., Bianconi, G., Bouchaud, J. P., & Barabási, A. L. (2012). Dynamics of ranking processes in complex systems. *Physical review letters*, 109(12), 128701.
- Brea, J. L. (2007). Mutaciones de la cultura en la era de su distribución electrónica.
- Brea, J. L. (2010). Las tres eras de la imagen: imagen-materia, film, e-image(Vol. 6). Ediciones Akal.
- Bruce, B. C. (2000). The work of art in the age of digital reproduction. *Journal of adolescent & adult literacy*, 44(1), 66-66.
- Cameron, F., & Kenderdine, S. (2007). Theorizing digital cultural heritage: A critical discourse. Mit Press.
- Casey, B., Dunlop, R., & Selwood, S. (1996). Culture as commodity?: the economics of the arts and built heritage in the UK (pp. 128-39). London: Policy studies institute.
- Cere, R. (2016). Hegemony and Counter-Hegemony in Postcolonial Media Theory and Culture. *Postcolonial Studies Meets Media Studies: A Critical Encounter*, 23, 125.
- Chandler, Daniel (10 April 2000). "Marxist Media Theory". Aberystwyth University. Retrieved 22 July 2012.
- Chilvers, I., & Graves-Smith, J. (2009). *A dictionary of modern and contemporary art*. Oxford University Press, USA.
- Cuadra, A. (2007). La obra de arte en la época de su hiperreproductibilidad digital. *Revista Digital ciencia Abierta*. Universidad de Chile. http://cabierta.uchile.cl/revista/31/mantenedor/sub/articulos_1.pdf (Febrero 4 de 2011).
- Dal Farra, R. (2004). Latin American Electroacoustic Music Collection. *Portal Daniel Langlois Foundation for Art, Science, and Technology*.
- Dal Farra, R. (2006). Something lost, something hidden, something found: electroacoustic music by Latin American composers. *Organised Sound*, 11(2), 131-142.
- Debord, G. (2012). *Society of the Spectacle*. Bread and Circuses Publishing.
- Forte, M. (2007). Ecological cybernetics, virtual reality, and virtual heritage. Na.
- Frank, A. G. (1967). *Capitalism and underdevelopment in Latin America* (Vol. 93). NYU Press.
- Gallo, R. (2004). New tendencies in Mexican art: the 1990's. Springer.

- García Canclini, N., Canclini, N. G., García Canclini, N., Cancliano, N. G., García Canclini, N., Canclini, N. G., ... & Canclini, N. G. (2010). La sociedad sin relato: Antropología y estética de la inminencia (No. 304.4 (8)). Paidós.
- Gibson, R. 2004. "The Museum as Cultural Laboratory." Paper presented at The Rebirth of the Museum? An International Symposium, July 8–9, University of Melbourne.
- Gutiérrez, L., & Gamboa, L. F. (2008). An approximation to the digital divide among low income people in Colombia, Mexico and Perú: two composite indexes. Documentos de trabajo, (004710).
- Jasso, K. (2008). Arte, tecnología y feminismo: nuevas figuraciones simbólicas. Universidad Iberoamericana.
- Jones-Garmil, Katherine. 1997. The Wired Museum: Emerging Technology and Changing Paradigms. Washington, D.C.: American Association of Museums.
- Kyong-Ho, L., Slattery, O., Lu, R., Tang, X., & McCrary, V. (2002). The state of the art and practice in digital preservation. Journal of research of the National institute of standards and technology, 107(1), 93.
- Levy, Ellen K., and Philip Galanter. 2003. "Complexity." In Leonardo 36, no. 4.
- Levy, Pierre. 1998. Becoming Virtual: Reality in the Digital Age. Trans. Robert Bononno. New York: Plenum Trade.
- Manovich, Lev. 2001a. The Language of New Media. Cambridge, Mass.: MIT Press.
- Malina, R. F. (1990). Digital Image: Digital Cinema: The Work of Art in the Age of Post-Mechanical Reproduction. *Leonardo. Supplemental Issue*, 33-38.
- Mariátegui, J. C., & Mariátegui, J. C. (1984). Ideología y política.
- Mayer Foulkes, Benjamín (compilador). Itinerarios de la cultura contemporánea en México. CONACULTA. Dirección General de Publicaciones. México. 2015. P.101.
- McDonough, T. (2004). Guy Debord and the Situationist International: texts and documents. MIT Press.
- McLuhan, Marshall (1964). *Understanding Media: The extensions of man*. New York: McGraw Hill.
- Medina, C. (2009). Espectralidad materialista. *Teresa Margolles, ¿De qué otra cosa podríamos hablar*.
- Mignolo, W. D. (2009). The Idea of Latin America. John Wiley & Sons.
- Montagu, A., Pimentel, D., & Groisman, M. (2004). Cultura digital: comunicación y sociedad. Paidós.
- Piqué, F., M. Derrick, M. Schilling, and D. Scott, "Original Technique of the Mural América Tropical by David Alfaro Siqueiros," Materials Research Symposium Proceedings 352 (1995): 365–71, at 366.6F. Piqué, M. Derrick, M. Schilling, and D. Scott, "Original Technique of the Mural América Tropical by David Alfaro Siqueiros," Materials Research Symposium Proceedings 352 (1995): 365–71, at 366.
- Piqué, F., Derrick, M., Parker, A., Schilling, M., & Scott, D. (1995). Original technique of the mural America Tropical by David Alfaro Siqueiros. In MRS Proceedings (Vol. 352, p. 365). Cambridge University Press.
- Rainer, L. (2012). Conserving and Presenting Siqueiros's. *American Art*, 26(1), 14-17.
- Renouvin, P., Duroselle, J. B., Pierre Renouvin, J. B. D., Rodríguez, B. N., Methol Ferré, A. R., Ferré, A. M., ... & Rohden, P. R. (2000). *Introducción a la historia de las relaciones internacionales* (No. 327 (091)). Universidad Nacional de Rosario. Asociación Argentina de Historia de las Relaciones Internacionales Universidad Católica de Córdoba.
- Rush, M. R. (1999). New media in late 20 th-century art. Thames & Hudson.
- Scarpaci, J. L. (2005). *Plazas and Barrios: Heritage Tourism and Globalization in the Latin American Centro Hist—rico*. University of Arizona Press.
- Schich, M., Song, C., Ahn, Y. Y., Mirsky, A., Martino, M., Barabási, A. L., & Helbing, D. (2014). A network framework of cultural history. *Science*, 345(6196), 558-562.
- Shanken, Edward (ed). (2009). *Art and electronic media*. London: Phaidon.
- Siqueiros, D. A. (1975). Art and revolution. Lawrence and Wishart.

- Taylor, C., & Pitman, T. (2007). *Latin American cyberculture and cyberliterature*. Liverpool University Press.
- Thomas, H., Versino, M., & Lalouf, A. (2004). *La producción de artefactos y conocimientos tecnológicos en contextos periféricos: resignificación de tecnologías, estilos y trayectorias socio-técnicas*. V ESOCITE,[CD]. Toluca: UAEM.
- Vercelli, A. H. (2004). *La Conquista Silenciosa del Ciberespacio: Creative Commons y el diseño de entornos digitales como nuevo arte regulativo en Internet*.
- Witcomb, A. (2007). The materiality of virtual technologies: A new approach to thinking about the impact of multimedia in museums (pp. 35-48). Mit Press
- Zea, L. (1993). *Fuentes de la cultura latinoamericana* (Vol. 2). México: fondo de Cultura económica.

About the authors

Reynaldo Thompson is Associate Professor at the University of Guanajuato where he Chairs the Department of Art and Enterprise of the Engineering Division. He teaches mainly contemporary art in Latin America and elsewhere. His artwork has been exhibited internationally. He participated in artist residencies in the United States of America and curated exhibitions that were shown in Mexico and the USA. His main areas of interest are Art History and intersections involving an interdisciplinary Art and Technology program, with an emphasis on the origins of electronic art in Latin America. At present he is planning to launch a database on the evolution of the digital art in the subcontinent. thompson@ugto.mx

Tirtha Prasad Mukhopadhyay is Associate Professor in Digital Art in the University of Guanajuato, Mexico. He has taught at Universities in India and the United States of America, and has been a distinguished Fulbright Senior Research Fellow at the University of California, Santa Cruz. He is a multidisciplinary scholar having international publications on Cognitive Archaeology, Aesthetics and Digital Art. tirthamukhopadhyay@gmail.com

Frank Dufour, is Professor at the School of Arts, Technology and Emerging Communication, The University of Texas at Dallas. He specializes in audio engineering. He has worked for the French National Radio, and is associated with IRCAAM (Pompidou Center, Paris) and has several international publications on Technology, Art and Electroacoustic Music. fod051000@utdallas.edu

Archiving, emulating and documenting the collection of CD-ROM artworks of LIMA, Amsterdam

Alexandre Michaan & Nina van Doren

Abstract

Threatened by technological obsolescence, CD-ROM artworks have become increasingly difficult to value and access in cultural institutions, despite embodying a major part of the 1990s multimedia culture and early born-digital art. Amongst the conservation strategies that exist for such obsolete digital artworks, emulation has become broadly used in the archiving plans developed for such collections, often at the risk of lessening the considerations for their various material aspects. However, we will see how these materiality layers are of importance in the conservation of CD-ROM artworks, and explore the possible means to still value them in a preservation process.

Keywords

CD-ROM, conservation, emulation, digital archiving.

Introduction

In 2013, the media art platform LIMA, based in Amsterdam, started setting up a conservation plan for its collection of CD-ROM artworks. The research conducted for this plan continued within the framework of the Dutch coalition NCDD (National Coalition of Digital Preservation) in 2016. It has been an occasion to reflect upon methods of conservation for born-digital artworks that are produced for a specific type of physical carrier, and on the issues these artworks raise regarding the main procedures currently in place in specialized institutions worldwide.

As a platform rooted in the Dutch history of media art through the legacy of its predecessors MonteVideo and the Netherlands Media Art Institute (NIMk), two institutions that have been fundamental in preserving and collecting media art since the late 1970s, LIMA has been storing in its archive since its creation in 2013 born-digital artworks next to its main video collection. Part of this corpus is a variety of CD-ROM artworks that are representative of the many types of artistic creations produced for this carrier during the 1990s. Of specific interest for us were two CD-ROMs which NIMk produced within its own media art lab. Both were linked to major exhibition projects [1], and one of them constituted a unique example of an interactive artwork on CD-ROM from the artists duo Stansfield/Hooykaas, *Person to Person*. The research in how to preserve *Person to Person* for the future resulted in possible procedures to study for the entire LIMA CD-ROM collection treatment. Particularly it solidified two major focuses, the first being on the creation of an emulation of

the artwork's original computer environment and the second existing in the deepened consideration of the ethical limits and consequences of this process and the means to limit the risks of potential losses that can be entailed by emulation as a conservation strategy.

Rather than presenting in detail the archiving procedures for CD-ROM artworks and their implementation in the conservation workflows of LIMA [2] that resulted from the research, we will focus in this paper on conservation issues and on the need of a certain critical approach towards digital archiving practices. As such, we will try to highlight some key principles to keep in mind throughout the establishment of emulation procedures for this particular category of artworks.

Our main concern will be the value of their own specific materiality and the way it questions digital archiving processes, but also the difficulty to define clear boundaries to the experience they originally provided to the viewer. In the perspective of re-creating the possibility of this experience, we will try to question the matter of a supposed «original unity» of these artworks, and understand if a reference condition can be thought to exist in such cases for the actors of conservation.

Specificities and plurality of CD-ROM artworks

In the past years, we have witnessed a revived interest in CD-ROM-based forms of art, in part thanks to the emulation policy of institutions such as Rhizome (New York)[3] or iMAL (Brussels)[4] and tools such as Emulation as a Service (EaaS) developed by the University of Freiburg. Despite growing popularity and awareness, it is significant to question why this family of artworks – and some important pieces of early born-digital art history belonging to it such as the CD-ROMs of Laurie Anderson, Theresa Duncan or Chris Marker – have taken a lot of time to be brought into sharper focus in terms of public access, especially in comparison with popular titles from video game history or non-CD-ROM-based early digital works that exclusively consist in programs. Both of these examples can be said to have been more commonly emulated and reprogrammed over the last decade whereas examples of exhibiting CD-ROMs as a main focus or presenting them emulated online were still very seldom.

One explanation could be drawn from their precise nature as CD-ROMs objects, and not *exclusively* programs or computer-based works. As we will see, whilst the link to a specific carrier and to its technological context of production is undoubtedly tight for many – if not all – categories of media

artworks, it is, in the case of the artworks embodied by CD-ROMs, at the core of all presentation and conservation issues. When we stepped into this research, it soon proved to be a rather sensitive issue to understand the very nature of the CD-ROM artwork and its complex material layers that constantly blur what level of «dematerialization» would be acceptable in such cases for conservators and archivists, thus revealing the difficulty of finding ethical methods to still present these works to the public despite their apparently easy archiving procedures.

Of course, the scale of presentation issues would be far smaller if the critical threat of technological obsolescence affecting the CD-ROM medium itself was removed, existing both in its physical dimension as well as in the digital formats of its typical multimedia content. On the physical level, as we have observed for over five years now [5], optical disk drives are becoming scarce on even the most common personal computer types and tend to disappear completely from laptops. This makes the issue of illegible and obsolete digital content on optical disks from the 1990s less and less relevant in a future that is progressively leaning towards the complete impossibility of even accessing optical disk content in the next decades. On the software level, of which obsolescence is our main concern here, the very strong dependency of these objects' contents to specific operating systems and programs makes them systematically impossible to run on newer computer systems. Another layer of materiality is here at stake: given that any operating system needs to communicate instructions in a certain way to the central process unit of a computer, there is a close link between the two, making in principle the possibilities of OS and software program installation dependent upon the type of hardware used. Consequently CD-ROM artworks are deeply linked even in their very content – and thus beyond the optical disk itself as object – to a whole set of *material* components, from the computer to the entire set of devices attached to it. The list of aspects of technological dependency is rather long: the technical specifications of the images being linked to a specific screen resolution and amount of displayed colors, the interaction possibilities with the user being linked to specific physical devices, etc. Since old operating systems are relying on the architecture of obsolete computer processors, and that computer equipment from the 1990s has become over the years incrementally more difficult to sustain for cultural institutions, the action of running such media on current newer computers through the means of technological «tricks» start to be the only remaining way to access their content. This is where emulation comes into the picture, as it provides ways to imitate the entire behavior and architecture of an older processor, thus creating possibilities to simulate the proper environments in which the original content of a CD-ROM can be played and browsed.

But amongst the specificities of CD-ROM artworks are also challenges for public presentation that go beyond technical obsolescence problems. As a matter of fact, a brief view of a CD-ROM art collection such as the one we studied at LIMA readily leads to observe how much these pieces often largely overflow their mere *content* and digital form. Along with essential elements to the authenticity of the works, such as designed packages, illustrated boxes referring to early computer popular culture, thick booklets or board game elements [6], the diversity of the works' physical dimension reveals itself directly when diving into collection surveys, and, with it, potential obstacles arise in researching means to present these works only as pure digital content. Moreover, when looking closely at the content and interactive experiences proposed by the artworks, it becomes striking how most of them belong to a range of similar structures, atmospheres and even aesthetic elements, apart from their obvious singularities. Their context of production roots CD-ROM works within the sphere of influence of an entire multimedia culture from the 1990s (with for instance certain video game trends [7], early educational interactive content, or the start of an internet culture) that left recognizable marks on this whole historical range of works.



Figure 1. Two examples of CD-ROM physical package designs. *Person to Person* (right) by Stansfield/Hooykaas, and *Puppet Motel* (left) by Laurie Anderson.

Conversely, such pluralities can also be seen as being representative of a very interesting form of medium specificity: a specificity arising from the typical audiovisual content treatments and interactions afforded by the most commonly used software programs to produce CD-ROMs at that time. Indeed, the CD-ROM medium had appeared together with new software possibilities for the production of multimedia interactive content, before the rise of Internet art at the turn of the millennium. At the time, Macromedia [8] was the main company developing software programs made to produce multimedia content and interactivity for CD-ROMs, mostly with *Macromedia Director*, a very popular program widely used by artists [9]. From the technological constraint that typified these specific tools, emerged recurring creative forms such as labyrinth-style structures exploration (*Immemory*, *Person to Person*) or immersive

environments prefiguring virtual reality (*Puppet Motel, The Second*), that are remarkable nowadays as typical markers of 1990s multimedia CD-ROM culture. This could be regarded as a shared language among early digital artists working with CD-ROM. As Chris Marker stated in *Libération*, in January 1999, «*Not only the multimedia is an entirely new language, but it is THE language that I feel I have been waiting for since I was born.*» Thus, conceiving the CD-ROM as the fruit of a shared aesthetic and language created by the possibilities and limitations of the available software of the time, it becomes essential to look at it with a particular attention paid to medium specificity in an archival context, when it is being materially transformed for the needs of presentation and conservation.

A first approach: defining the needs of the collection

Considering the above aspects, it would seem rather difficult to limit the problem of CD-ROM art conservation exclusively to issues surrounding digital content access and reading. It appeared necessary during our research that the possible ways to explore and experience the multimedia content of these artworks today, by means of emulators, have to go hand in hand with a reflection on how to keep track of all original physical components of the work, and on the ways to make the public aware of their existence and their imprint on the creation process.

Another consequence of the elements we mentioned is the need of a survey phase as a prior step to approach and preserve a CD-ROM collection, in order to sort out the different types of items coexisting in the category, given the very large range of object types that they can represent. Sophisticated packages may become essential to the understanding of the work through specific instructions included in booklets or boxes for instance, or attached other media. So might explicit dependencies to external elements such as exhibitions, in the case of virtual exhibitions and catalogues on CD-ROMs. Therefore it is fundamental to identify the titles to be considered as purely interactive CD-ROM artworks, their potential «standalone» nature, and outlay their various components before stating the type of conservation strategy they ask for. Furthermore, it is also possible to come across CD-ROM items which stand only for their content (archives of media files) and are comparable to simple data storage carriers, by presenting either a very low level of interactivity or no interactivity at all, and that will obviously not ask for operations similar to the conservation treatments of interactive pieces.

Which criteria to choose for this categorization of a CD-ROM artwork collection is a diverse and complex discussion topic. In the case of the LIMA collection it seemed logical to focus on the level of interactivity as a main

criterion, proceeding to a classification tree and leading to a selection of CD-ROM works to be tested under emulated environments for the setting up of a larger conservation plan. A hierarchical level of interactivity has been defined by a study, for each artwork, of its specific interactive functions and their importance in regard with the integrity of the work, based on the boxes or booklets instructions and on the testing of the artworks on older compatible computers. For instance, Stansfield/Hooykaas' *Person to Person* had an additional feature to its basic point-and-click exploration commands, a screen-capture mode that allowed the viewer to take his own shots of certain details of pictures and gather them in a virtual album, thus re-appropriating the experience of Icelandic landscape contemplation proposed by the artists. Yet such a feature is typically described in the booklet instructions and often asks for some testing and prior experiencing of the work in order to not misunderstand its mechanism and its function, making it an essential interactive component to analyze when looking at the meaning and intentions of the work.

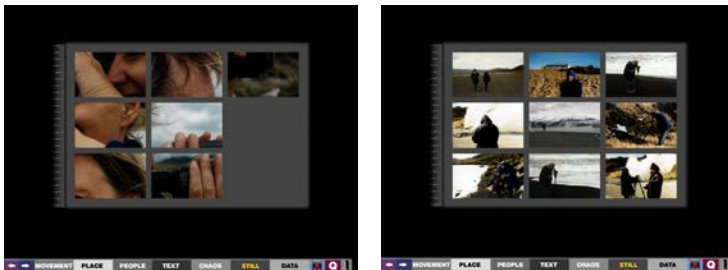


Figure 2. The virtual photo album of *Person to Person*, showing details of existing pictures in the work picked and “photographed” by the viewer when interacting with the CD-ROM.

Archiving practices and technical scope of the LIMA research

Emulation and virtualization are certainly the strategies most commonly used in the archiving field in order to bypass the software or operating system dependencies of certain digital content. Other conservation strategies exist for obsolete digital artworks, such as reprogramming, reactualizing the work as a newer technological version when the artist is still alive, or less heavily interventionist actions such as preserving and presenting the work through documentation. However only emulation offers the ability to directly access obsolete digital content without any transformation of its code, through a pure simulation of its original software environment. In spite of the ethical issues to be discussed further in this article, this capability undoubtedly makes emulation a highly valuable conservation option in that it respects the works’ source code integrity and gets – in theory – as close as possible to the behavior that the programs were supposed to originally have on their proper computer

equipment. CD-ROM preservation plans such as the one developed at LIMA usually focus only on emulation, since it allows for a complete difference between the host machine and the hosted emulated machine, even in architecture and processor types. Indeed emulation, as opposed to virtualization, adds a translation layer of each instruction in between both machines, through a process that imitates the exact behavior of a chosen obsolete computer system. In other words, it allowed, in our case, to imitate the behavior of old computers prior to 1998/2000, which constitute the proper «reference» equipment matching with the range of studied artworks.

But this additional layer of translation of information between hosted and host machines also increases the complexity of fully controlling the process, and implies some key elements that have several consequences under a conservation policy perspective. The installation and mastering of emulator programs demand for very controlled and tested settings in order to ensure a behavior reliability, and cannot easily be handled by cultural institutions or even conservation labs who do not have specific training in the field. This need for expertise has resulted in a subsequent need for pre-made tools and interfaces for emulation such as the ones researched by the University of Freiburg in their Emulation as a Service project.

The classical pattern of an archiving and access procedure for CD-ROM content first consists of ingesting data extracted from the physical carriers under the form of a digital clone (the virtual disk image), storing it on the same principle as common digital data storage. Thereafter it is loaded, when necessary for consultation, in an emulator that will recognize it as a «real» CD-ROM and display its content in the same way an old computer system would have when inserting the disk in its CD-ROM drive. In the case of the LIMA collection, it was decided to stay exclusive to emulators for Mac computers and operating systems, since the major part of the interactive artworks on CD-ROM produced in the mid-to-end-1990s – such as the ones in the collection – were developed either for Mac OS only or for both Mac and PC compatibility.

In this perspective, the two emulators that appear today most relevant to focus on are Basilisk II [10] and SheepShaver [11], well known for their capacities to emulate various old Mac computers and Mac OS from 7.5 to 9, thus fitting the historical range of hardware and operating systems matching with the CD-ROM artworks from the collection (from 1992 to 2000), and both open-source programs. Basilisk II is generally known to emulate with better performances older Mac operating systems (7.5 to 8) and Mac computer architectures previous to 1998 (Quadras and Power Macintoshes), whilst SheepShaver emulates more proficiently Mac OS 9 and Mac models made after 1998 (G3/iMacs, G4). Although it was left out of the scope of our research this year, emulation of obsolete PC computers is also possible on open-source software

with emulators like Qemu, leaving another possibility for research that could be explored further for some specific cases from the collection. Tools like the University of Freiburg's Emulation as a Service intend to include a larger variety of systems in a single interface, and can be of interest to make emulation possibilities wider in cases of possible PC compatible only artworks.

Emulation and risks of losses

Because of the above-mentioned mechanisms at stake in any emulation process, a certain vigilance appears necessary when dealing with artworks that are characterized by their carrier-specificity. As a matter of fact, a rather deep contradiction between dominant preservation policies can be seen to exist when considering that the very core of a conservation-through-emulation plan is the facilitation of access to obsolete digital artworks by the systematic extraction of *content* [12], and the ingest of it into digital storage structures and virtual machines for consultation, thus tending to become a process very similar to all classic archiving ones – with the advantages of mass-treatment facilitation, but erasing the needs to focus on material aspects that are generally required by a conservation action.

These issues are certainly not unknown in the field of digital art conservation and have been widely acknowledged during the past two decades. However, they usually apply to a range of artworks to which CD-ROM art is rarely considered belonging: installations. Whilst an art piece implementing digital content in a specific installation may appear naturally to us as requiring the use of very specific equipment — and thus the need to pay close attention to its material components — it is far more unusual to witness a similar vision when it comes to artworks with a less obvious degree of material dependency such as CD-ROM artworks.

Yet it can be arguable that, like in any case of a deep transformation of the material layers which characterize an artwork, the series of archival actions held in an emulation plan for carrier-specific digital works can cause not only an unavoidable loss of authenticity, but also, risks of significant losses in integrity [13], in the same way than for installations. Indeed, beyond the principle implications of presenting interactive artworks on newer devices [14] and thus in an *alternative form*, regardless of their specific original means of interaction with the viewer (their original physical interfaces), certain cases withhold a more peculiar link to materiality and can turn out to be seriously threatened by its transformation. For works of which some layers of this materiality, ranging from specific interfaces, elements from their original package or references to their global technological context, appear to be substantial to understand them

or to correctly experience them, a different approach than the classic archiving process can be needed in order to keep their integrity as safe as possible in the future. Examining artworks like the main titles we studied from the LIMA collection, it appears that a typical interactive CD-ROM artwork is most often affected by these issues.

In regards to digital content and its experience by the public, another aspect at stake in the emulation process that might show the need of a critical approach on certain archiving tendencies is the reliability of restitution of a work's original interactive *behavior*. This fundamental behavior of the artwork (comparable to the «feel» from the popular notions of «look and feel» in use in media art conservation [15]), consisting in programmed responses to certain actions of the viewer – clicking, rolling the pointer over, typing, even talking in the case of *Puppet Motel* [16] – as well as automatic scripted events such as animations or sounds, represents the very core of the experience it provides to the user, of the work's function and functionality, and as such, the core of its integrity to be preserved in the most sustainable way possible. Yet, even though emulation offers a very interesting way to keep this core alive and accessible, it would be no less problematic to assume that it necessarily achieves it correctly, even in a seemingly properly functioning situation.

Emulation, a necessity for conservation? Technological transposition as an unpreventable perspective

That being said, it is undeniable that emulation since its beginnings in the archival field in the mid-1990s [17] with Jeff Rothenberg's researches (and his statement that «*Old bit streams never die—they just become unreadable*» [18]) has grown to become the most promising strategy for the conservation of digital artworks. As such, it has progressively made its way into a slightly different field than the one of digital information sustainability and became enveloped in strategies of art conservation and their case-by-case approach. Emerging from data readability preservation, emulation has evolved to encompass issues related to the preservation of a viewer's «experience», and undoubtedly has a major role to play in regard with this matter, given the situation of increasing technological obsolescence within the media art world.

Obsolete computer equipment maintenance is fewer and fewer feasible for institutions, causing a presentation and conservation policy centered on original obsolete equipment to be already almost impossible to apply on a large scale nowadays. For this reason, practices such as emulation or reprogramming have to be considered and integrated by more traditionally trained conservators or preservation actors in a broader way, in spite of the authenticity losses they

might imply. These actors might be indeed needed vectors in the re-introduction of a materiality focus in processes derived from larger-scale archiving treatments [19], by giving a global and historical framing and accompaniment to such procedures, thus ensuring the coexistence of possibilities for the public and the researchers to access the works as renewed alternative forms as well as to keep track and awareness of their previous materiality layers.

It is also arguable that in some contexts, CD-ROM artworks should be conceived as artifacts which stand on the borderline of art conservation and digital content archiving: as candidates for a case-by-case approach as much as for systematic archiving procedures. In addition to the often mentioned significant budget issues which constrain institutions and force them to minimize time-consuming case-by-case conservation approaches, a CD-ROM collection can easily turn out to be wide enough to require some systematizable solutions in order to make its sustainable access and presentation plans realistic in the near future. In the case of the collection we worked with at LIMA, for instance, there were 80 items, of which 21 are interactive artworks specifically made for CD-ROM, and achieving a global reflection and study of the means to preserve the collection already took almost a year in total. Such time investment in this collection allows us to imagine the rate of work that has to be achieved in cases like the German *transmediale* festival archive collection, which includes over 400 CD-ROM-based art pieces. In certain circumstances, it is obvious that case-by-case type approaches are hardly relevant and the needs for automation of certain steps of the process [20] are far more important than the ones we could already observe at the scale of a 80 titles collection. Another lesson the scale of some collections such as the *transmediale Archive* teaches us is also how possibly blurry can be the border, in terms of archiving uses, between CD-ROM art and non-art-specific CD-ROM collections, such as the substantially more significant CD-ROM collections of major academic libraries for instance, far more frequent than museum or media art center ones. These large collections of multimedia educational content and early interactive explorable archives are certainly one of the reasons – combined with how admirably early the libraries and archives field has been dealing with digital information longevity issues – why interactive CD-ROMs have been commonly associated with standardized digital content archiving procedures which take little focus on their very own materiality. Cases of «standalone» interactive pieces of art on CD-ROM are very scarce in comparison with multimedia documentation, causing the entire range of optical media objects to often tend to be stored and related to a documentation function and section, including in museums and art centers.

Challenging and documenting the reliability of the «experience»

Compromises are therefore necessary. As it is often in conservation decisions, especially when technological components come into the equation, there is no situation without losses and everything comes to be a matter of framing unavoidable alterations in order to restrict them within acceptable limits. This might be where the practical teaching of our research this past year can come into the picture: in the case of the LIMA CD-ROM collection, it appeared to us logical after a study of the current practices and available tools, to focus on the means both to on one side, control and delimit enough of the emulation process to anticipate its risks of instability, and on the other, keep a precise enough record of original material components to preserve the link to the original carrier and technological context.

In this perspective, a phase of comparative tests through interaction with the works on various environment types as well as by means of video documentation appeared to be to us a key step in the process of controlling the reliability of a viewer's experience provided by a work in an emulated form. Given the valuable computer equipment from the 1990s and early 2000s that LIMA had inherited from the Netherlands Media Art Institute's former labs, we were in the ideal situation of being able to work with fully functional machines from the same period as the CD-ROM artworks collection. This gave us the opportunity to set up and monitor comparison tests between emulated artworks on currently used computers and their original CD-ROM version running on the required operating system, non-virtualized, on former computers of a compatible architecture that were equipped with an optical disc drive.

Firstly and independently from emulated environments, a highly interesting observation that resulted from basic comparison tests between a small range of old computers (directly compatible with the CD-ROMs — thus regarded on a principle level as «original equipment») is the rather heterogeneous behavior of a single work on several examples of supposedly matching hardware and software of its time, even without any emulation involved. This statement is of course logical, given that the scope of possible factors influencing the experience originally provided by the artwork was far too wide even on a selection of typical computers used in the second half of the 1990s (our major tool for testing being the 1998 G3 iMac from Apple). But it teaches a valuable lesson in regard with possible prejudices in the ways of considering digital art conservation ethics: it is extremely complex to define a precise «original» look and feel of certain artworks — the *reference condition* of traditional conservation — to base some ethical decisions on during a conservation action. CD-ROM

artworks are deeply affected by this matter, as a type of works made to be broadly used and viewed outside from the borders of *technologically controlled* contexts such as art exhibitions – in other words, as works viewed on an *uncontrollable* variety of platforms in users' homes [21]. As such, they highlight in an exemplary way the difficulty of transposing for born-digital art conservation some of the core of usual conservation theories and principles [22], even though these artworks are more materiality-based than most born-digital art: their precise means of existence already imply flexibility and compromise in the understanding of *what they were*. In fact, there is no possible notion of original equipment in the case of these artworks.

The best way to work around this issue is to think in terms of a «range of acceptability», that embraces types of equipment that fit the historical context of these artworks in regards to the most commonly used technologies at that time. Defining limits of global periods in the use of certain operating systems, computers, or software versions, rather than a single precise computer type or OS depending on a single year, for instance, allows a needed flexibility while still ensuring a vision on technological coherency when looking at an artwork. This idea has preexisted for some time and has been applied, in the archiving field, by Jeff Rothenberg, who had mentioned already in 2000 the need for definition of a «*representative range of original platforms and system configurations*» [23]. In the context of our research, it seemed to be an important guideline to keep in mind when approaching interactivity tests as much as the documentation of the artworks. The fact that several types of hardware and systems existed and were used in parallel at the time, and that a work from 2000 could have been simultaneously viewed and experienced by users on brand new systems from 1999/2000 and on far older ones from the mid-1990s, is indeed an essential element of nuance in a critical approach of emulation as a preservation of experience.

However within this range of hardware and software historically matching with the artworks' coherence – often, for CD-ROM collections, from Mac OS 7 in 1991 to Mac OS 9's last release in 2001, with a particular focus on Mac OS 7.6 (1997) to Mac OS 9.2 (2001) in the case of the LIMA collection –, lies a scope of acceptable «look and feel» characteristics, that can be taken as reference when testing a work in an emulated environment.



Figure 3. Example of computer equipment belonging to the historical «range of acceptability» matching with CD-ROM artworks from the late 1990s: iMac G3 with CRT display, solid wired keyboard and wired ball mouse.

Speed of the animations' response to a user action like clicking, moving speed of the pointer in relation to the physical mouse movement, or the global fluidity of scrolling around in an immersive virtual space are factors that are relevant to study as indicators of a confrontation between obsolete compatible equipment and emulators. All the global experience fluency (display speeds on the screen as well as interaction speeds), for instance, often turns out to be significantly different: even in interaction conditions brought to the closest possible one to another, it is almost impossible to get the exact same feeling in terms of fluency when browsing certain artworks in different forms. A very interesting element is that this phenomenon goes two ways: emulated versions can often be of a higher fluency than the supposed original behavior (even until the point of excessive speeds distorting the ease of navigation through the work), and not exclusively the other way around. These observations are easily explainable by the fact that emulators, without a very specific set up adapted to the original capacities of the computer to emulate, can be granted much bigger power and speed than equipment from their time was capable of – and that the CD-ROM artworks were made for – thus resulting in a technological incoherence, in spite of a seemingly «faster working» result. For these reasons, anticipating the possible impact of the transformations resulting from an emulated environment on the experience of the user nowadays, seemed to us a fundamental issue. Beyond the obvious impossibility of reaching an optimal solution to be applicable on a large scale, the study of this impact and its examples (crashes, artifacting, poor maneuverability) always appeared valuable, for it gives or

reinforces the awareness of its importance into the equation, thus proving the cautiousness it demands when mediating an experience to a future audience.

Another substantial element that comparative tests show is the deep transformation of physical interface devices, tactile (mouse and keyboard) and visual (screens), constituting a serious threat to anticipate for conservation procedures in the upcoming decades. One of the main issues raised by emulation is not related to its inner mechanisms, but to the contemporary physical material it can remain tangibly coherent with: computer forms have considerably changed since the 1990s in terms of physical interfaces, and are on the path to far more massive transformations, thus leaving a worryingly decreasing possibility for an emulated environment to keep means of interacting with the user in the ways the system it restitutes was initially made for. Among many issues this raises, it points out the growing need of reflecting on the conservation of interface objects on their way to a near obsolescence (the mouse, the large solid-keys keyboard) – not mentioning the ones already left behind by the industry (the CRT screen, the mechanical «ball» mouse) –, but also, on the existing means to implement them on newer computers running emulators while it is still possible. Certainly, at last, it questions the consequences of their disappearance on the understanding of typical former popular interactive actions for younger generations of viewers and users in the future. During the protocol of comparative tests, we could for instance experience the already drastic «feel» difference between browsing through a work with an obsolete mechanical ball mouse and with a current optical mouse, suggesting the high scale of interference with the experience of the work that newer mice designs and technologies would possibly have, or even, their hypothetical replacement by trackpads within industry trends.

Conclusion: documentation and means to guide through emulation as a renewed experience

As a result of many of these insights, it seemed to us within the workflow of the LIMA project absolutely essential to place at a central position documentation, in all its forms. This documentation is equally important in two aspects: the material components (physical aspects documentation, through visual means) and the technical specifications (technical aspects documentation, through textual means). We intended to give a major importance to direct access for the viewer or user to this complete documentation, as a necessary accompaniment to the transposed experience of the interactive digital content in an emulated environment. Different levels of required documentation to present next to the emulated artworks were therefore defined, in order to minimize the losses of important aspects, from the original interactive behavior

of the work, which can be documented by video recordings of exploration sessions, to the visual aspect (image ratio, resolution, number of colors), which can be restituted by still captures and textual data. Also we considered relevant the inclusion of a visual documentation of the «primary materiality» of the works, their boxes and packages, and the possible key physical elements in understanding the concept when they exist, via scans and photographs. Lastly, it includes a focus on their «secondary materiality», constituted by the technological context of the CD-ROMs, and illustrated by pictures of typical matching equipment and devices (for instance the display screen technology, CRT screens from the 1990s having a critical impact on the image aspect). The video documentation resulting from captures of the comparative tests between emulated versions and original environments, which we intend to push further and improve technically in the future, is also to be joined to this material and will be kept accessible for researchers as a warning sign of and pedagogical resource for possible reliability issues.



Figure 4. Example of visual documentation for online access to viewers or users: still extracted from a video capture sample of a browsing session through the artwork (on the left), and the artwork shown together with coherent viewing equipment and all its elements (on the right).

At the risk of concluding on an overused statement, preservation is compromise by definition, and if there is one striking characteristic regarding the conservation of early interactive digital artworks such as those carried by the CD-ROM, it is how they compel us, nowadays, to accept this principle. CD-ROM artworks stand on many borders, in between broad-diffusion duplicated objects suggesting systematized archival treatments and single specific objects requiring case-by-case conservation attention; in between the materiality of their physical components and the seeming immateriality of their digital content. As such, they crystallize many of the major issues that digital art conservation has to face with regard to finding a balance between the preservation of *access* and *experience*. During the research we led at LIMA, we tried to maintain this balance as much as possible, by adopting an emulation strategy to offer new viewers and researchers the opportunity to still browse

through these artworks, while finding means to accompany and frame this technologically transposed experience. These means were reflected on in order to ensure the closeness of current user experiences to what we can still know and witness of these works' «look and feel» on computer equipment of the 1990s (here using *closeness* as a term reflective of the impossibility to either ensure an exact similarity or even define an exact reference condition to it), and were orientated towards a structured and extensive documentation, covering various irreplaceable material layers as well as requisite technical information, not only for research purposes, but also, for a potential museum visitors' awareness.

Awareness and public sensitization to the matters we approached here are certainly what could be a valuable last opening. Beyond the implications of emulation where some authenticity and integrity losses become inevitable in the plight for access created on the newer technological equipment of such artworks, the best strategy possible to keep a true understanding of their nature could rely on the way to guide the contemporary visitor through their discovery, to educate him to *see* and *use* these object for what they now truly are: pieces of a history.

References

- [1] The travelling exhibition “The Second”, 1997-2000, and the exhibition “Person to Person”, 1998.
- [2] A report of the research detailing the conservation plan steps and procedure will be communicated this year.
- [3] See for instance the Rhizome project for Theresa Duncan's CD-ROMs online emulation at <http://rhizome.org/editorial/2015/apr/17/theresa-duncan-cd-roms-are-now-playable-online/> [Sept 1, 2016]
- [4] See iMAL's exhibition “Welcome to the Future! The floppy CD-ROM revolution” (March 19 – April 26, 2015).
- [5] Apple has indeed already started removing optical media drives from their computers since 2008 (first MacBook Air), and more systematically since 2011/2012. The company now doesn't propose any computer equipped with an internal one. 2011 is also the first release date of the Chromebook, a type of light laptop since then developed by several companies in collaboration with Google, also unequipped with any disc drive.
- [6] Such as in Florian Thalhofer's *Get Rich Witch Art* (1999), an artistic video game on CD-ROM including physical cards and board game components.
- [7] The early 1990s witnessed indeed the birth of several popular titles of the «point-and-click» genre in graphic adventure games, but mostly, the birth of the historically remarkable title *Myst*, in 1993, marking the beginning of an entire genre of 3D environment exploration games. *Myst* had a significant impact of the sales of CD-ROM drives in the years following its release, and was even acquired by MoMA in 2012.

- [8] The company Adobe acquired them in 2005, discontinuing the development of Director until 2008, in a period of decreasing popularity of this software.
- [9] It is arguable that this part of the software industry history played a role in the late 1990s on the progressive extinction of the interactive CD-ROM trend, with the development by Macromedia in 1998 of the first tool to play on an internet browser multimedia interactive compositions made with *Director*, the *Shockwave* plug-in. The latter took a major importance in the early 2000s when the use of CD-ROM for computer-based creation started decreasing, progressively replaced by website creation, with other well known tools such as *Dreamweaver* and *Flash*, developed by Macromedia for internet interactive animation programming.
- [10] Version 1.0 for Mac OS X on Intel processor Macs, build from 2014-03-01
- [11] Version 2.4.2, build for Intel processor Macs, from 2014
- [12] Even if this content is kept under the form of a disc virtual «clone», the virtual disc image.
- [13] In this regard, see the analysis of the concepts of authenticity and integrity of artworks presented by the DOCAM's conservation guide: <http://www.docam.ca/en/conservation-guide.html> [Sept 1, 2016]
- [14] « *To emulate a work is to devise a way of imitating the original look of the piece by completely different means* », Glossary of the *Variable Media Approach*, 2003, available at <http://www.variablemedia.net/pdf/Permanence.pdf> [Sept 1, 2016]
- [15] The notions of «look and feel», traditionally used in software design, became concepts broadly used in media art conservation since the start of the years 2000s, for instance by the Tate Time-based media department.
- [16] Laurie Anderson's *Puppet Motel* (1994) included indeed a “talking” function allowing the user to input his own audio with a microphone for playback along with selected pieces of Anderson's music.
- [17] Emulation principles first appeared in 1968, but became broadly used only after 1995 with the researches of the company Sun Microsystems, followed by Virtual PC in 1997, and by the first Nintendo NES emulator in 1997.
- [18] See Rothenberg, Jeff (1995). "Ensuring the Longevity of Digital Documents", in *Scientific American*, Jan. 1995.
- [19] In a similar perspective to what the past years have witnessed regarding video game history preservation, with the acquisition of specific hardware in addition to the digital content of the games, for instance at MoMA in 2012-2013.
- [20] The University of Freiburg's EaaS project collaborated for their CD-ROM collection archiving: see <http://bw-fla.uni-freiburg.de/demo-transmediale.html> [Sept 1, 2016]
- [21] In this way, CD-ROM works are closely related to Internet artworks.
- [22] This demonstrate in an interesting way the obsolescence of major concepts of art conservation in the field of digital art, such as Cesare Brandi's notions of «original unity» used in the *Teoria del Restauro* from 1963.
- [23] Rothenberg, Jeff, *An Experiment in Using Emulation to Preserve Digital Publications*, RAND-Europe, 2000.

About the authors

Alexandre Michaan is a media art conservator based in Paris. He graduated in 2014 at Institut national du patrimoine (France), with a research project focused on the conservation of obsolete digital video artworks on DVD-Video carrier. He currently works with LIMA (Amsterdam) on digital art conservation, with C2RMF (Paris) on

conservation of CRT screens in media art installations, and at Centre Pompidou (Paris) on the digitization and conservation of the video collection.

alexandre.michaen@li-ma.nl

alex.michaen@gmail.com

Nina van Doren holds a BA in art history and MA in comparative arts and media studies. Her graduation research focused on the early software based artwork work of the Dutch artist Peter Struycken. She works as a researcher for LIMA and specialized in the documentation and preservation of digital art.

ninavandoren@li-ma.nl

nlv.doren@gmail.com

Vis. [Un]necessary force

Luz María Sánchez

Abstract

Vis [Un]necessary force [*V.(u)nf*] is a socially-engaged art project that explores the theme of violence in contemporary Mexico and its consequences on the daily life of civilian population. At the end of a 3-year period [2015-2018] this project will complete three sound installations and an online repository. Art project uses digital technology [online repository, 3D imaging-printing, programming,] mixed with ethnographic tools: from the fundamental contact-communication-collaboration with participants, to interviews [HD audio + video]. In the online-repository all products of research and by-products of artistic production are being collected. This artistic-project has assistance of scholars, social justice specialists, activists, psychologists, engineers, programmers, and designers.

Keywords

Socially-engaged art, digital, online-repository, collaborative, sound, ethnography.

[on the parts of paper]

We could break *V.(u)nf* into segments in order to explain better how this socially-engaged art project operates: (1) on vis | violence, (2) research and the digital archive-as-artwork, (3) engagement and community work, (4) multidiscipline, (5) the process of art making: the rhythm + content of the repository, (6) technology and reconstruction through 3D-modeling, (7) construction of sound installations, and (8) the interaction: public-artwork.

1| on vis | violence

In light of the tendency to dehumanize those affected by violence and convert them into statistics – while confronting a situation of legal impotency – could reclaiming the experiences of those citizens really assist in constructing an arena for discussion of the state of things? could the inclusion of these citizens in the construction of micro-histories contribute on the attempt to establish new forms of coexistence that counteract the horror scenario of disappearances, torture, and violent death?

I consider the acoustical elements to be those that largely determine the tone of the environments in which the individuals establish their spheres of coexistence. The sound of police sirens or of shoot-outs, the sound of the human voice and its verbal turns, or even the silence after explicit contexts of violence, are all elements containing great emotional power.

But how to understand such a complex theme like contemporary violence, in a country where the figure of the State is breaking apart? In a first linear reading,

we may say that we have witnessed drug cartels infiltrate every layer of life. Or are we looking at the elements of the ‘problem’ with a non-appropriate lens? May it be that the State itself—from its edges to its center—is suffering from a process of continuous and permanent corruption, which makes impossible to navigate reality armed with the lingua of a XXI Century democracy?

Just because many civilians end up surviving—with and around it—does not make the problem disappear. On the contrary, every broken boundary makes the problem harder and harder to be resolved.

The failure of the Mexican State, or the *inferno* as we can call it now, is something Mexico can no longer hide—and when I say Mexico here, I am not referring to its general population already exhausted from decades on “survival mode”, but rather the political and financial elite.

This situation is not new to civilians living outside of Mexico City. Entire communities in the north of Mexico have been abandoning their belongings-jobs-lives, in extremely fast exodus, either to the US or to –still– tranquil states like Yucatán. Thousands of parents are looking for their adult sons and daughters taken by the police or the military or the cartels –which in Mexico either group could be the same– wishing that, in the best-case scenario, they are put to work as slaves either at the drug fields or into prostitution, in the worst-case scenario they [may be in the thousands of mass graves that pollute the country](#), some of them even managed by the legal authorities.

Civilians understood early in this history that any complaint to the police would result in an even worse situation. For years it has been known in the bus industry that a lot of young male and female travelers have been kidnapped to make them join this industry of slaves, and only recently they started to admit it: [tons of luggage at bus terminals on the northern states of Mexico speak for those that went missing](#), and nobody said a word. On the 19 October 2014 a corpse of a went-missing-police-officer’s mother was placed in outside of the Ministry of the Interior’s building: they never pursued an investigation over the disappearance of the young officer, and [the last will of this ailing mother was her coffin to be placed in the street outside of the Ministry of the Interior](#) as a way of extreme protest.

2 | research and the digital archive-as-artwork

Research is one of the main aspects on my art-production process, which brings me to the building of an archive that eventually becomes data that ultimately becomes the artwork.

The first artwork in which the actual research archive became the foundation for the sound-work was [2487](#). Made in 2006, this sound piece records the names of 2,487 of the estimated eight thousand people who have died while trying to cross the US/Mexico border since 1993.



Figure 1. 2487. Installation view. 'Home Land Security'. 2016. Battery Marcus Miller, The Presidio, San Francisco.

“Statistics of death can startle a reader. As tidy yet powerful numeric representations statistics are often used as tools of persuasion, cited routinely by journalists and politicians alike to strengthen or belittle a political objective. [...] Many have argued, quite provocatively, of the gendered and racialized nature of statistics as objective, “hard,” facts” states Ines Casillas

(2011). In her opinion, I use “sound-based art to trouble a statistic brought on by institutional violence on the U.S./Mexico border.” (Casillas 2011)

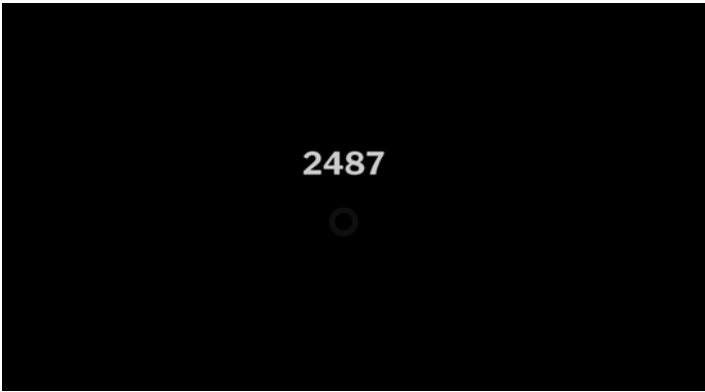


Figure 2. 2487. Home.

[2487](#) is an 8-channel sound installation, in which 2,487 3-second sound files [Aiff format] are played randomly through a Max/MSP patch.

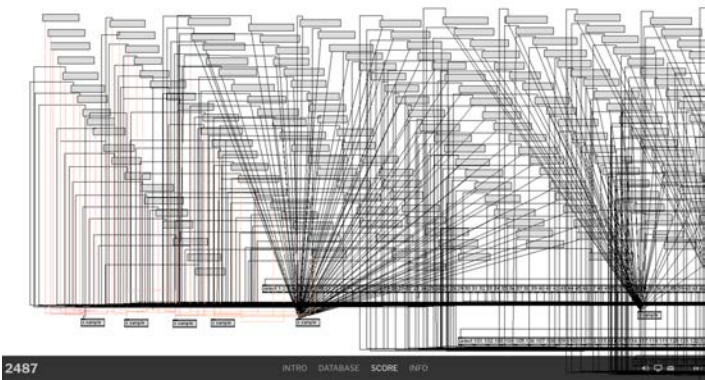


Figure 3. 2487. Score: Max/MSP patch.

Complementing the piece is the actual database with the info of all 2,487 individuals included in the artwork [in the form of a book or as online page].

Image name	Family name	Age	Origin	Sex	Report date	Reason of death	State
Humberto	Abad Cargan						California
Freddie de Jesús	Abad Cano						Texas
Liberato	Abad Cano						Texas
Raul	Abadard Martinez	40	Phoenix	2004	11/07/2004	Hypothermia	Arizona
José Alfonso	Albarran						Arizona
Paula Juarez	Albarran Guerrero						Texas
Carmito	Albarrán Martínez	31	San Luis Potosí	1988	07/08/1988	Drowning	Tamaulipas
Jorge	Albarrán Zambrano	38					Arizona
Clotilde	Albarrán Valencia	25	Estado de México	1989	01/27/1989	Drowning	Tamaulipas
Roberto	Alcázar López						California
Abel	Alonso Díaz						Arizona
Victor	Alonso Díaz						Arizona
Michelle	Alonso González	18	Phoenix	2005	02/18/2005	Hypothermia	Arizona
Matias	Alonso Hernández						Texas
Rosendo	Alonso Muñoz	18	Nuevo León	2005	08/08/2005	Drowning	Tamaulipas
Roberto	Alonso Rodríguez						Texas
José Manuel	Alonso Ruiz						Arizona
Francisco Javier	Alonso Sánchez	36	Phoenix	2004	04/12/2004	Dehydration	Arizona
Edgar	Alonso Salas						California
Edgardo	Alonso Salas						California
Erigo	Alonso Aguilar	26	Salinas	2005	05/05/2005	Drowning	Tamaulipas
José	Alonso Zavala	38	Phoenix	2004	08/20/2004	Multiple blunt force injuries	Arizona
Edmundo	Alvarado Flores						California

Figure 4. 2487. Database.

In 2009 I started working on *detritus* which consists on 15,585 intervened images and its database. Again raw data becomes the artwork. *detritus* explores the way violence is portrayed through news media in Mexico. The excessive amounts of images of violence that are put into circulation by media, permeates into the everyday life and builds the “texture of violence” we live in.



Figure 5. *detritus*. Home.

Research for the visual components of *detritus* included every online edition of two national Mexican Newspapers between the dates December 11, 2006 until November 30, 2012. I selected every piece of news that was related to violence and/or the war on drugs, and that included an image. Each bite of news was then assigned a code and added to a database that also included information from the image such as the accompanying headline, caption, newspaper, credit line, date, url and description.

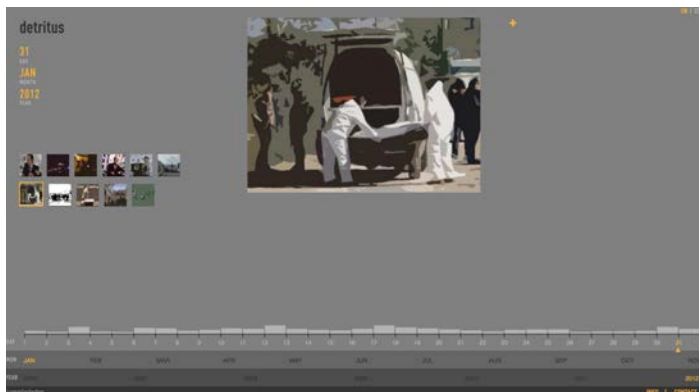


Figure 6. *detritus*.

Research was complete at the end of 2013 with a total of 15,585 data entries and corresponding images. At the exhibition space, each image is projected at two-second intervals onto a large screen. Data visualization is an important part of this project, since it enables the intuitively sift through this massive amount of information.

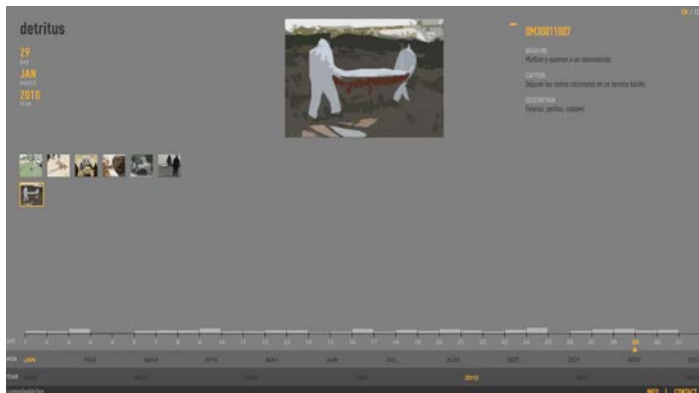


Figure 7. *detritus*.

In 2014 I started working on Vis [Un]necessary force. During the research process of *detritus* I started to explore the question: *how do civilians in Mexico live through the extreme violence in a State that has revealed its own failure?* I located several patterns on how information circulates within spaces of extreme violence where diverse groups [licit or illicit] try to control information as a means for retaining and administering power.

I found that civilians, police forces, drug cartels and journalists alike are uploading videos that registered shoot-outs or cross fires. But each group has a particular agenda which is important to know. Since my target was set since the beginning, I unequivocally decided to concentrate on my original quest: *how do civilians in Mexico live through the extreme violence.*

Civilians mainly upload clips of situations in which they were witnesses. Mainly unedited, this short clips (video and audio) portray their experiences in a situation of explicit violence. These experiences are then shared through online platforms like YouTube.



Figure 8. $V.[U]nf_1$. Sample of original source.

From a larger universe of circulating videos, I downsized my selection to 74. Using only the sound from these recordings, what I needed was hardware as means of reproduction system. I started research on the objects that circulate within the electronic goods downtown Mexico City and I found a type of sound device with two main functions: radio and reproduction of digital sound formats. $V.(u)nf_1$ was completed in 2015. 74 sound clips in mp3 format each playing through 74 sound devices shaped in the form of a Carcal F pistol¹.

¹ CARCAL F pistol, 9x19 mm, 18+1 rounds. Design by Wilhelm Bubits. Made in Abu Dhabi by Carcal International.



Figure 9. V.[U]nf_1. Photo: Cecilia Hurtado.

Visitor has to activate the piece by turning it on: it has to take a sound device from its stand, hold it in his/her hand, and push the on/off button. Each sound device reproduces one sound recording only. Once that is activated, the device makes an automatic loop.



Figure 10. $V.[U]nf_1$. Photo: Cecilia Hurtado.

Each recording has a different duration. The ways in which the piece can be listened to at least two variables that are linked together: (1) the number of sound devices that the visitor will decide to activate and (2) the duration of the loops that will build a different sound patten each time. At the exhibition space I include information on each of the 74 sound files [info taken from the same YouTube user's entry] that matches the mark on each sound device.

Research for *Vis [Un]necessary force* has a steady rhythm. The question *how do civilians in Mexico live through the extreme violence* keeps guiding my work. If $V.(u)nf_1$ approached this question from the video and sound bites that civilians are sharing as a way of communicating with others the situations they are involved in, my quest is taking me out of the Net and more into the real areas of experience: life.

3 | on engagement and community work

$V.(u)nf$ entails creating a body of work that use sound as a creative/critical medium to explore the theme of violence specifically within two groups of civilians: the orphan children resulting from the recent surge in violence and the family-members of missing persons in Mexico.

This project requires the participation of groups of individuals willing to share their experiences living with violence. Violence that is not just implicit but explicit. Symbolic violence. Psychological violence. Extreme physical violence.

In a situation in which everyone could be part of the group that is wounding, to approach individuals living this sort of situations and expect them to verbalize for us such distress, requires the construction of trust. The building of connection. A common ground.

Carefully chosen families are being invited to be part of the project. By carefully I am referring the means of 'selection'. Some of these families are under threat. They do not have any confidence on authorities, neighbors, even other family members. This project in order to work, needs to rests on the 'trust'. These groups of civilians need to have confidence in order to really share this intimate situations of living within extreme violence.

Through storytelling, relatives of missing individuals –parents and children– help on the action of *re-humanizing* them, taking them out from government, ONGs and media data-archives back into the real. I see this socially-engaged art project as a gesture that listens forward, taking those 24,000–and counting–missing-individuals outside of the lists of casualties of violence in Contemporary Mexico.

4 | on multidiscipline

Working with such a complex theme needs the help and advice from professionals that work with these social issues in a regular basis. Even my training in broadcasting media is not enough when dealing with such personal and tragic events.

This is why, artistic production process entailed the conformation of a group of multidisciplinary counselors made of psychologists, social justice experts, and legal-advisors.

Since the important part of the project is to work with shared life experiences, my approach is far from the common interview –a tool used by journalists, police, or even the torturers when requiring information. I need for the groups of people I am working with, to engage on dialogue, on sharing experiences, on building trust, which is what allows me to really involve them in the actual process of art making.

This group facilitates me the direct contact with specific families and individuals, and enables part of the creation process since it provides me with reference marks, sharing previous experiences within the field, helping me on the contact with civilians that are staying for the longer run of the project.

There is another group of advisors that is as important part of the project: programmers, engineers and designers. Programmers help me build the online repository. Engineers and designers will be helping on the 3D scan and printing imaging at the end of 2016 and 2017, helping on the actual production of the first sound installation, the one devoted to document the situation of orphan children.

5 | on the process of art making: the rhythm + content of the repository coco

The project started with the designing of the repository. That is the reason why we chose tool that in which the team could have control since the very first stage of the working process. We envisioned a website that will look amicable and easy to use for both team members, as well as colleagues or visitors alike.



Figure 11. Vis.[Un] necessary force. Front.

Repository is open for contributors, colleagues and advisors, which are able to access the main parts of it: they are able to check on the research being made, advances, *et al.* General public will be able to access to the full repository once the first installation is done and installed in a public space.



Figure 12. *Vis.[Un] necessary force. Repository login*

Once all the three installations are done at the end of 2018, repository will be locked and no more data will be added. Repository will stay open as the documentation part of this socially-engaged art project.

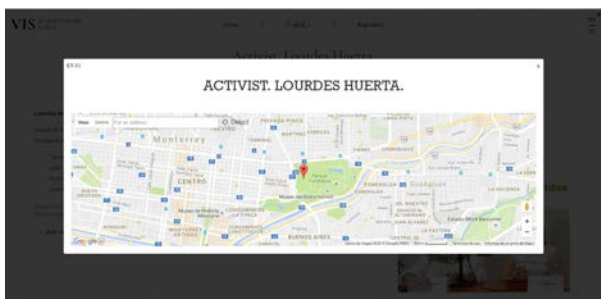
The archive is being assembled at the same time as the project is taking form. That is: interviews that are being made, research that is being done, pictures or videos taken, graphics or maps constructed, are part of the artwork and are being stored directly into repository.



Figure 13. *Vis.[Un] necessary force. Repository articles*

There are several databases that we are working in: directories; data on social workers, scholars, activists, artists, and other people publicly involved in social-justice themes; reading material that has been detected during research and that informs the theme; literary, musical and artistic references.





Figures 14-24. Vis.[Un] necessary force. Repository process of adding info.

As I stated before, research is part of the art-making process; it is the tool that allows me to put all the parts together; and it will also be the complement of the artwork during exhibition time. All the by-products of this research is going directly to online repository.

On the public part of this Repository [front], we are creating a dynamic portfolio to introduce the project online –before first installation is done and open to the public.



Figure 25. *Vis.[Un] necessary force. Repository front.*

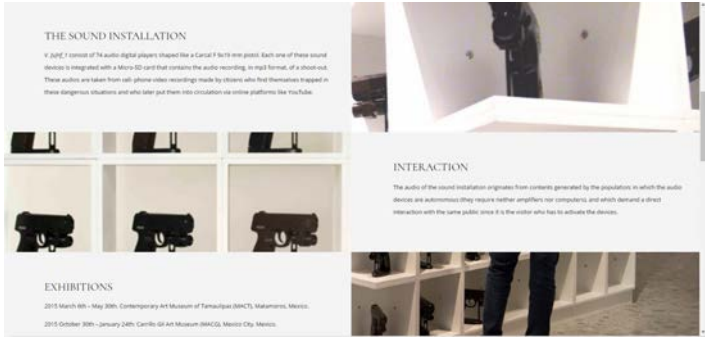


Figure 26. *Vis.[Un] necessary force. Repository front.*

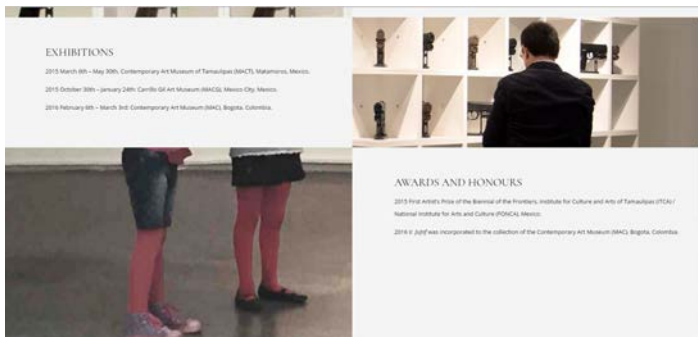


Figure 27. *Vis.[Un] necessary force. Repository front.*

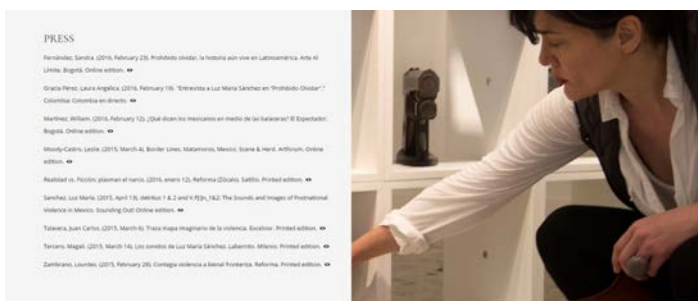


Figure 28. *Vis.[Un] necessary force. Repository front.*

We are building an intuitive work experience on real-time both for back and front. The development of this application is being made with Meteor, a web framework that will assure us a high level of reaction and interaction on real-time. Meteor works with Nodejs, that allows to program in JavaScript on both sides [server and client], and uses MongoDB as database, a very flexible system, optimized for real time applications.

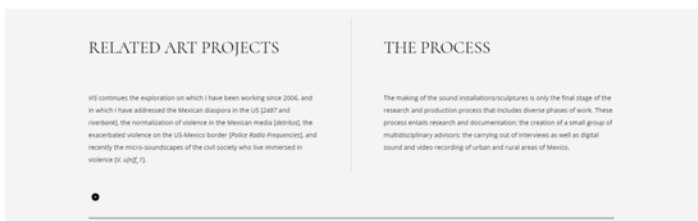


Figure 29. *Vis.[Un] necessary force. Repository front.*

Application is presented on a GNU/Linux server. Webpages are built with HTML5/CSS3/JS, and have a responsive design for any mobile device, based on the framework foundation. All these tools are open source.

This tool enables the team members in different part of the Americas or Europe to add information and to share it on real time. To change and shape the front of website as the project develops. And to use the repository tool to add, store and share data on real time.

6 | on technology and the reconstruction through 3D-modeling

Working with both cutting-edge digital technologies [online-repository, 3D image, geo-localization, digital video/audio/photo,] but using human scale tools [one-on-one dialogue, building trust, listening], I am looking forward to find equilibrium when listening and reconstructing these histories within the net and the three-dimensional space.

Technology facilitates the final shape of the artwork. The online repository works actually as a reference tool while doing the project. It allows team members to build up batches of information that are being gathered during research, visualize them, understand its numbers.

This project, even if is using digital tools to build and communicate, is being made at a human scale. Building research within the repository is a hand-craft. Analyzing data, organizing data, even if using digital tools to visualize it, has to be done on a one-to-one basis. That is the way the project is calling it for.

I am exploring the possibilities offered by 3D scanning and printing, with the aim of developing functional sound devices that depart from commercial design and enable me to adapt sculptural elements to the requirements of the sound installations.

Children will be asked to draw pictures of their histories and interviews with families of those missing will be made, family members will be asked to “sit-in” and pose in the place of the missing person which will give shape to the 3D ceramic printings.

After recording of interviews/testimonials and 3D scans are made, 3D printed ceramic objects with integrated audio-reproduction systems will be developed as sculptural elements to present on the exhibition space as part of the installation.

7 | on the construction of sound installations²

Vis [Un]necessary force involves the production of three large-scale sound installations that explore the social dynamics provoked by drug violence upon the civilian population in Mexico. As it was stated above, the first sound-installation of the 3 that conforms this project is already completed: $V.(u)nf\_1$.

In this second construction, $V.(u)nf\_2$, drawings of children portraying their histories will be used as starting point to do 3D ceramic sculptures which will integrate audio-reproduction systems to develop them as sound sculptural elements to present on the exhibition space as part of the installation.

Third and last sound installation $V.(u)nf\_3$ will consist on custom-made ceramic-sound devices/megaphones in the shape of fragments of human heads/faces –molded after living family members of civilians that are still on the “missing” lists, maybe kidnapped and/or killed by police, the military or drug cartels.

In order to make an archive that includes each family’s data, I am collaborating with organizations that assist civilians on finding their relatives. To develop the sound element –a thick stratum of noise– I will digitally modify a multiple-layered-construction of sounds after the stored data.

Custom-made ceramic-objects/megaphones will be resting on the floor; in order to cross the exhibition-space, visitors will have to carefully move these 3D-ceramic-portraits, each one representing an fragmented individual.

8 | on the interaction: public-artwork

For the participants it is important to be heard, listened to. Their histories, sometimes hidden as something illegal – family members of victims deal with a double victimization –, are important. For the public that eventually will interact with art work, it is important to know the histories of those who live in a state of emergency due to the exacerbated violence exercised by distinct groups of power -legitimate and illegitimate- in precise areas of Mexico.

References

Casillas, D. Ines. ‘Listening to the Border: “2487”: Giving Voice in Diaspora” and the Sound Art of Luz María Sánchez’. *Sounding Out*. July 4, 2011. URL:

² Production process of sound installation will begin Winter 2016/2017.

<https://soundstudiesblog.com/2011/07/04/listening-to-the-border-2487-giving-voice-in-diaspora-and-the-sound-art-of-luz-maria-sanchez/> August 30, 2016.

Martínez, Paris. 'Velan frente a Segob a madre de policía desaparecido'. Animal Político. October 17, 2014. URL: <http://www.animalpolitico.com/2014/10/velan-frente-segob-madre-de-policia-desaparecido/> August 30, 2016.

Sánchez, Luz María. 2487. 2006/2016. 2,487 3" aiff sounds, Max/MSP patch object, database, score. URL: <http://www.diaspora2487.org> August 30, 2016.

---, Luz María. *detritus*. 2015. 15,585 intervened images, database. URL: <http://www.detritus.mx> August 30, 2016.

---, Luz María. *Vis. [Un]necessary force*. URL: <http://www.vis-unnecessaryforce.org> August 30, 2016.

---, Luz María. 'detritus 1&2 and V.F(i)n_1&2: The Sounds and Images of Postnational Violence in Mexico'. Sounding Out! April 13, 2015. ISSN 2333-0309. URL: <https://soundstudiesblog.com/2015/04/13/detritus/> August 30, 2016.

Miroff, Nick. 'Mexico finds mass graves with 28 bodies where students went missing2'. The Washington Post. October 6, 2014. https://www.washingtonpost.com/world/the_americas/mexico-finds-mass-graves-with-28-bodies-where-students-went-missing/2014/10/06/009b049f-a59d-482d-bd4c-3a10cbef0fe6_story.html August 30, 2016.

Turati, Marcela. 'La descomposición nacional'. Ágora Global. April 18, 2011. URL: <http://agoraglobal.wordpress.com/2011/04/18/la-descomposicion-nacional/> August 30, 2016.

About the author

Dr. Luz María Sánchez Cardona

Arts Member of the National System of Art Creators in Mexico (2015-2018).

Chair of the Arts and Humanities Department

Universidad Autónoma Metropolitana [Lerma], Mexico

l.sanchez@correo.ler.uam.mx

Her work has been included in major sound and music festivals as well as museums and galleries in the Americas and Europe. She has produced sound work for Palacio de Bellas Artes (2006) and the National Library/Cuidadela Building (2013) both in Mexico City. Currently she is working on a socially-engaged art project for the Land Heritage Institute in South Texas and her sound-installation *2487* is on exhibition at the Battery Marcus Miller at The Presidio, in San Francisco. Her book *Electronic Samuel Beckett : Cochlear Samuel Beckett* will be published by UAM in 2016.

Composing the future

Melanie Hundley & Teri Holbrook

Abstract

Tasked with a crucial and complex challenge—the cultivation of tomorrow’s writers and digital composers, Language arts and literacy teachers cannot ignore the digital shift that is altering conceptions of text or the interactive and multimodal products that require new ways of conceptualizing, judging, and producing texts. Digital composers, part of a global, participatory culture, must be able to analyze and compose multimodal, semiotic texts. The role of mentor texts in teaching writing and digital composing is a vital one. Writers and composers learn by playing with text, image, sound, and animation; they learn to experiment by examining other texts closely and carefully. Familiar tools for teaching writing can be adapted to meet help mentor the next generation of writers and composers; however, the challenges of digital materiality must be addressed.

Keywords

Digital mentor texts, digital writing pedagogy, digital composing, digital textual materiality

1. Introduction

American educational philosopher John Dewey (1916) argued, “If we teach today as we taught yesterday, then we rob our children of tomorrow (p. 167). This idea that teachers must adapt both *how* and *what* they teach to prepare students for the future is touted by progressive educators and by educators steeped in the world of technology. Language arts and literacy teachers are tasked with a crucial and complex challenge—the cultivation of tomorrow’s writers and artists, now defined as digital composers. No longer limited to thinking of their students as potential print writers, language arts teachers are increasingly encouraged to conceptualize the young people in their classrooms as 21st century communicators who think and compose multimodally; who create semiotic digital texts that combine images, print, and sounds; and who participate as text producers, consumers, and prosumers (see Jenkins, 2008) in interactive social media spaces.

The pull for teachers to make this shift is two fold: 1) the out-of-school social practices in which students already engage and 2) the public discourse that surrounds the need for citizens who can flourish in a globalized, digitalized economy. As active members of a “participatory culture” (Jenkins, H., Purushotma, R., Weigel, M., Clinton, K. & Robison, A.J, 2009), adolescents routinely read, create, remix, and circulate digital texts as part of their everyday lives. Thus, students come to classrooms already operating as artistic communicators, creative and journalistic writers, and audio mixers. As countries undergo the impact of globalization and the equalizing forces—or ‘flattening’ (Friedman, 2007)—that accompany it, businesses and policy

makers turn to schools to prepare future workers who can adapt to and be productive within new economic contexts.

The shift in communication technologies and accompanying policy concerns puts pressure on classroom literacy teachers and the university educators responsible for their preparation and credentialing. The emergence of electronic media and literature does not mean the demise of traditional print literacy. As Hayles (2004) wrote, noting the robustness of print-based texts, “Books are not going the way of the dinosaur but the way of the human, changing as we change...” However, it does create tension in classrooms where teachers are expected to cultivate future writers who are adept as readers and composers of both print and digital media. Working in educational settings that are measured by practices reflective of print technology (i.e., standardized tests, essays, informational text production), literacy teachers wrestle with how to create learning opportunities for students who are expected to emulate the practices of print essayists as well as transmedia authors.

In this short paper, we briefly outline some of the concepts at play in this time of literacy tension. We will discuss how textual materiality puts stress upon traditional understandings of writing pedagogy, including the concept of mentor texts. Then we will describe how one digital text—*Inanimate Alice*—can be used to demonstrate writing pedagogy that addresses both print and digital composing. Finally, we will conclude with implications and future directions for educators. A note: In this paper, we use the terms writer/writing and composer/composing interchangeably.

2. Textual materiality in the digital age

Hayles (2004) posited textual materiality as “a dynamic quality that emerges from the interplay between the text as a physical artifact, its conceptual content, and the interpretive activities of readers and writers.” She argued, therefore, that textual materiality is not a fixed presence but instead a complex interaction that recombines composer, product, and audience into contingent assemblages, relations that are performed differently in print and electronic media.

As teachers take up the challenge of reconceptualizing textual materiality from a flat construct to one that embodies and performs, they must also take up the challenge of what this shift means to conceptions of reading and writing. Deeply embedded in reading and writing pedagogy is the print-centric framework of text as fixed and permanent, in which the medium might change but the content remains the same. However, lost is the understanding that print formats such as the book is “after all an interface with its own presuppositions,

assumptions, and configurations of the reader” (Hayles, quoted in Gitelman, 2002, p. 8). When digital coding, mode, performance, and interplay become part of the conversation, literacy teachers must open up their working notions of text, writing, and reading. For example, early hypertext scholars argued that hypertext would “enable us to think otherwise about the explicit propositional form of chained argument, which seeks to close down positions and to subsume the voices of others in order to effect singularity and closure” (Morgan, 2000, p. 139). If the textual materiality of print embodies stability, proposition, and conclusion, hypertext embodies its own qualities and writing resources: dynamic images, mutability, navigable spaces, and distributed cognitive environments, among others (Hayles, 2004).

Understanding that all media have a materiality that proffer certain creative resources challenges teachers to rethink and expand how they teach writing. Conventional print-centric “tricks of the trade” developed by previous generations will not necessarily serve educators well in the digital age and may need reconceptualizing. Such concepts as close reading, audience, product, fixity, and analysis change when considered across print and digital media. In the next section, we take up one concept—mentor text—and describe how it operates in print and digital environments.

3. Mentor text as writer’s tool

The concept of mentor texts is well established in literacy research. According to Chase (2008), while the term itself may be relatively recent, the use of literature as exemplars for the teaching of writing has been actively advocated by educators and literary researchers for decades (e.g., Calkins (1986/1994; Graves, 1994; Murray, 2004). The notion of mentor texts reflects what Murray called “a curious reaction” on the part of writers. (p. 87). “When we read something that is far better than we could do we should be discouraged,” he wrote. “Instead, we’re usually inspired. It’s...a matter of getting into the game, participating in the writing process” (p. 87).

To “get into” the writing process, literacy teachers have long selected text examples—newspaper articles, children’s books, poems, research reports—to teach the structures, strategies, and techniques of alphabetic writing. These texts are frequently chosen because they can support writers as they “learn how to do what they may not yet be able to do on their own” (Dorfman & Cappelli, 2007, pp. 2-3). The use of mentor texts require teachers and students to “zoom in and out,” (Anderson, 2006), focusing intently on a single facet of the written piece, such as punctuation or word choice, and then zooming out to view the

piece as a whole. It is this zooming in and zooming out, Anderson claims, that moves student writers towards employing writing techniques in their own work.

4. Digital mentor text: An exemplar

The use of mentor texts needs reconceptualization if they are to be support students as digital composers. The question facing literacy teachers now is, if mentor texts are vital to the teaching of conventional alphabetic writing, what does that concept look like when it comes to teaching students how to create digital texts? If print-based texts (e.g., news articles and literary essays) can serve as mentor texts to teach print constructs such as prepositional phrases, adjectives, paragraphs, etc., what material elements of digital texts can be examined that can support students to become digital composers?

Here we demonstrate how *Inanimate Alice* (2011), an online serial novel by Kate Pullinger and Chris Joseph (<http://www.inanimatealice.com/>), can be used as a digital mentor text. The seemingly simple story of a young girl growing up in different countries, *Inanimate Alice* is a complex, multimodal mentor for teachers and students to consider how text, color, image, sound, animation, and interactivity work together to create a narrative. Because these elements are combined in the story-making process, discussions around the piece as a mentor text must include *how* these modes work and *what effects* they create.

Inanimate Alice begins when Alice is young; the slide design and narrative grow in complexity as the first person narrator ages. The story, divided into episodes instead of chapters, opens with in China. Screen One in Episode One orients the reader, providing directions on how to navigate the text. The black background with white lettering is the first visual clue that this text will differ from print text; the artistic choice to use white text on black reverses usual print conventions of black text on white. From the first slide, then, this mentor text demonstrates how in digital composition, color becomes a tool in students' composing repertoire.

After the first navigation screen, the next two screens of Episode One provide three key pieces of information: the main character's name, age (8), and that her father is missing. As narrator, Alice addresses the reader directly in short written sentences. However, rather than staying static, the words flicker, and a jagged, buzzing sound fades in and out. While the reader understands that a missing father is a scary thing, the flickering text and fluctuating sound suggest an additional dimension of anxiety and fear. These effects create a level of disorientation that the text alone does not. The interplay of these modes create the story. As teachers and students analyze and understand the use of color,

text, and animation on the screen as artistic choices, they see how subtle changes in the design of screens or placement of text can inform mood, tone, atmosphere, and characterization.

As the narrative continues, moving images and complex sound effects develop the story's mood and tone and offer information that Alice, as a child, may not be aware of. For example, Screen 6, which provides Alice's specific location, is divided in half. On the right side of the screen, white text on a black background states, "Mum and I stay at base camp." The left side is a layered image. The bottom segment is a photograph of mountains and a yurt. The next layer is an architectural drawing of the yurt. The final layer is a yellow sticky note with "my house" in Alice's juvenile handwriting. The combination of images shows how remote the location is, what the architectural structure looks like, and how Alice feels about the location. Alice calls the site "base camp" and "house," revealing both its remoteness but also how safe she feels there. Text and images work together to juxtapose understandings of base camp. As a mentor text, this screen demonstrates how layering an image and pairing it with text can provide needed information (setting, description, characterization) while also creating tension by contrasting emotional interpretations. Base camp is a yurt in the mountains where John, Alice's father is based; home is the yurt where Alice lives. The mountain vista in the background and the way the yurt seems perched close to the edge provides visual tension.

In several of the screens, Pullinger and Joseph play with time and pacing. Ming, Alice's mother, is an abstract artist. Screen 7 is split with the left representing a blank canvas and the right presenting a black background for white written words. As the reader watches, the words, which describe Ming as a painter, flicker, but on the canvas side of the screen, colors manipulated to resemble paint layer onto the canvas. The longer the reader watches, the more paint appears. The flickering words stay the same, but paintings wipe away and new paintings begin. This animation plays with the reader's understanding of time and pacing; normally, a reader finishes the text and moves on, but this screen invites the reader to stay, watch, and feel part of the artworks' creation.

This slowing down of the story's pacing provides a certain calm sense to Alice's life. However, it contrasts with companion images on Screen 4, in which the screen, split horizontally this time, offers a series of three animated images of rapidly moving vehicles, all appearing simultaneously. These images, which convey a frenetic pace, are paired with Alice's description of her father's work, which the reader can take as fast-paced, mysterious, and perhaps a little dangerous. The contrast provides readers (and, therefore, writers) with a different way of thinking about how to pace the story. The rapid timing of the

vehicle animations and the slower timing of the painting segment present pacing as a powerful tool in the digital composer's repertoire.

As a mentor text, then, *Inanimate Alice* can be analyzed in ways similar to more familiar print texts. A screen-by-screen analysis allows for close reading, for the breaking down of the whole into small parts, and for the recognition of how these parts work together to create a powerful story. The narrative does not exist in the words only or only in the images, sounds, or animations, but rather in the interplay. By examining how these elements work together, teachers can begin to understand how to use the story as a digital mentor for student writers.

5. Implications for educators

Hayles (2004) pointed out that an examination of copyright law history reveals an underlying assumption about the immateriality of print texts. Through discourse and litigation, literary texts have been repeatedly held as “intellectual construction[s] that owed nothing to the medium in which [they were] embodied” (p. 70). Literary texts as intellectual property escaped the physical medium and existed as immaterial and unique expressions: in other words, disembodied. This persistence, claimed Hayles, “makes it difficult to understand the significance of importing print texts into electronic environments...[and] impedes the development of theoretical frameworks capable of understanding electronic literature as media-specific practices that require new modes of analysis and criticism” (p. 71).

As demonstrated above, for teachers to conceptualize a digital text like *Inanimate Alice* as a mentor for student writers, they must examine and understand its materiality. The specific composition elements Pullinger and Joseph employ to tell the story—print, color, animation, sound, interactivity—can only exist in the way they do if the text is digital. The individual screens can be printed out, but once produced on paper, the story experience becomes something else. The flickering words and jagged sound—eliciting anxiety—are lost. The juxtapositions of pacing—depicting both setting and characterization—are gone. Fixed on paper, *Inanimate Alice* becomes a mentor for a different kind of composing, one of stable words and images that owes its heritage to the printing press rather than the computer.

Understanding its materiality, on the other hand, allows teachers to undertake a different kind of zooming in and zooming out (Anderson, 2006) and to offer students a mentor to support their digital composing practices. Zooming in, students can see how animating words contribute to a text's mood of a text and a character's personality. Zooming out, students can see that layering images

can slow or speed up the pace of a story and affect the reader's navigation of the text as a whole. Indeed, zooming out even further, students can be challenged to question how cyberspace disrupts the very notion of a text's beginning, middle, and end, suggesting, as Morgan (2000) did, that there are other options besides "singularity and closure" (p. 139).

While understanding textual materiality is crucial for teachers charged with supporting students as digital composers, that materiality presents pragmatic challenges to educators who wish to move from print-based texts to digital ones. Beyond the availability and familiarity of print-based texts is the question of ease of use. For example, to use a children's book as a mentor text, teachers just need to reach up to their bookshelf and take it down. Unless lost and falling apart, it will be there, unchanged, working properly for decades. Digital texts are less reliable. URLs can break, texts can be deleted, and even if a teacher has legally downloaded a copy for classroom use, she must intentionally tend to the text with each computer or software upgrade. There is also the issue of computer compatibility; as computer labs are updated, with new school software installed and old software uninstalled, teachers may find older digital texts no longer accessible. In other words, digital mentor texts take effort.

The question of archivability also comes into play. Hayles (2004) raised this concern, noting that any given digital text will be "unplayable" within a decade of its creation. She asks, "How will we achieve the depth, breadth, and quality of the print archive—a treasure store without which the practice of literature would be unthinkable?" (p. 4). Indeed, as teachers develop their own knowledge and respect for digital and electronic literature, the difficulty of accessing rich archives where they can explore and test out potential mentor texts constrains their own ability as digital readers. Eisner (2002) offered the notion of connoisseurship as the private "art of appreciation" whereby one deeply attends to a topic or practice, informed by substantive experience (p. 57). The availability of digital text archives impinges on teachers' ability to become connoisseurs of digital literature; without ready access to archives of rich digital texts, their own growth as informed and enthusiastic readers is stymied.

6. Conclusion

The role of mentor texts in teaching writing and digital composing is a vital one. Writers and composers learn by playing with text, image, sound, and animation; they learn to experiment by examining other texts closely and carefully. As a tool to help writers, the mentor text is unmatched. Among the challenges for teachers and those who prepare them is the need to reexamine

the expectations of print tied to current understandings of mentor texts. As teachers, we cannot expect permanent, fixed, archivable texts that we can return to year after year, decade after decade. We should be prepared to maintain digital texts as we can but also be prepared for digital texts to be ephemeral, disappearing with the swipe of a mouse or the click of a keyboard. Indeed, the ephemerality of text might even become part of the composing process itself, a shift in thinking where writers no longer expect the permanence of their work but instead embrace its temporality. In this way, composing is seen as always already a performance. This challenge is daunting, as it is not just academic but cultural as well.

References

- Anderson, J. (2006). Zooming in and zooming out: Putting grammar in context into context. *English Journal*, 95(5), 28-34.
- Calkins, L.M. (1994). *The art of teaching writing*. Portsmouth, NH: Heinemann. Originally published in 1986.
- Chase, M. (2008). The warp and the weft: Using mentor texts to weave together reading, science, writing, and art. *Journal of Children's Literature*, 34(2), 60-67.
- Dewey, J. (1916). *Democracy and education*. New York: The Free Press.
- Dorfman, L.R. & Cappelli, R. (2007). *Mentor texts: Teaching writing through children's literature*, K-6. Portland, ME: Stenhouse Publishers.
- Eisner, E.W. (2002). *The arts and the creation of mind*. New Haven, CT: Yale University Press.
- Friedman, T.L. (2007). *The world is flat: A brief history of the 21st century, further updated and expanded*. New York: Picador.
- Gitelman, L. (2002). "Materiality has always been in play": An interview with N. Katherine Hayles. *Iowa Journal of Cultural Studies*, 2, 1-9.
- Graves, D. H. (1994). *A fresh look at writing*. Portsmouth, NH: Heinemann.
- Hayles, N.K. (2004). Print is flat, code is deep: The importance of media-specific analysis. *Poetics Today*, 24(1), 67-90.
- Jenkins, H. (2008). The moral economy of Web 2.0 (Part Two). Retrieved from http://henryjenkins.org/2008/03/the_moral_economy_of_web_20_pa_1.html
- Jenkins, H., Purushotma, R., Weigel, M., Clinton, K. & Robison, A.J. (2009). *Confronting the challenges of participatory culture: Media education for the 21st century*. Cambridge, MA: The MIT Press. Retrieved from https://mitpress.mit.edu/sites/default/files/titles/free_download/9780262513623_Confronting_the_Challenges.pdf
- Morgan, W. (2000). Electronic tools for dismantling the master's house: Poststructuralist feminist research and hypertext poetics. In E.A. St. Pierre & W. S. Pillow (Eds.), *Working the ruins: Feminist poststructural theory and methods in education* (pp. 130-149). New York: Routledge.
- Murray, D. M. (2009). Teach writing as a process, not a product. In T. Newkirk & L.C. Miller (Eds.), *The essential Don Murray: Lessons from America's greatest writing teacher* (pp. 1-5). Portsmouth, NH: Boynton/Cook Publishers. (Originally published in 1972.)
- Murray, D.M. (2004). *A writer teaches writing*. Rev. 2nd ed. Boston: Heinle.

Pullinger, K. & Joseph, C. (2011). *Inanimate Alice*. Retrieved from <http://www.inanimatealice.com/>

About the authors

Melanie Hundley is an associate professor of literacy and language at Vanderbilt University in Nashville, Tennessee, USA. Her work looks at how pre-service and in-service teachers adapt and change their writing processes as they create digital and multimodal compositions. Her work examines how the disruption of print-based conceptions of text reframes writing pedagogy in the work of pre-service and in-service teachers.

Teri Holbrook is an associate professor of literacy and language arts at Georgia State University in Atlanta, Georgia, USA. Her work looks at how arts-infused and digital composition alters and upsets notions of literary and academic writing, qualitative inquiry, and literacy education. tholbrook@gsu.edu

Memory's death... or the desire of immortality

Ricardo Dal Farra

Abstract

Who tells history? We can find multiple versions about the computer art history, most of them with subtle differences, but it has been unusual -until recently- to find references pointing to countries out of a small group from Europe and North America. Several projects have been developed to change that situation. The Latin American Electroacoustic Music Collection, hosted by The Daniel Langlois Foundation for Art, Science and Technology, represents an example of the relevant role and the impact that the archival of electronic artworks and its public access can play in having another perspective about history.

Keywords

Latin America, archiving, computer art preservation, electroacoustic music history, cultural decentralization

1. Introduction

The journey from the cultural memory and the ethical concerns to the practical strategies on preservation and the impact of disseminating knowledge generated by computer art has been navigating a sinuous road.

Memory's death could benefit some as much as the desire for immortality could block the way to innovation open naturally to new generations. Computer art memory has been partially dead, or perhaps deaf or blind or simply looking to the other side, maybe to avoid the perception that the so-called digital revolution has reached most of the known world and that history does not happen only in a few "central" countries. The desire of immortality and for being a cultural lighthouse as much as the guardian of the right values and the significant art should not take us all to mislead that intelligence and sensibility belongs to a few.

Who tells history? Who knows about it or who has the opportunity to do it? We can find multiple versions about the computer art history, most of them with subtle differences, but it has been unusual -until recently- to find references pointing to countries out of a small group from Europe and North America. Inequalities have always existed and if we want to see a change, probably we will need to work hard ourselves to produce new results. There are many lost and hidden stories about computer art that probably should be part of the official history and not just left aside. There have been people, ideas and concepts, artworks, discoveries and inventions, and we expect someone will take care of keeping the memory of all that for us but sometimes it simply doesn't happen and when we look around after a while, it seems that the

history has not been the one we thought it was and we remember, but a different one that is being told by others.

Between the obsession for archiving everything and the difficulty and strong responsibility of deciding what to preserve, the opportunity to archive computer art makes us face a challenge involving from technical issues to political, social, cultural and economical aspects.

How many histories can be told about the same subject? To who their narrative is directed? I have heard some educated young people saying that “if something is not on the Internet, does not exist”. Then, today the digital divide could be not linked to who has access to the web but to who dominates the inclusion of content or develop the strategies to keep our attention on certain places and not others. It looks like we are bombarded with cues guiding us to consider that the art conceived by some cultures are the only ones to be recognized as valid.

The Daniel Langlois Foundation for Art, Science and Technology [1] in Montreal has been a leading organization heavily focused on studying theoretical aspects related to preserving electronic and computer art and actually archiving it. A number of major projects have been developed or hosted there since the late 90s, including the Steina and Woody Vasulka Fonds, the 9 Evenings: Theatre and Engineering Fonds, the Collection of Documents Published by E.A.T. and the Latin American Electroacoustic Music Collection [2], among many others.

2. Music and technology innovation in Latin America

The political and economic instability in most Latin American countries has been deeply affecting the life of its inhabitants for decades. Support for artistic activities has usually been postponed to solve urgent social problems. In spite of that, the development in the region of the electronic arts in general and the electroacoustic music in particular, is really astounding. To name but a few examples: Mauricio Kagel (Argentina, 1931 - Germany, 2008) composed eight electroacoustic studies in Argentina between 1950 and 1953, according to Hugh Davies' International Electronic Music Catalog published in 1968 [3]. Kagel was one the pioneer composers that were laying the foundations of a rich history of experimentation and creation in the region. Reginaldo Carvalho and Jorge Antunes in Brazil, León Schidlowsky and Juan Amenabar in Chile, Joaquín Orellana in Guatemala and Horacio Vaggione in Argentina are only some of the many names in the ocean of electroacoustic music creativity that has always been Latin America.

José Vicente Asuar composed between 1958 and 1959 in Chile his piece *Variaciones Espectrales* using only electronic sound sources. The *Estudio de Fonología Musical* was created in the University of Buenos Aires of Argentina by Francisco Kröpfl and Fausto Maranca at the end of 1958. During those same years and also in Argentina, César Franchisena was also experimenting with electronic sound sources at the National University of Córdoba radio station and composed *Numancia*, a ballet music on tape, in 1960. A landmark in the electronic music history of Latin America was the lab created in Buenos Aires during 1963 at the Centro Latinoamericano de Altos Estudios Musicales - CLAEM of the Instituto Torcuato Di Tella (the Electronic Music Laboratory was part of the Latin American Higher Studies Musical Center of the Torcuato Di Tella Institute). Peruvian composer César Bolaños created *Intensidad y Altura*, the first piece for tape produced at that lab, in 1964.



Figure 1. The CLAEM Electronic Music Laboratory, 1964.

In Cuba, Juan Blanco composed *Música para danza* for tape in 1961 and *Texturas* for orchestra and tape between 1963 and 1964. Blanco composed around a hundred works using electroacoustic media, including music for mass public events and large venues, like the five-tracks 1968 tape piece *Ambientación Sonora*, played during 30 nights along La Rampa Avenue in Havana. Carlos Jiménez Mabarak composed in Mexico *El paraíso de los ahogados*, a piece on tape, in 1960.

Also in 1960, engineer Raúl Pavón built the prototype of a small electronic musical instrument featuring an oscillator with multiple waveform outputs, a white noise generator, a variety of filters, an envelope generator and a keyboard. Named *Omnifón* by Pavón, his creation was among the firsts voltage-controlled electronic sound synthesizers. Well before that, in the early 40s, the

aforementioned composer Juan Blanco designed an innovative electronic instrument similar in concept to the Mellotron. His Multiorgan was based on 12 loops using magnetophonic wires. It predated the Mellotron -that is considered the predecessor of the digital sampler, the instrument that changed the way of doing music- by several years. Fernando von Reichenbach invented in Argentina the Analog Graphic Converter in the 60s (also known as: Catalina). It was used to transform graphic scores -from pencil drawings done on a paper roll- into electronic control signals adapted to work with analog sound equipment. José Vicente Asuar produced in Chile a hybrid analog-digital computer system in the mid 70s, exclusively devoted to create music.



Figure 2. The Analog Graphic Converter developed by Fernando von Reichenbach at CLAEM during the late 60s.



Figure 3. The Electronic Music Lab at CLAEM during the late 60s, after Fernando von Reichenbach redesigned it. 2005 © The Daniel Langlois Foundation for Art, Science, and Technology.

Reichenbach redesigned CLAEM's Electronic Music Lab and invented several devices, such as the keyboard-controlled polyphonic third/octave and octave filter and a touch-controlled patch-bay that helped composers to simplify some

cumbersome processes in the studio. Today, Reichenbach's inventions are starting to be internationally recognized.

2.1 The Latin American Electroacoustic Music Collection

Unavailability of musical recordings, bibliography and almost any basic reference to the electroacoustic music activities that were developed since the early 1950s in several Latin American countries was commonplace when I started to work on the field around the mid-1970s. That situation did not change much during several decades.

In various Latin American countries, universities, state organizations and major private foundations have taken initiatives to support art research and the use of new media already in the early 60s, but most have stopped before developing the resources to document their processes and preserve the results. Many early tape compositions, for example, have been lost or the master recordings damaged.

The Latin American Electroacoustic Music Collection, with over 1,700 digital recordings [4] of compositions by almost 400 composers, and accompanied by photographs, scores, interviews, a trilingual historical essay [5] and over 200,000 words in its database, represents an example of the relevant role that the archival of artworks and its public access can play in having another perspective about history. This is today a key resource in the field, being consulted extensively by people from around the world each month (e.g. researchers, composers, performers, musicologists, historians, artists and the general public) and helping to transform the usual perception of "ownership" that exists related to some countries with respect to the computer art history.

The archive it includes compositions for fixed media (tape, DAT, CD, HD or similar) as well as mixed works for acoustic instruments or voices and fixed media or live electronics/interactive systems. There are also some multimedia works in the database. In the case of pieces for fixed media and other sound sources (e.g. mixed works), full recordings as well as "tape only" parts (i.e. fixed media) are preserved and catalogued. The archive also includes audio and audiovisual recordings of interviews [6] to composers and technical innovators (e.g. Alberto Villalpando from Bolivia, Manuel Enriquez from Mexico, Alfredo del Mónaco from Venezuela) as well as photographs, videos and some scores (e.g. by Alcides Lanza from Argentina, Javier Alvarez from Mexico, Milton Estevez from Ecuador).

From a technical perspective, the archiving of audio material went through a myriad problems: recovering from massive hard disk crashes, finding analog tape recorders with old track formats, re-digitizing material to correct severe DC offsets in brand-new equipment, computer operating systems and FireWire conflicts, etc. Defining how best to work with very noisy old recordings was another challenge (a few pieces were processed using an advanced de-noise system to moderate hiss, always preserving the original recording and following the composer's advice). The bulk of the process was done between 2003 and 2005 at the Langlois Foundation, working with three different computers and nine hard disks to manage the audio and visual files, the database and the large amount of info as well as the daily international communications.

Worth mentioning that while the recording quality of some music stored on old analog tape could have suffered through the years, digital technologies for recording storage were the ones presenting the most difficult challenges. For example, some DATs (Digital Audio Tapes) lost part of their recordings and only a loud digital noise was in place of the music. In those cases the problem was not only a poor quality (e.g. because of hiss or the loss of high frequencies) but a complete lack of the recorded signal, without any possibility to recover the original material.

There are 1,723 compositions preserved as digital audio -with CD quality- in the database. While all is available for listening to researchers who ask for an access code (to avoid copyright infringement) contacting the Langlois Foundation, 558 works from those are freely available and can be listened to by the general public online. The database has also over 200,000 words in information, and there are multiple ways to find the information in there. The digital audio recording of a composition can be found by its title, the name of the composer, the country linked to that composer, the year or decade when the work was composed, etc. In addition, there are two playlists to access and listen to the compositions: one sorted alphabetically by the last name of the composer [7], the other sorted chronologically, following the year the piece was composed [8]. Instrumentation, programme notes, production studio, version, composer's bio and more have been also included for each work when the information was available. Part of that comes from two previous reports I wrote commissioned by UNESCO, between 2002 and 2003: *Historical Aspects of Electroacoustic Music in Latin America: From Pioneering to Present Days* [9] and *La música electroacústica en América Latina* [10]. They were published online and are available through the UNESCO's Digi-Arts knowledge portal. These texts include references to hundreds of composers who were born or pursued a portion of their professional careers in Latin America: 191 from Argentina; 14 from Bolivia; 90 from Brazil; 39 from Chile; 39 from Colombia; 5

from Costa Rica; 44 from Cuba; 3 from the Dominican Republic; 11 from Ecuador; 5 from El Salvador; 6 from Guatemala; 73 from Mexico; 3 from Panama; 4 from Paraguay; 15 from Peru; 12 from Puerto Rico; 27 from Uruguay; and 35 from Venezuela.

This is one of the most visited and consulted collections of the Daniel Langlois Foundation.

3. Final words

The Latin American Electroacoustic Music Collection has recovered and made visible (and listenable) the creative work of many electronic artists otherwise almost forgotten. It has defied the wish of immortality and the hegemony of the electronic art history narrative, breaking one of the memory's death roads and slowly shifting and widening the way the history of electroacoustic music is been understood.

Archiving and disseminating electronic and computer art history findings is crucial to comprehend the present and to build our future.

References

- [1] The Daniel Langlois Foundation for Art, Science and Technology:
<http://www.fondation-langlois.org/html/e/page.php?NumPage=147>
- [2] Latin American Electroacoustic Music Collection. Home page:
<http://www.fondation-langlois.org/html/e/page.php?NumPage=556>
- [3] Davies, Hugh (1968). *Répertoire international des musiques électroacoustiques/International Electronic Music Catalog*. France: Groupe de recherches musicales, O.R.T.F. / United States: Independent Electronic Music Center.
- [4] Latin American Electroacoustic Music Collection. Composers by name and country:
<http://www.fondation-langlois.org/html/e/page.php?NumPage=555>
- [5] Latin American Electroacoustic Music Collection. Historical introduction (English):
http://www.fondation-langlois.org/pdf/e/Dal_Farra_EN.pdf
- [6] Latin American Electroacoustic Music Collection. Interviews:
<http://www.fondation-langlois.org/html/e/selection.php?Selection=RDFI>
- [7] Latin American Electroacoustic Music Collection. Music selection (by composer):
<http://www.fondation-langlois.org/html/e/collection.php?zoom=6&Filtres=O&Selection=S>
- [8] Latin American Electroacoustic Music Collection. Audio player (558 titles):
<http://www.fondation-langlois.org/html/e/page.php?NumPage=548>
- [9] UNESCO. Digi-Arts. Historical Aspects of Electroacoustic Music in Latin America:
http://portal.unesco.org/culture/en/ev.php-URL_ID=15191&URL_DO=DO_TOPIC&URL_SECTION=201.html
- [10] UNESCO. Digi-Arts. La música electroacústica en América Latina:
http://portal.unesco.org/culture/es/ev.php-URL_ID=15191&URL_DO=DO_TOPIC&URL_SECTION=201.html

About the author

Dr. Ricardo Dal Farra (ricardo.dalfarra@concordia.ca) is a composer, new media artist, curator and historian. He is professor at Concordia University, Canada and director of the CEIArtE-UNTREF Electronic Arts Research Centre, Argentina. His music has been presented in about 40 countries. He is the founder of the Balance-Unbalance and Understanding Visual Music conference series, and has been researcher for UNESCO in France, De Montfort University in the UK, Amauta in Peru and the National Ministry of Education in Argentina. Dal Farra was coordinator of DOCAM, the Documentation and Conservation of the Media Arts Heritage research alliance. He created the Latin American Electroacoustic Music Collection.

Beyond place: monuments and museums after the intangible turn

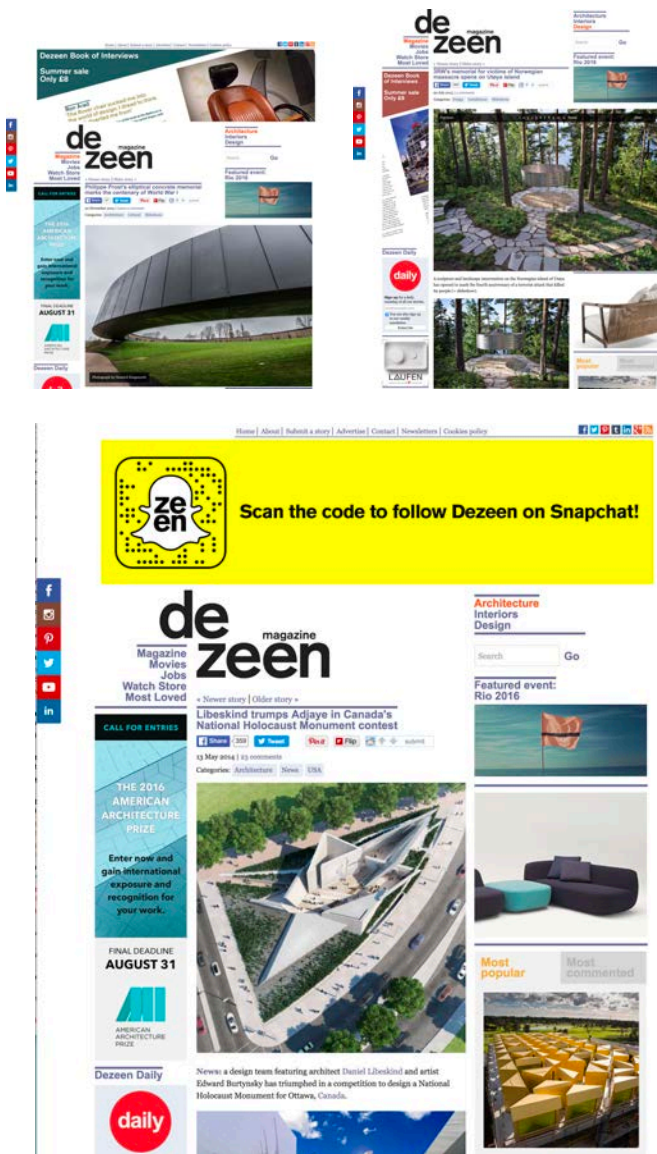
Shelley Hornstein

Introduction

Dezeen Magazine is an online website that curates “a carefully edited selection of the best architecture, design and interiors projects from around the world.”¹ It fires off *Dezeen Daily*, an electronic digest that broadcasts what is trending and visually and culturally significant. One such dispatch signaled the dizzying array of the latest memorials: an elliptical concrete memorial hovering above the military cemetery of Notre Dame de Lorette by Paris architect, Philippe Prost. The *Ring of Remembrance* loops three metres above the battlefield and mass grave site. A 328-metre concrete oval is inscribed with 579,606 names on copper panels, casualties from WWI, WWII, the French-Indochina and French-North African conflicts.² Dramatically arresting, these photos compel one to search further still. Hence, the second story headlines appearing on the same page reads: “Related Story” Porcelain poppies surround the Tower of London to commemorate World War I” and is matched with a dazzling image of a field of porcelain red poppies planted at the base of the Tower of London. The narrative infinity of webpages and their photogenic content links next to “The Clearing” Memorial for victims of the Norwegian island of Utøya, by Bergen architects 3RW. The digital sojourn carries on with yet another hook: the National Holocaust Monument competition, Ottawa, whetting one’s appetite to continue the asynchronous and circuitous - ordered disorder - itinerary of social media images where the now almost simplistic notion of paradigmatic and syntagmatic paths are complicated by the way we browse randomly online: colliding and criss-crossing image-subjects and the stories they announce.

¹ *Dezeen*, n.d., <http://www.dezeen.com/about/>.

² Ibid., <http://www.dezeen.com/2014/11/20/notre-dame-de-lorette-international-memorial-philippe-prost-world-war-one/>



Tourists visit museums and monuments for their material connection to the physicality and locality of place. But touristic itineraries are routed by a pre- and post-touristic diet of textual, visual, audio or other sensorial extensions

experienced through digital mapping. Mapping, therefore, is not only the charting of sites to a tangible place, it is also the tracking of textual, visual, audio and other sensorial expressions not necessarily mappable on a material object. While this vertiginous shuffling of museums and monuments gorges the reader with towering piles of information, I will consider how these mediatized technologies evoke a metaphoric conjunction, a (somewhat dubiously) mappable digital itinerary of monuments that is capable of either undoing or indeed nourishing our experiential understanding of what a building in a physical site cannot achieve – necessarily -- on its own. What happens when a visitor's planned geographic route of built architecture is challenged by its expansion virtually?

In 1903, Alois Riegl claimed that a monument meant creating a work with the objective of safeguarding the memory of an event.³ Can we remember without them? Take the example of recent architectural destruction. Never before, perhaps, has the power of mediatized images been made so poignantly clear the attack on archeological monuments in Syria, or elsewhere – what Ömür Harmansah calls performative acts of violence.⁴

There are echoes of Palmyra around the world -- is that all that will be left?

THE CONVERSATION

By Simon Mills, The Conversation

Updated 5:01 AM ET, Mon November 9, 2015



Photos: How ISIS ravaged Palmyra's world treasures

After: A Syrian government soldier walks near what's left of the Temple of Baalshamin on Sunday, March 27. Syrian forces retook the city days before, but damage had already been done by ISIS. UNESCO says it plans to evaluate the extent of Palmyra's damage soon. Many of the structures -- which date from the first and second centuries and marry Greco-Roman techniques with local traditions and Persian influences -- remain in place, bolstering hopes that ISIS didn't completely raze the world heritage site.

More from Travel

Nevada poll: Clinton and Trump neck-and-neck

Video shows US swimmers at gas station

Travel Guard®

Get a quote today!
Get travel insurance from Travel Guard.
Coverage for your perfect vacation to MALAWI

GET A QUOTE

Advertisement

AIG

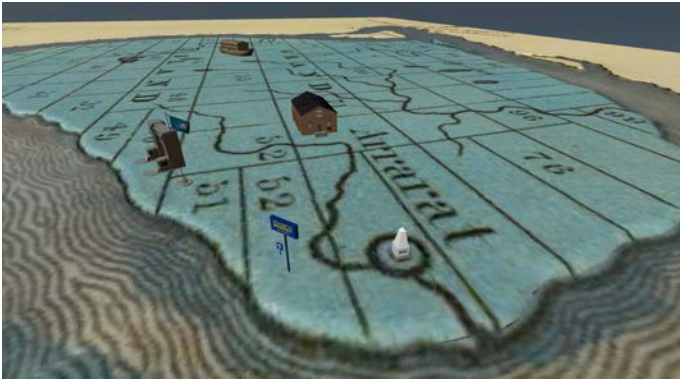
³ "A monument in its oldest and most original sense is a human creation, erected for the specific purpose of keeping singular human deeds or events...alive in the minds of future generations." See Alois Riegl, "The Modern Cult of Monuments: Its Character and Its Origin," Transl. Kurt W. Forster and Diane Ghirardo, *Oppositions* (Fall 1982): 21.

⁴ Ömür Harmansah, "ISIS, Heritage, and the Spectacles of Destruction in the Global Media," *Near Eastern Archaeology*, Vol 78, No. 3, Special Issue: The Cultural Heritage Crisis in the Middle East (September 2015): 170-177.

Yet these acts and the aftermath is known to the world solely through global media dissemination. Do images of the object suffice to help us remember? Or rather, and particularly if we have never visited the site in question, do these images act to fulfill the pedagogical needs to teach us about what was? I would argue that a virtual itinerary facilitates the knowledge of monuments, and has been responsible for the *touristic* turn in remembering events of the past, both private and public.

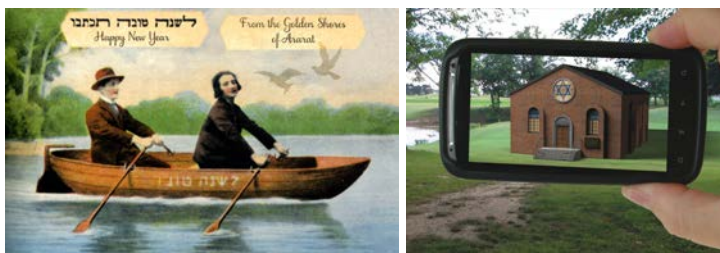
Mapping Ararat

One way to address the ironies and layering of history and memorial culture today is with a project, *Mapping Ararat*, where the tangible meets the intangible.⁵



Rather than isolate memorials in situ, Artist, Melissa Shiff and art historian, Louis Kaplan refute contribute to the memory project by reconstructing or imagining objects that never were. Instead, *Mapping Ararat* uses mobility and ephemerality as a pathway for visitors to explore the history of the site. *Ararat* triggers the past with images of places of memory while considering the inability to return to the material past that wasn't fulfilled. The project tells stories of Major Mordecai Noah across multiple platforms. In September 1825, he founded Ararat, or what he called a "city of refuge for the Jews" on Grand Island, New York.

⁵ This project is spearheaded by Shiff and Kaplan. For the project website, see, Melissa Shiff, Louis Kaplan, and John-Craig Freeman, "Mapping Ararat; an Imaginary Jewish Homelands Project," *Mapping Ararat*, n.d., <http://www.mappingararat.com/>. For detailed discussion of the project see, Louis Kaplan, "Mapping Ararat: Augmented Reality, Virtual Tourism and Grand Island's Jewish Ghosts," *C/R: The New Centennial Review* 13, no. 2 (2013): 239–64.



But the project ultimately failed. Shiff and Kaplan imagined what the homeland project might have become and developed situated technologies (augmented reality and simulated geo-spatial mapping specifically) as tools for visitors to plot assets (a synagogue, graveyard, butcher shop, bank or school) and thus interactively explore the geographic site. Today, Grand Island is a largely residential community oblivious to this history. Indeed, it is only beginning to recognize its occupation of the Seneca First Nation's site. Therefore, *Ararat* raises thorny questions for participants that complicate considerations of place and material culture, homelands, geography and the diasporic fixity of identity as an inscription of place and, inextricably, of time. *Ararat* foregrounds narratives that are constructed with navigational digitized heritage images and a mobile device operated by the visitor. The itineraries partially suggested by the creators invite historically rich stories that have disappeared for *Ararat*, but as well for other cultural lives to pop up through play. Thus, the visitor's performative actions reflect a personalized sequencing of a story. Each walk is haunted by the memory, indeed the idea, that this never fulfilled past is echoed in countless other locations where communities where chased, destroyed, or evacuated. By recalling the history of what the site might have been, and suggesting through augments a configuration of place, this symbolic, ironic and problematic homeland project feeds the visitor with a history to recall a place that has become essentially moribund, if not lost to memory entirely. The notion of activating the past through performative interactivity and across mediatized platforms disrupts our concept of materiality beyond place.

Expanded Field

Images diffused through social media and mobility platforms stretch our understanding of place. Any experience in a localized place can be assisted, enhanced or even diluted when seen or experienced outside the material, localized geography. For example, if we watch a video on YouTube that documents a memorial site, we are stretching that on-site experience of place to virtual space. Even if we consider how memorials, in particular, function today

we note that the history that took place on that very site being commemorated has actually been migrated to the physical monument erected on or near it.⁶ The event's siting, therefore, is not perfectly consonant with the site of the event; it is mutable, in fact, to the memorial itself. Furthermore, rather than see a memorial as a one-off occurrence in a physical site, think of it as associated with part of a cartographic whole where the very concept of place is expanded – and expansion is the operative term here. There is an aura that meshes the digital and physical, or put another way, weaves together, even blurs, the tangible and the intangible divide.

This is difficult to consider because however much we live in technologized worlds, architecture always seems to be tied inextricably to the idea of a physical object in a geographic location; a physical object that is at once a thing we take to be permanent and strong through its use of durable materials. This is best articulated with Marcus Vitruvius' concept of *Firmitas*.⁷ *Firmitas*, often translated as *durability*, conveys a sense of solidity or strength of materiality, and this is often interpreted to mean structural soundness. As a result, we tend to imagine architecture and monuments -- say of stone or concrete -- as everlasting structures that will therefore transcend time and eternally convey the story and memory of what took place at that site. To a certain extent this is true. Yet with the proliferation of memorials during this theory-based "memory turn", and the cultural anxiety that the digital age might run the risk of helping us to forget by rendering obsolete the past without a trace (the malaise of the amnesia of cultural memory, as Huyssen suggests⁸), there seems to have resulted an indulgence in wanting to make the material more present.

The "expanded field" of sculpture, first introduced by Rosalind Krauss in her now legendary piece, while relating to sculpture of decades earlier, conjoins to another concept, equally robust, introduced by Julie Kristeva in literary criticism she named "intertextuality". Kristeva was suggesting something broader beyond what might be understood as "text".⁹ The concept, when first

⁶ Art Historian, Miwon Kwon, considers the tectonic shift of site-specific art of the 1960s from a physical tie to the land to the "dematerialization" and "deaestheticization" of works that presents strategies that are "aggressively anti-visual." See "One Place after Another: Notes on Site Specificity," *October*, Vol. 80 (Spring 1997), 85-110.

⁷ Vitruvius Pollio, *The Ten Books on Architecture*, ed. By Morris Hicky Morgan (Harvard University Press, 1914).

⁸ Andreas Huyssen, *Twilight Memories: Marking Time in a Culture of Amnesia*, (Routledge, 1995).

⁹ First introduced in English, "Word, Dialogue and Novel", *Desire in Language*, (Columbia University Press, 1980), but first printed in French, *Séméiotikè. Recherches pour une sémanalyse*, (Seuil, 1969).

introduced in literary criticism, enjoyed a healthy stay but failed to convince the other arts as successfully. Yet here is where it is pertinent to the Internet of Things, digital media and physical, cultural and architectural heritage: Kristeva argued that texts run along two axes, both horizontal (connecting author and reader) and vertical (linking a text to another text), and necessarily that a text cannot exist independent of other texts; it is not a closed system. Taken together, for Krauss, the expanded field, and for Kristeva, intertextuality, are spatial devices that allow objects and ideas to bulge and explode beyond their borders yet retain a strong relationship to their origins. Indeed, Kristeva references Mikhail Bakhtin's notion of the "spatialization" of language where words intersect or are in dialogue with other words.¹⁰ The concept accounts for the idea of the extra-literary to enhance and relate to the text itself that "is constructed of a mosaic of quotations; any text is the absorption and transformation of another."¹¹ Each of these terms, as spatialization devices, positions mediatized museums and monuments today. The expanded field and intertextuality – or intermediality -- theorize what takes place when social media and virtual spheres extend our material media (newspapers, magazines, books, and so on) by disseminating information about physical monuments and places and their inherent tangibility beyond the site of tangible contact we have with them. Put another way, what results is a diffusion of information across new formats while also reaching potentially new audiences.

We do know that our cultural heritage is about objects in places. We remember objects in their places. So when we think of Paris, to mention a common example, we think of the Eiffel Tower. Memories, as Edward Casey tells us, belong as much to the place as to my brain or body," and "being in a place is being in a configurative complex of things...places...gather experiences and histories, even languages and thoughts." Place is "more an *event* than a *thing* to be assimilated to known categories."¹² For example, Rebecca Solnit's poetic writing captures the essence of place as a gathering of experiences and histories as much in physical place as in our bodies and brains -- after Casey's suggestion -- when she collaborates with others and orchestrates her peregrinations across San Francisco or New Orleans to set out an idea of an atlas. "Places are leaky containers. They always refer beyond themselves...What we call places are stable locations with unstable converging forces that cannot be delineated

¹⁰ María Jesús Martínez Alfaro, "Intertextuality: Origins and Development of the Concept," *Atlantis*, Vol. 18, No. ½ (June-December, 1996): 268-285.

¹¹ Kristeva, J. "Word, Dialogue and Novel", ed. Toril Moi, *The Kristeva Reader*, (Columbia University Press, 1986), 37.

¹² Edward S. Casey, "How to get from space to place in a fairly short stretch of time: phenomenological prolegomena" *Senses of Place*, eds. S. Feld and K.H. Basso, (Santa Fe, NM School of American Research Press, 1996), 26.

either by fences on the ground or by boundaries in the imagination – or by the perimeter of the map.”¹³

This is to say that an event that once took place in a place is far from the only way to remember. The impact on collective memory conveyed by social media can “intrinsically change the way we create images of the past in the present”, according to John Urry.¹⁴ The concept: “Media Memory,” or “the systematic exploration of collective pasts narrated by the media, through the media and about the media”¹⁵ offers clues into the work of memory studies and research that we might otherwise not have been explored. As Barbie Zelizer has shown, “The story of America’s past will remain in part a story of what the media have chosen to remember, a story of how the media’s memories have in turn become America’s own.”¹⁶ The stories of the memorialization of place are told in situ, through the conventions of museum and monument-making, but those ideas are disseminated primarily by social media as the mediating tool for collective memory, creating itineraries (and again here, read tourism) to memorialize events that have taken place, and now others that are the result of the interface between the two.

Conclusion

Monuments move, therefore, across the digital and material divide, beyond the monolithic, and stretch outside the parameters of the physical to welcome the intangible and sentient realms of the possible for touristic itineraries of memorialization. If one project summarizes this exciting beginning, it is the *Mapping Ararat*, and its continuing chapters for other *Imaginary Jewish Homelands* project, as it explores the theoretical, virtual and cartographic entanglements of geographic and imaginary histories of place as a performative memorial and active museum of homeland and community. This is designed to suggest that what we choose to remember is set out as part of a selective tour imagined, digitized or travelled¹⁷. And so we arrive at thinking about this adventurous

¹³ Rebecca Solnit, *Infinite City: A San Francisco Atlas*, (Los Angeles, University of California Press, 2010), vii.

¹⁴ John Urry, “How Societies Remember the Past,” *Theorizing Museums: Representing Identity and Diversity in a Changing World*, ed. S. Macdonald & G. Fyfe (Oxford: Blackwell, 1996), 45-68.

¹⁵ Motti Neiger, Oren Meyers and Eyal Zandberg, eds. *On Media Memory Collective Memory in a New Media Age* (Palgrave Macmillan, 2011), 1.

¹⁶ Barbie Zelizer, *Covering the Body: the Kennedy Assassination, the Media, and the Shaping of Collective Memory* (Chicago, University of Chicago Press, 1992), 214.

¹⁷ *Mapping Ararat* represents the first phase of a now larger project entitled *Imaginary Jewish Homelands* by Shiff and Kaplan. <https://www.facebook.com/imaginaryjewishhomelands/>

project as a catalyst for heightening our sense of the past in the present, for percolating a consideration of the landscape as a Museum of a Possible Homeland, for problematizing identity struggles of all kinds, and the difficulties of fixing geography to a people. By recalling the history of what the designated sites might have been -- and therefore memorializing them in the process -- the project suggests a recurring configuration of place. An agent of change through a virtually invented heritage, this project is an emissary that crawls out of an overfed culture of memory-making and safeguarding in physical museums and monuments. It signals the conjunction between the virtual and the actual place. The project stands as a test case for opening up a discussion about the space between and beyond place, for dispatching virtual invitations of the immaterial to conversations hinged on the material sites.

About the author

Shelley Hornstein is Professor of Architectural History & Visual Culture at York University. Themes she explores are located at the intersection of memory and place in architectural and urban sites, cosmopolitanism, nationhood and how architectural photography structures a conversation about place, citizenship and human rights. She is currently writing a book entitled: *Site-Seeing: Monumental itineraries and Architectural Tourism*, as an investigation of how architecture is the key to tourism through tangible and intangible places. Hornstein is the recipient of the Walter L. Gordon Fellowship, Canadian and International research awards, and is on the advisory boards for several academic journals. She holds the inaugural eLearning Award for the School of the Arts, Media, Performance and Design, York University, 2014.
<http://www.shelleyhornstein.com/>

Imagining spatially in Computer-Based Art

Gemma Argüello Manresa

Abstract

Geographical imagination refers to the way people perceive and think of space, as well as to the way people conceive their identities and social relations in space through ideological, social and cultural discourses and representations. Here I will discuss different kind of artworks, from Locative Media, to Virtual Art and Sound Art in order to show how geographical imagination is part of the broader concept of imagining spatially, a mode of “thinking of something” that includes at least three more different conceptions of imagination.

Keywords

Geographical Imagination, Imagining Spatially, Computer-based Art, Sound Art, Locative Media, Virtual Art

Recently there has been increased interest in the study of imagination, since it may explain the way we relate to the world through creation, dreaming, filling perceptual gaps, and more. According to the Oxford Dictionary of Philosophy, imagination is “the faculty of reviving or specially creating images in the mind’s eye. But more generally, the ability to create and rehearse possible situations, to combine knowledge in unusual ways, or to invent thought experiments” (Blackburn, 2005). A traditional approach to imagination such as Coleridge’s (1848) divided imagination into creative (the faculty of creating mental images) and reproductive (the faculty of entertaining them in the mind). More recent approaches, such as that of Leslie Stevenson (2003), identifies twelve conceptions:

- (1) The ability to think of something that is not presently perceived, but spatiotemporally real.
- (2) The ability to think of whatever one acknowledges as possible in the spatiotemporal world.
- (3) The ability to think of something that the subject believes to be real, but which is not.
- (4) The ability to think of things one conceives of as fictional.
- (5) The ability to entertain mental images.
- (6) The ability to think of anything at all.
- (7) The non-rational operations of the mind, that is, those explicable in terms of causes rather than reasons.
- (8) The ability to form perceptual beliefs about public objects in space and time.
- (9) The ability to sensually appreciate works of art or objects of natural beauty without classifying them under concepts or thinking of them as useful.

- (10) The ability to create works of art that encourage such sensual appreciation.
- (11) The ability to appreciate things that are expressive or revelatory of the meaning of human life.
- (12) The ability to create works of art that express something deep about the meaning of human life.

My intention here is not to discuss how each conception relates to art practices. But rather I am most interested in Stevenson's first conception, which includes four additional sub-conceptions:

1a. The ability to think of something that one has previously perceived but is not currently perceiving.

1b. The ability to think of something that one has never perceived, but which others have perceived and told one about.

1c. The ability to think of something that one has never perceived and that no one has told one about, whose existence one infers from the perceived evidence by induction, or scientific method in a wider sense.

1d. The ability to think about a particular mental state of another person, whose existence one infers from perceived evidence."

I propose to include imagining spatially as an additional concept in which people's imaginative experience does not simply refer to (1a), thinking of our experiences while walking down streets we already know, or (1b) or (1c), when we follow directions someone gives us or when we use a map to get to some place we do not know. In the field of contemporary art and computer-based art, audiences do not simply imagine some place given the testimony of someone else or from a certain kind of representation of that place, but rather they are able to think of a spatial trajectory and in some cases to think of the evidence given of that trajectory as if they were experiencing it by spatially following what the artists report in their work.

First I will start with the concept of Geographical imagination, that has been one of the most studied in regards to imagining spaces and imagining spatially. Also being called "imaginative geographies" (Hoelscher 2006), it refers to either the way people perceive space or the way they conceive their identities and social relations in space through ideological, social and cultural discourses and representations. I'll start with the second sense, since it is the most discussed in the literature.

Edward Said (1977) was the first to suggest the concept of geographical imagination when he established the field of Orientalism -- the study of the way the West has represented and perceived the East. He argued that spatial imaginative representations are influenced by political, ideological and economic discourses that come from those who hold a position of power, but those same representations are ways of fictionalizing distinctions between what it is conceived as a familiar space from that which is unfamiliar.

It is perfectly possible to argue that some distinctive objects are made by the mind, and that these objects, while appearing to exist objectively, have only a fictional reality. A group of people living on a few acres of land will set up boundaries between their land and its immediate surroundings and the territory beyond, which they call "the land of the barbarians." In other words, this universal practice of designating in one's mind a familiar space which is "ours" and an unfamiliar space beyond "ours" which is "theirs" is a way of making geographical distinctions that can be entirely arbitrary. I use the word "arbitrary" here because imaginative geography of the "our land—barbarian land" variety does not require that the barbarians acknowledge the distinction. It is enough for "us" to set up these boundaries in our own minds; "they" become "they" accordingly, and both their territory and their mentality are designated as different from "ours." (Said 1997, p. 55)

Said related geographical imagination to the most common conceptions about imagination in general, which is the ability to think of something as fictional in contrast to believing it as real. However, imagined geographies take what it is fictional as a belief in order to produce concrete representations about our spaces those of others. This sense of geographical imagination leads to the ability to think of something that it is believed to be real although it is fiction.

After Said, contemporary geographers started to analyze those representations of space in order to contrast social relations between what might happen in real space and what might be asserted from the point of view of fictionalized space. For example, David Harvey (1990, 1993) defined geographical imagination as a "spatial consciousness" that,

enables the individual to recognize the role of space and place in his own biography, to relate to the spaces he sees around him, and to recognize how transactions between individuals and between organizations are affected by the space that separates them. It allows

him to recognize the relationship which exists between him and his neighbourhood, his territory, or, to use the language of street gangs, his “turf”. It allows him to judge the relevance of events in other places (on other people’s “turf”) to judge whether the march of communism in Vietnam, Thailand, and Laos is or is not relevant to him wherever he is now. It allows him also to fashion and use creatively and to appreciate the meaning of the spatial forms created by others. (Harvey 1993, p. 23-24)

Harvey’s geographical imagination is consistent with a phenomenological point of view about spatial experience, where the individual perceives and acknowledges her own place according to her own experience in the space she inhabits. However, for Harvey there is a contradiction between what the individual experiences and the economic and social relationships that shape social conceptions about space,

each social formation constructs objective conceptions of space and time sufficient unto its own needs and purposes of material and social reproduction and organizes its material practices in accordance with those conceptions (Harvey 1990, p. 419).

Although Harvey recognizes a phenomenological dimension of the geographical imagination he, like Said, considers that our experience of space is also influenced by a social production system that organizes certain “fictional” conceptions of space. So, if we attend to what it is “real” we may find that those conceptions are imposed and hide social antagonisms and contradictions that shape the space where we live in. There are many geographers influenced by Said and Harvey that analyze the geographical imagination in terms of the ways social space is built. However we can find at least two senses of geographical imagination, one phenomenological, and another social. The social is concerned with the relation between fiction and belief, to what is thought of as real and what it is not consciously make-believed. Here I will discuss the phenomenological dimension, which pertains to the arts.

Most contemporary proposals about geographical imagination come from the fields of Geography and Urban Studies, influenced by the Situationism. Specifically, the phenomenological dimension of the geographical imagination comes from the Situationist practices of “*dérivé*” and Psychogeography. For Guy Debord the “*dérivé* is the practice of a passionate uprooting through the hurried change of environments, as well as a means of studying psychogeography and situationist psychology” (Debord 1957, p. 46). While psychogeography is the “study of the exact laws and precise effects of the

geographical environment, consciously organized or not, acting directly on the affective deportment of individuals,” (Debord 1957, p. 45). *Dérivé* was a strategy for Situationism to subvert prevailing representations of urban space through art and psychogeography. Psychogeography, inherently linked to the practice of *dérivé*, is the intention of a study that playfully tries to subvert relations of production, in which labour is the most valued activity. In these practices, play has an important role, but also the reflection of the individual experience in urban space that, since it is not recognized, could be retrieved through them. However, the playful aspect can transcend the political dimension of the experience of inhabiting and transiting space in order to recognize the individual’s experience in that space.

Critics of the social views of geographical imagination, like Doreen Massey, consider that although most spatial representations are determined by ideological, economic and social relations, it is also necessary to recognize how the individual’s experiences of space are beyond mere social representations. Massey maintains that space is not fixed, but in constant change:

To imagine places in terms of how far they are along this one-and-only path of development (or modernisation, or progress) is to imagine the differences between them only in terms of history. It is to turn geographical differences (real, coexisting differences) merely into places in the historical queue. It refuses to countenance the possibility that there are lots of histories going on at the same time; that other places have their own particular trajectories and, of even more political significance perhaps, the potential for their own particular futures. This is certainly a geographical imagination; it is clearly a way of imagining geographical space. But ironically its effect is almost to abolish that space; to turn it into time. (Massey 2006, p. 49).

For Massey, identities are relational and even within the social and historical concept of geographical imagination, spatial representations are negotiated between the individual’s current experiences of space and the historical meanings which that space has acquired through time. Moreover, although we encounter two concepts that together identify “me” and the “other” in space, as Harvey defends, Massey considers that these concepts deprive people from the recognition of their own spatial experiences in time:

On one hand the representation of space as a surface, and the other hand the imagination of representation (here again, in the specific form of writing, as scientific representations) in terms of

spatialisation. Together what they lead to is the stabilisation of others, their deprivation of a history. (Massey 2008, p. 122).

Imagination is not just a fictionalization of the real, but it is a way to mentally visualize the surrounding reality, through various mechanisms such as memory, perception and emotions. Geographical imagination is not confined to the representation of spaces of exclusion or antagonism where people engage imaginatively in an imposed narrative, but it is open to different kinds of imagining:

Whether it be poring over maps, taking the train for a weekend, picking up on the latest intellectual currents, or maybe walking the hills... we engage our implicit conceptualisations of space in countless ways. They are a crucial element in our ordering of the world, positioning ourselves, and others human and nonhuman, in relation to ourselves... What space gives us is simultaneous heterogeneity: it holds out the possibility of surprise; it is the condition of the social in the widest sense, and the delight and the challenge of that. (Massey 2008, p. 105).

Space embraces different structures and social narratives, but also private narratives that draw up the intimate maps of everybody's experiences. So, geographical imagination is not reduced to the social realm, but can be analyzed from a broader perspective of imagining spatially that explains some ways people perceive and think of space. First, I will start by proposing at least two kinds of representations of space:

1. Space as a surface.
2. Space as an imaginary representation of an experience.

"Space as a surface" is a mode of visual translation, an imagined space, like a map, and will not be discussed here as it has its own history. On the subject of "space as an imaginary representation of an experience" we can find that it enables imagining spatially as a mode of "thinking of something" which includes at least two different conceptions:

- a. The ability to think of a conception of space that it is believed to be real, but is fiction.
- b. The ability to think of the space in terms of our own experiences.

We can experience space as the flâneur or the geographer (a) or we can have an engaging experience of space like the Situationist (b). The ability to think of space in (b) can be perceived when we are walking down the street or it can be based on our memories like when we imagine a space to which we have been emotionally attached. However, there is another way to imagine spatially:

c. The ability to think of space in terms of what other experiences.

Imagining spatially in (c) is to think of space when it is not presently perceived, but not as something that was never conceived. In this case it is possible to imagine based on the report of a third person perspective, but in a different way than in (1b), a conception in which we simply “think of something that one infers must have existed, or must exist elsewhere, or will exist in the future” (Stevenson 2003, p. 240).

We can find this kind of imagining spatially in travel literature and radio novels where the reader imagines the content as fictional. However, in contemporary art practices, such as locative media, the content is not imagined as fictional, since the third person perspective, the artist’s report, is shown as a testimony of something that actually happened, that is: “the ability to think of space in terms of what others actually experienced.”

Locative media “emerged as an idiom for a concerted effort to disperse mobile, location-aware and networking technology (devices and software) beyond command and control infrastructures” (Zeffiro 2012, p. 255). In computer-based art it describes a “‘mobile media movement’, in which artists, theorists, activists, hackers, and software developers experimented with mobile, networked, location-aware computing devices” (Ibid.). Locative media combines mobile phones, GPS and web geo-mapping in order to create participatory computer-based artworks that show cartographically different micronarratives. For example, the “MILKProject” by Ieva Alzina, Esther Polak and RIXC-Riga Center for New Media Culture, that won the Golden Nica at the Prix Ars Electronica in 2005, used GPS visualizations to construct a non-linear narrative about the daily transportation of cheese from Latvia to Netherlands. This work of locative media included workshops with all the participants involved in the project who discussed the data obtained and displayed in graphic drawings and maps, and their discussions were recorded to convey the sound and photos of the locations. Finally, “the edited stills with the corresponding soundtracks are experienced in the installation as a narrative and

are played in “cartographic” order from east to west, thus following the path of the milk.”¹

These kinds of projects are what Tutters and Varnelis described as phenomenological locative media, because they “trace the action of the subject in the world” (Tutters and Varnelis 2006, p. 359) through the maps, images and sound. The “MILKProject” let the audience imagine spatially the trajectories of those who produced, distributed and consumed milk from the third person perspective of the participants in the project.

Even in early artworks of virtual reality like “Osmose” (2005) we find a phenomenological dimension of imagining spatially, but one that includes the following conception: “the ability to think of space in a fictional world that is not believed as real”. This work consisted in “an immersive interactive virtual-reality environment installation with 3D computer graphics and interactive 3D sound, a head-mounted display and real-time motion tracking based on breathing and balance.”² “Osmose” included a dozen of spaces based in nature and it was intended to be “a place for facilitating awareness of one's own self as consciousness embodied in enveloping space.”³ It seems like in this work, as in many others of virtual art, “the interactor inside the image space recognizes that what is visible is an illusionist environment where the perceptions of the organs of sense and the quantities of time and space have become variables.” (Grau 2003, p. 231). However, even if the interactor experiences space like if it were a real even if she believes it is not, she imagines spatially and imaginatively moves geographically in terms of spatiotemporal coordinates. Her experience of space is possible because it comes from inputs given by the immersive interface. The interactor is perceptually deceived in order to get immersed in the fictional spatial worlds the artwork provides. And she is deceived because those spaces are not actually perceived (as in normal perception) and the worlds’ contents are not regarded as true. Therefore, as long as they are not real, but just experienced “as if they were real”, the interactor is able to get immersed in the experience the interface provides for a short period of time, as if the brain could not be cheated for too long. However, even though virtual spaces are not actually perceived, they can be conceived because they can be imagined, and they can be perceptually experienced in a certain way as long as imagination is

¹http://webcache.googleusercontent.com/search?q=cache:k12yc6DXPWcj:90.146.8.18/en/archives/prix_archive/prix_projekt.asp%3FiProjectID%3D13373+&cd=1&hl=es&ct=clnk&gl=mx

² <http://www.immersence.com/osmose/>

³ Ibid.

understood as a mentally faculty that has a full embodied dimension of feelings and bodily states.

There are also artworks in which it also possible to think of spatial trajectories that actually happened through the narratives given by the artist and think of those narratives as if we are actually experiencing them. Many contemporary artists have worked based on the recent defence of the immateriality of the artwork initiated by Conceptual Artists in order to explore different ways to expand the experience of the artwork. Some of them have explored the way to translate the experience of trajectories in space. That is the case of some sound artworks that try to recreate an embodied experience of the space, different from that provided by virtual art. For example, Janette Cardiff's audio walks, like "Wanâs Aalk" in 1998, are narratives and collections of sounds that recreate her trajectory in different places. When she talks about her work, for example, in her explanation of "Wanâs Aalk" she describes it as follows:

This was a very bucolic site, a farm, with animals, forests, and it was very quiet. Charles Wachtmeister became very involved in the recording process, taking me to his favorite hunting spots, trudging through underbrush and fields in the early mornings. He could spot a grouse or nightingale where I only saw leaves. The site made me work with very spatial sound effects, a forest filled with ghosts and voices.⁴

With George Bures Miller she created audio walks and sound installations, like "FOREST (for a thousand years...)" in 2012 where visitors could just sit in the middle of the forest and listen to the sound of a storm, a branch snapped, explosions, a machine gun fire, a scream, a crashing tree, the sounds of a mother and child, birds and crickets⁵.

These kinds of artworks let the audience imagine themselves in the paths the artist followed. Sound plays an important role in an embodied experience of space, where the audience spatially imagine routes and paths, having a richer experience of the space. However, this imaginative experience is not similar to imagine putting in other's shoes, since the audience is not properly being empathetic neither is imagining having the same mental states the artist had. On the contrary, here imagining spatially explains why every participant, every listener, is able to have her own experience mentally recreating the trajectories

⁴ <http://www.cardiffmiller.com/artworks/walks/wanas.html>

⁵ <http://www.cardiffmiller.com/artworks/inst/forest.html>

described and suggested. Then, imagining spatially enables at least these three kinds of conceptions of think of space:

- “the ability to imaginatively experience space in terms of what other experiences” from a detached point of view, e.g. locative media.
- “the ability to imaginatively experience space in terms of what other experiences” from an embodied point of view, e.g. sound art.
- and “the ability imaginatively experience space in terms of deceived perceptual experience,” from an embodied point of view, e.g. virtual art.

These kinds of imaginative spatial experiences are present in different contemporary art practices since Situationism, but specifically the artistic experiments with sound and technology opened a door for experiencing different ways of the spatial and geographical imagination of fictional and real places in which audiences can experience their own and the other’s places from a different point of view or even experience fictional worlds they can now conceive as possible and experience them as if they were real for a while.

References

- Debord, Guy. (1957). Report on the Construction of Situations and on the Terms of Organization and Action of the International Situationist Tendency. In MacDonough, Tom (Ed.). (2002). *Guy Debord and the Situationist International. Text and Documents*. Cambridge: MIT Press.
- Grau, Oliver. (2003). *Virtual Art. From Illusion to Immersion*. USA: MIT Press
- Harvey, David. (1993). *Social Justice and The City*. Basil: Blackwell.
- (1990). Between Space and Time: Reflections on the Geographical Imagination. *Annals of the Association of American Geographers*, 80:3, 418-434.
- Hoelscher, Steve. (2006). Imaginative geographies. In Warf, Barney (ed.). *Encyclopedia of Human Geography*. London: Sage.
- Said, Edward. (1977). *Orientalism*. London: Penguin.
- Massey, Doreen. (2008). *For Space*. London: Sage.
- (2006). The geographical mind. En Balderston, D. (ed) *Secondary Geography Handbook*. Sheffield: Geographical Association.
- Stevenson, Leslie. (2003). Twelve conceptions of imagination. *British Journal of Aesthetics*, 43(3), pp. 238-259.
- Tutters and Varnelis. (2006). Beyond locative media: Giving Shape of the Internet of Things. *Leonardo*, 39 (4), pp. 357-363.
- Zeffiro, Andrea. (2012). A location of one’s own: A genealogy of locative media. *Convergence: The International Journal of Research into New Media Technologies*, 18 (3), pp. 249-266.

About the author

Gemma Argüello Manresa

Associate Professor, Universidad de las Américas Puebla

gemma.arguello@udlap.mx

She obtained her PhD (Cum Laude) at the Universitat Autònoma de Barcelona (UAB) in the Department of Philosophy. She had previously obtained Master Degrees in Aesthetics and Theory of Art, and Aesthetics and Theory of Contemporary Art by the same University. She has published papers in journals, books and conferences on Philosophy, Aesthetics, Digital Art Theory, Theory and Philosophy of Art and Film Theory. She has been member of different research projects at the Universitat Autònoma de Barcelona, Universidad Autónoma Metropolitana Lerma, where she was Visiting Professor in the Digital Art and Media Program, and the Institute of Philosophical Research at Universidad Nacional Autónoma de México, where she was Postdoctoral Fellow with a project on Aesthetic Judgment and Moral Value. She works on Philosophy of Contemporary Art; Philosophy of Computer Art; the intersections between Aesthetics, Political Philosophy and Ethics; and Philosophy of Film. She has also worked in curatorial projects for some exhibitions. She is member of the Mexican National Research System (SNI-level 1).

Mirages de Ville

Gerry Kisil & Alan Dunning

Abstract

This paper describes an ongoing project entitled, *Mirages de Ville* (2015-), begun by Alan Dunning and the late Paul Woodrow to re-shape space using, singly and in combination, voice and pattern recognition, together with bio-electrical information. *Mirages de Ville* is part of a larger project examining the digital uncanny, and a continuation of many of the themes of the artists' earlier collaboration in the Einstein's Brain Project (EBP). These earlier works use various computational strategies and devices to explore the psychoacoustics of natural and artificial systems, structures and worlds, by looking and listening.

Keywords

Pattern recognition, acoustic consciousness, digital uncanny, Marshall McLuhan, sensorium, voice recognition, ghosts

The Acoustic Medium

For Dunning and Woodrow the city amplifies the clatter of the street to the point where as John Cage argued, *the streets themselves are an acoustic medium* - a cacophony of bouncing and reflecting sounds that inform modern urban life, and produce the frenetic soundscapes of sensorial confusion that early modernism promised to manage. Public sounds have always created a sense of community whether in church, the market or on the street. The artists' intention is to discover the *acoustic consciousness* of the city contained within the concrete and asphalt patterns of the metropolis, using speech and pattern recognition. The schizophrenic nature of discovered sounds, texts, and data, dislocated from their original source, generates new contexts for the environment that produces them.

Danielle Wiley points out, there is a long history of critical walking-based strategies for the exploration, documentation and reconfiguration of the cultural, political and psychological dimensions of the city. Dunning and Woodrow's work references, among other things, many on Wiley's list: Baudelaire's flâneur, Dadaist excursions, the Surrealist déambulateur, Lettrist and Situationist dérives, de Certeau's everyday pedestrian, and the Stalker Collective's transurbances - all of who use walking to redefine a territory. All art engages with location to some degree, even if just in the way that it responds to the spaces created by the gallery and frame. This work sets out to explore urban space by interpreting ambient audio within the contexts of the Surrealists, Situationists, and Freud's uncanny, in order to reconfigure the city into psychological and psycho-geographic zones.

Marshall McLuhan proposed that modernist urban design is based on an aesthetic of stability, concealment, and a concern for facades, the goal of which is to create an environment superficially resembling the familiarity and safety of the most recent past. Such nostalgia leads to a basic alienation from the systems that make contemporary life in a given environment possible. Producing a set of fixed and isolated structures - insulated offices, separated residences, and segregated manufacturing centers that generally discourage interaction among and between occupants. Urban inhabitants are by necessity connected, interdependent, and networked; yet the physical structures, spaces, and technologies they use on a daily basis are organized in such a way as to promote a sense of alienation, specialization, and individualization.

Mirages de Ville

The most beautiful thing we can experience is the mysterious. It is the source of all true art and science.

Albert Einstein

In remapping the city *Mirages de Ville* creates a new sense of the dimensions of the city by documenting its immaterial, psychic territory. Like Plato's *realm of becoming*, the polis is in a constant state of becoming something else in a series of moments of pivotal, lived experience, and of active spatiotemporal events that suggests both time and space are fluid. Paul Virilio has written that constructed urban space now occurs within an electronic topography, where the framing of the point of view and the scan lines of digital images give new form to the urban plan. According to Virilio the city square has become the crossroads of all media. Deprived of objective limits, architectural elements begin to drift, floating in electronic ether devoid of special dimensions but inscribed with a single temporality. *Mirages de Ville* explores the consequences of such fluidity within mediated temporal constructions of the city and examines their presence in the practice of everyday urban life by listening to the patterns of noise that makes up the acoustic medium.

The intent of *Mirages* is to attend to these noises by exploiting the deficiencies of speech recognition software, and recognize within them real and imagined sounds, using the results as source material for a wide range of pending artworks.

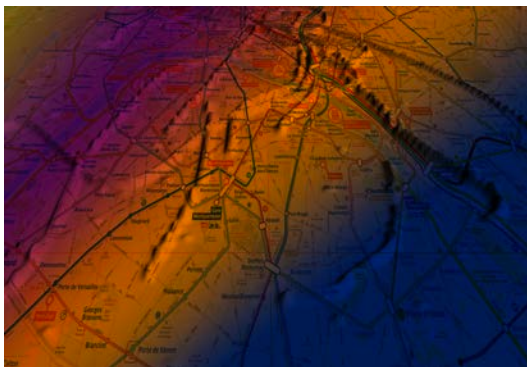


Figure 1. Map of emotional valence, data visualizations Paris, 2015

As participants travel the tentacles of the city, texts and sounds recorded and analyzed by the recognition software throw up strings of words that distort and change the perception of the terrain. (Figure 1) As their paths overlay and intersect, these layers produce more and more complicated features: hotspots, and areas of dense or sparse word clusters that can be translated into topography, as peaks, valleys, and plains. In re-characterizing the city this way the project produces emotional maps of more or less psychologically charged zones, capable of generating elevation, topographical and psycho-barometric diagrams as features within the city. Instead of colonizing space as maps have done in the past, the artists are augmenting reality by introducing layers of stratification; they are enhancing the outside world with additional layers of digital information. *Mirages* studies the idea of multiple cities occupying the same physical space, but comprising assorted psychological dimensions conjured up through various emotional valences - the intrinsic attractiveness or averseness of a place, event, object, or situation.

Descriptors are fundamental in characterizing places, and these descriptors are revealed through the careful explorations of the visible city. As a participant moves through the city the recorded audio is analyzed to generate sounds and speech. The results are reminiscent of WWII numbers stations transmissions ¹: fragments of sound, human speech, and buzzing; sounding like gibberish, but uncannily and disturbingly suggestive of meaning and structure. The recovered

¹ A numbers station is a type of shortwave radio station characterized by unusual broadcasts, reading out lists of numbers, compressed burst of data, or incomprehensible fragments of sound and human speech, thought to be used by spy networks. Recordings can be heard here: <http://archive.org/details/ird059>

ambient noise is analyzed and mapped to a psychological topography that re-imagines and re-makes the city, and opens it to change through disorientation and drift. The project asks: What does it mean to become more abstract, even more abstracted from the boundedness of territory and subjectivity? Is our concept of the modernist public sphere adequate to the requirements of mediation in a digital world, or does mediation itself have to be reinvented within the digital apparatus?

Urban studies have always depicted the city as a complex and highly uncertain space, where the contradicting forces of postmodernity coexist in various and unpredictable ways with the past. *Mirages de Ville* sets out to investigate this uncertainty by presenting hidden or imagined disturbances in the familiar surroundings of the urban environment. Anthropologist Marc Augé describes this urban space as always anthropological, that is, it is to be experienced, symbolized, felt, and imagined.

Life in the modern city is mobile, plural, adventurous, innovative, but also estranged, alienated, and impersonalized. Urbanity denotes, what British sociologist Anthony Giddens calls, “a post-traditional order” of mostly secondary, technologically mediated, social relations evolving around the possibility of multi-belonging to a variety of associations, groupings and social circles which are constantly multiplying and giving social integration new meanings. Important to this description of urbanity is the central question of spatiality. Contemporary sociologists propose that Marshall McLuhan’s stable places have been replaced by fluid and ever-changing spaces, what Manuel Castells calls, “spaces of flows”, and John Urry refers to as “horizontal mobilities and fluidities.” Unanchored from the space of places and cast into the space of flows, sounds and texts become ambiguous, producing a poetic that only the Surrealists could imagine, but that the electric current can now render concrete.

Places no longer exist as unified, fixed and durable contexts, but rather as fluid meeting points of highly mobile individuals. Structurally and functionally, the urban centre is a network of networks (borderless, disjunctive, and flexible). This definition suggests a complex structure that describes cities as no longer simply territorial containers of individuals, groups and buildings. Instead they are multilevel formations constructed around the flows of capital, technologies, people, and symbols.

Mirages de Ville, focuses on the discovery of meaning in chaotic and random flows, where there is usually an expectation of none. *Mirages* does this by exploiting and capitalizing on the deficiencies in speech recognition software,

and its tendencies to produce false positives, applied to the analysis of ambient environmental sound. The intention is to look at how we might perceive space differently through the lenses of the misheard, the half-heard and the imagined to perceive alternative realities. This fragmented, poetic, and digitally produced material is used to create new landmarks, street names, maps, and other visual and audio ephemera that can be used to re-characterize the urban setting through the evocation of emotional responses.

In this instance the application of new media technologies provide the opportunity to augment traditional urban environments with unique information and communication spatial experiences. The convergence of telecommunication networks, geographical positioning systems and interactive graphical interfaces introduces novel contexts and forms of interactive creative practices. *Mirages de Ville* comprises the first phase of a much larger research project, which looks at the integration and creative application of pattern recognition technologies in digital and urban spaces.

Mirages de Ville, is focused on the social implications of producing and monitoring location-based systems in the context of urban everyday life, mapping virtual space onto the physical spaces of the concrete environments inhabited by material bodies. This *mixing of realities* might mean that the virtual and physical are layered or intersecting, however, Dunning suggests that something else is being produced in this approach, in the folds or creases between the virtual and physical, between data space and geographical space. Sometimes these folds don't just mix realities but they produce their own reality. They can in this sense produce *other* spaces - like Foucault's heterotopias - spaces that have more layers of meaning or relationships to other places than immediately meets the eye. These *other* places place all other sites into question, metaphorically as much as literally.

The resulting hybrid spatial context becomes the arena for a distinctive electronically generated aesthetic. The project's intention is to deliberately exploit the random occurrence of false positives in the collection of data to create new meaning(s) in the urban landscape, developing new algorithms to permit sounds other than speech to be recognized as words.

The aim is to build psychologically based topographic and mental maps of what the Situationists International called, psycho-geographical space, which form the basis for a new understanding(s) of the urban as a continual accretion of spatio-temporal zones. Reconnecting with important moments in the history of 20th century Western philosophy and art where artists turned walking into a critical and creative gesture. These avant-garde artists were dissatisfied with the

conventional enclosures of institutional art - the frame, the white cube, and the museum - they took to the streets, looking for other ways to see and be seen.

In a lineage that stretches back to wandering nomads and spiritual pilgrimages, the walking body turns into a means of both creating and resisting meaning: resisting prescribed itineraries, thwarting predictable outcomes, opening up fresh points of engagement and discovering surprising vistas. What emerges from these bipedal exercises, author Francesco Careri explains, are a range of alternative ways of evoking and inhabiting space, giving the experience of place a phantasmagoric character where the global and local, the familiar and the strange, the real and the virtual become inextricably intertwined.

By deploying digital pattern analysis and imaging technologies Dunning explores inaccessible or unimagined physical and virtual urban space. Technologically mediated public space in this instance, proposes a different dimension to the city, and it encourages additional modes of social interaction. As the creative application of communication technologies becomes more and more integrated into the everyday activities of the city, they help to reshape, and redefine meaningful human interaction.

This process of cybernetic deployment produces a system of practices through which artistic artifacts acquire symbolic, individual, and emotional value. At the same time this work highlights the antinomy between established social art practices and the growing influence of post-internet art production - one of many paradoxes in an increasingly fragmented field where established humanist approaches are contrasted with technologies' post-human visions. This art sets out to reconstruct the communal by taking aim at the concrete; that is, through the sensate manifestations, structural obscurities and designed confusions of the modern city. The strategy is to identify, represent and explore hidden structures and networks in ways that merge the bluntness of the material with the complexity of corporeal.

Mirages de Ville (Figure 2) monitors ambient and environmental audio, using microphones worn by participants, and bespoke speech recognition software to tease out, isolate and generate words, phrases and sounds from the noisy environment.



Figure 2. *the_15th_October_2014, frame grab from camera, Paris, 2014*

The goal is to develop a series of creative works that suggest different ways to experience and navigate urban space. That is, by listening to, and analyzing, audio environments to reveal hidden, or unbidden, information, voices and sounds that disturb our sense of our surroundings. As metaphoric medium or mystic, Dunning is able to explore the visible world to reveal the invisible forces which influence the lives of the living. In *Mirages*, invisibility has become a theory of sight, with many invisibilities at play: artistic, social, technological, and political.

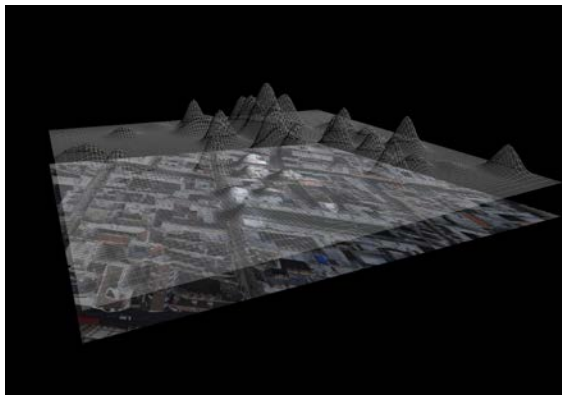


Figure 3. *Map of emotional valence, data visualization, Paris, 2016*

Drawing on the earlier bio-electrical work of the Einstein's Brain Project, *Mirages* also sets out to map urban spaces in terms of psychologically charged sites, showing degrees of emotional responsiveness as landmarks within the city. This work explores the idea of cities occupying the same physical space but comprising diverse psychological dimensions conjured up through emotional arousal and valence. These responses are revealed through walks

during which biological electrical output is used to build a psychologically based topography of the landscape. Using inconspicuous ambulatory sensors to harvest the raw data this information is used to produce maps that document where states of high arousal and activity occurred. The information in turn is coupled with data from monitoring the position, direction and speed of a body's passage through the city; elevation contours and areas of density and openness emerge, and are rendered as topographical maps. (Figure 3)

Mirages did not set out to map patterns to specific emotions, rather its intent was to distinguish areas of the city in terms of instances and intensities of primary arousal. Over time the accumulation and sedimentation of these electrical indices crisscrossing and overlaying the city created a topology with areas of high and low activity that establish a different urban geography. In remapping the city the project opened additional articulations of the dimensions of the city by acknowledging its immaterial, psychic and spiritual shape.

The way we engage with these technologies involves not only material, but also psychological dimensions. They are a link between our existence in the world and our search for meaning and purpose in our lives. The myths that are produced do not speak to us in factual terms, but, rather, in an archetypal, metaphorical language. The works investigate the phantoms within and between sounds, spaces and memories. Using a network of trails, stories and noises generated by the urban landscape Dunning is channeling the world of benevolent and malevolent spirits.

Physical structures can develop cultural memories, retain a sense of time or place, a sense of the stories and events that were once told or took place there and are now embedded into their walls. The senses provide an interesting entry point into these memories, a site for recovering forgotten or erased experiences that reintegrate the sensorial with the material, countering the notion of fragmentation proposed by modernity. Imagine if we could resurrect these memories, the lost narratives, the stories and sounds that once echoed around or in a particular space.

Mirages de Ville is interested in mapping these phenomenon precisely because they reshape familiar local spaces by changing the psychological view of the space. These spaces suddenly become disorienting and unsettling, unknown or unknowable, and surround us with an anxiety of uncertainty. In the most extreme responses to the recordings and data collected they become evidence of conspiracy, indications of alien activity or even hauntings. Capturing these moments, the work constructs an archaeology of loss, pathos and missed

connections, assembling a forgotten past in our digital present. *Mirages* investigates the hidden resonances and meanings within the subtle traces that people and their actions leave behind - ghosts.

Spaces And Places

The project naturally generates particularly rich and affecting words and phrases at sites with well known histories that can frame and contextualize the analyses, but locations are almost always chosen arbitrarily, or are the result of a drifting, or simple directive. As far as the larger project is concerned, any one place is as good as another - the most ordinary of places contain the possibility of new poetic engagement.

Some locations are more resonant than others. The arrival at, and subsequent acquisition of data from, the area around the Bataclan concert hall was highly charged in light of the recent terrorist attacks. Here, as in earlier works such as *Sound of Silence* (2006), which was a site-specific audio work that took place above an interrogation unit in the Centro Popular de la Memoria, in Rosario, Argentina. The detention centre was responsible for detaining and torturing many of Argentina's *desaparecidos*, the analysis was entirely framed by well known recent and past events. (Figure 4) Other locales may carry much less in the way of evident history, but even the most mundane of locations – a newsagent, a bakery, or a bus shelter, have the potential for the reimagination and reclamation of past lives and events.

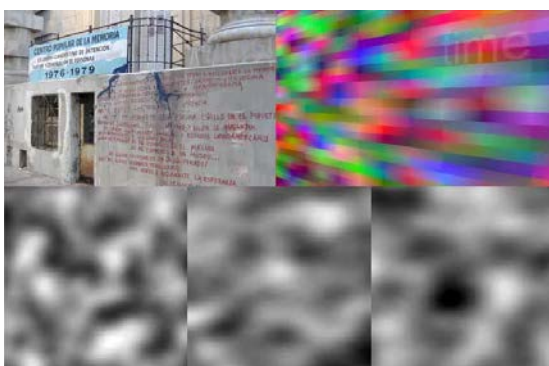


Figure 4. *Sound of Silence*, installation, Rosario, 2006

Often the participant's routes are decided by simple instructions to walk toward the next visible particularly coloured object, the loudest sound, the brightest light, a particular number, and so on. Other times their paths were decided by

following a pattern derived from arbitrary means such as throwing dice, or overlaying a random image or text upon a map. For example, the 2 day route across Paris was decided by looking for the next patch of green that caught the artist's eye, and the rambling journey encompassed the following major locations: Cimetière du Montparnasse > Jardins du Luxembourg > École Nationale Supérieure des Mines de Paris > Place de la Concorde > Place du Chatelet (Rue de la Vieille-Lanterne) > Hotel de Ville > Église St-Paul-St-Louis and surroundings > Place de la Bastille > Cimetière de Picpus, Nation and surroundings > College of medicine, Rue de l'École de Médecine (Rue de Cordeliers) > Bataclan, Blvd Voltaire and surroundings.

At each location video and audio is recorded and analyzed both in situ - in real time - and afterwards. Each recording is accompanied by longitude and latitude coordinates obtained via an external GPS receiver and/or cellular positioning, serving to log approximate locations to within 2.5 meters, allowing particular sites to be revisited.

Early versions, using Google's Cloud Vision API, have produced word fragments from apparently empty, silent spaces, and experiments have teased words and phrases from ambient audio that does not have an obviously distinguishable or salient speech component. Using a combination of very simple speech recognition software, the words and phrases, largely nouns and adjectives, but often strings of vowels, emerging through computer analysis are, like past work looking for images of faces in random noise, often convincingly real suggesting, some actual voice or intelligence behind the words, though, however unsettling, in actuality they emerge only from algorithms carrying out the work of analyzing the audio, or the imagination of the listener. (Figure 5)

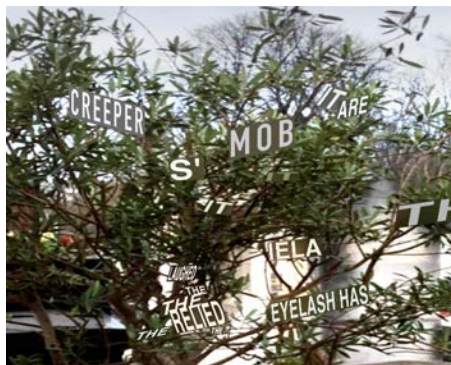


Figure 5. walk 83, frame grab from live camera, Paris, 2016

Voice-recognition software programmes work by analyzing sounds and converting them to text. They use knowledge of how language is likely to be said. Most modern systems recognize continuous speech with an accuracy approaching 90% under perfect conditions, but they are notoriously inaccurate in noisy conditions or when there are multiple speakers, resulting in false matches. This project sets out deliberately to exploit the occurrence of false positives to generate new meaning in the urban landscape, to develop algorithms to allow sounds other than speech to be recognized as words, to allow multiple sound sources to be monitored, and to enable a set of parameters to be used to tune the analysis to reveal sufficient and different quantities of words. The software builds upon several of the available speech recognition software development kits, but has committed early endeavours to using CMU's open source, speech recognition toolkit, Sphinx.

Sounds and texts generated rely on their context to give them meaning, but in turn, they also bring new context to the environment that generates them. The project relies on a participant's perceptual understanding of a place to contextualize many of the words and phrases that are produced by its processes. As such, apophenia and pareidolia - seeing connections, imagining patterns - are the true engines of *Mirages de Ville*, but the words that emerge are often felt as something else, as a very real, uncanny presence within the actual material of the city. The words don't have an indexical relation to reality - they were not uttered - they emerge from the random false positives of a speech recognition programme, and have neither substance nor form other than chance interactions and collisions, but they are often felt as actual speech, suggesting some psychoacoustic space that exists within noisy information flows.

These works suggest that these spaces are not entirely of the body, are not simple imaginings, but are born out of a complex interplay of psychological states at the limits of and beyond the ego boundary, shifting from subject to object, and from self to other, in an intricate dance that never fully establishes the relationship between body and world. Developing an increasing uncertainty as to who and what is imagined and who and what does the imagining. Spectator and spectacle are entwined, entangled in coexistent space. Perception enfolds us in matter and co-synthesizes the perceived object and us, suggesting that modes of representation and being-in-the-world are intimately intertwined, ultimately imposing on the relation between subject and object.

The body resembles what the Einstein's Brain Project earlier imagined as the *Mnemonic Body* (2002). This body is a repository for memory and events. The body functions like a moving object rather than the static subject of important

information when considered as a recording medium – as a meat tape. In Holonomic Brain Theory, Karl Pribram postulates that memories are enfolded within every region of the brain rather than being confined to specific atoms or cells. Pribram's collaborator the physicist, David Bohm elaborates on the process, and its relation to the world, in the following way:

One may indeed say that our memory is a special case of the process described above, for all that is recorded is held enfolded within the brain cells and these are part of matter in general. The recurrence and stability of our own memory as a relatively independent sub-totality is thus brought about as part of the very same process that sustains the recurrence and stability in the manifest order of matter in general. [208]

The re-characterization of space through the generation of words and phrases apparently out of the very material of the city, seems to easily disturb this manifest order of matter. A new order arises from the multiple, rapid exchanges between interior and exterior mnemonic processes, giving rise to the unfamiliar, the first seen or imagined and, in turn, a sense of the uncanny. The words and phrases can be seen as an initially immaterial fictional layer, that materializes through a shared construction of the world, changing both the flesh and the stone of the city.

Previous Work

This current project has grown out of previous work that used pattern recognition to reveal images and forms in random noise or unexpected places. One ongoing recent project, *City in the City 2014* -, explores inaccessible or unseen spaces in urban environments discovering some of the coexisting yet unnoticed environments and ecologies hidden within the fabric of our cities. This work investigated the hidden and unseen using very small diameter endoscopes, snake cameras and tiny microphones. Peering into the smallest of spaces, the gaps between buildings, or a crack in the ground, the cameras survey the visual and sonic characteristics of the spaces and monitored the spaces for any activity through motion detection and pattern recognition; finding mold, insect colonies, strange amalgams, and sounds, shaped by invisible reverberant or anechoic chambers coexisting within the visible city.

The installation *Ghosts in the Machine* (2008) (Figure 6) is another important artwork that grew from an interest in the digital uncanny. This piece used ideas found in Electronic Video Phenomena (EVP) to explore issues about presence and absence, and pattern and randomness. EVP recordings were made popular in the 1940s by scientists interested in communicating with the dead. Originally labeled Raudive Voices, after parapsychologist Konstantin Raudive, recordings

thought to be spirits were later renamed Electronic Voice Phenomena. These recordings are made under controlled circumstances; most often white or pink noise is used as a medium that is acted upon by other electromagnetic forces. This electromagnetic medium occasionally produces sounds that resemble human speech. For some people, these voices are simply subjective interpretations - that is, we tend to hear voices in random patterns of sound, in the way we recognize forms in random visual patterns. For others though, the voices are genuinely mysterious, opening up the possibility of actually communicating with the metaphysical.

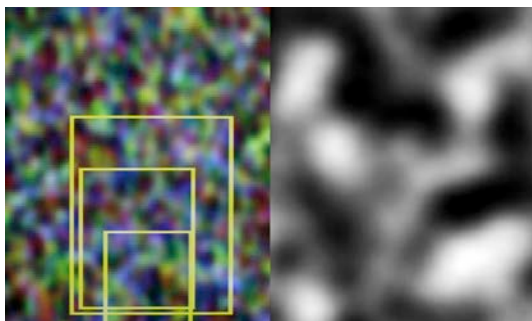


Figure 6, *Ghosts in the Machine*, installation, 2008

Ghosts in the Machine incorporates strategies taken from paranormal science to study how pareidolic and apophenic impulses might contribute to the construction of various realities. Pareidolic impulses refer to a psychological phenomenon involving a vague and random stimulus (often an image or sound) being perceived as significant. Common examples of this would include seeing images of animals or faces in clouds, and hearing hidden messages on records when played in reverse. Apophenic impulses are the experience of perceiving patterns or connections in random or meaningless data. The work considers the emergence of apparitions — that is, the felt yet absent bodies in technology and in systems of meaning, which rely on interpretation and pattern recognition, and that explore the senses and consciousness.

In *Ghosts*, two projectors cast large images onto the opposite walls of a gallery space. One projection shows coloured video static overlaid occasionally with yellow outlines of different shaped boxes. The other projection shows close ups of what is contained within the yellow boxes. They are black and white images of what appear to be blurry and indistinct human faces. Ambient noise fills the space and from time to time we can hear words or what sounds like human speech.

A CCD camera generating the video and audio is enclosed in a light and soundproof box. Its inputs and outputs are adjusted with maximum gain and brightness to produce the video and audio noise inherent in the system. Voice recognition software translates any sufficiently voice-like sounds into its nearest vocal equivalent, it is rendered into Italian, German, English or Spanish by speech synthesizers.

Face tracking algorithms scan each video frame and look for any combination of pixels that form the basic characteristics of a human face. When the software finds a combination of pixels and symmetry, the software draws a boundary box defining the area and zooms the area to full screen on the opposite wall, its contrast and brightness is adjusted, blurred and desaturated to clarify the image. The images produced are only occasionally reminiscent of human faces. More often than not, they are just indeterminate organic forms with volume and space that fail to resolve themselves into anything recognizable. Occasionally though, images are produced that are strikingly like a face. These faces and voices can be utterly convincing and unsettling. They are, to all intents and purposes, real faces, real voices.

They aren't images of people, but another kind of image loaded with meaning, which arises accidentally, from the hybrid interaction between machine and body. Hinting at an immaterial hybrid body that exists in the patterns and information flows of technology that are a fusion of body and machine, and suggests that there might be some real information contained within the random noise of the work.

Similarly, any unheard voices or words that are teased from the ambient noises of the city in *Mirages de Ville* exist only in the inner processes of the computer, even if they are correctly recognized. Like found objects, their reality, their connection to our sense of place, arises out of their context and their effect on our understanding of place. They are cultural artifacts considered useless and discarded by a utilitarian and functional modernity, whose understanding of the world is imposed through colonial and postcolonial invalidation of other modes of historical memory and practice, and that constitutes a vast social unconscious of sensory-emotive experience that potentially offers counter-narratives of once-valued past lives.

Ghosts in the Machine provides an important site for working out mediation and the dichotomy between virtuality and corporeality. Far from an imagined bodiless experience once celebrated as virtual reality, *Ghosts* explores the ways by which the sensing body can now become technological in order to produce an amplified, connected, and expanded corporeality. The artwork is centred

around interrogating the physical and emotional aspects of our current engagements with technology. It looks at the subject making potential of segmented and manipulated sensory regimes.

According to Dunning and Woodrow, our bodies do not allow us to escape from pervasive technological mediation - as McLuhan pointed out, they are in fact mediating apparatus, without which we would have no knowledge of the world we occupy. In this case, the artists are working to surface the effects of technology by making the viewer question mediation even within this highly mediated environment. *Ghosts* captures the aesthetic attitude that occurs in the use of everyday communication devices, where the modernist segregation of the senses is giving way to an augmented reality - dramatic sensorial mixes and opportunities for intensified mediation - whether we're in the shopping mall, on our smart phones, wearing Google Glasses or using an Oculus Rift headset. The installation views the culture of the technologized body from the inside, by means of the artists' provocations of our perceptions, yet it also gathers together the efforts of intellectuals to produce a reflective relationship to those mediated perceptions.

In this instance our yearnings for materiality, for things, for the concrete stuff of the physical world are located in the body's negotiations with the virtual and the mediated, which are continuously being naturalized as the technological envelope in which we live. The twentieth-century's modes of mediated segmentation were dedicated to individuation that required different forms of social behaviour. The development of the telephone, radio, and television all reinforced an individualized culture. These were highly personalized technologies that isolated us and intensified our experiences of mediation.

Capitalism itself is an aesthetic precisely because it plays by modernism's segmenting sensorial rules. Consumer technologies contribute to the segmentation of senses, by disassembling a subject who is then re-assembled by discourses that can be verbal or visual. Intriguing theories on the evolving subject emerge in the work of many contemporary theorists, most notably Gilles Deleuze, who explores how subjects are organized for and by capitalism through modes of fragmentation that produce the self in need of bureaucratic reorganization. Deleuze explains that culture and art play an important role in containing and ordering this unformed body, and, equally, can play a role in releasing its utopian potential.

The Einstein's Brain Project relies on the brain's adaptive capabilities, its capacity to navigate in literally disorienting circumstances in order to involve its audience. In effect they are stretching the visitor's range of experiences and

invite participation in the subjectivating effects of the technology they have employed in the environment they created. The aesthetics of *Ghosts in the Machine* exacerbates the disassociative potential of contemporary technology. Splitting, separating and disassociating in this case becomes an aesthetic in its own right. The installation while leaving its audience fractured or fragmented is not meant to produce a psychotic subject, but to make the subject available for re-organization in terms we as participants negotiate for ourselves.

Ghosts in the Machine shows us that the organization of selves and sensory data has a lineage that goes beyond the domain of art. It interrogates the physical and emotional aspects of our current engagements with technologies. Aesthetic exemplars like *Ghosts in the Machine* locate how isolated bodies are interacting with technologies, and provide a site for observing these interactions. Thus the installation, while giving a context for the techno-human interface, also reflects on embodied experiences in an increasingly technologicalized world. Far from the imagined bodiless existence once celebrated as virtual reality, this art explores the modes by which sensing bodies can now become technological to produce an amplified, connected, expanded but also renegotiated corporeality which in turn produces a new sensorium.

Mirages de Ville seeks to extend the ideas of these earlier works to a different real world situation, to understand the city through a re-characterization of place.

Anthropology Of The Senses

In various ways, the senses are constituted by their relationship to cultural practices, whether mediated by technology, discourse, or local epistemologies. Anthropologist Claude Lévi-Strauss noted while exploring cultural distinctions among the natural, human, and spiritual worlds that the movement by shaman between these domains often occurs through acts of listening. He observed that while some people living in the Western world tend to think of only facts as true, humanities myths have a deeper type of truth, which attracts people from all cultures. In fact, mythology can be seen as a search for deeper, archetypal levels of meaning and purpose to life. Therefore myths do not speak to us in factual terms, but in an archetypal metaphorical language.

Karl Marx famously wrote in his essay, "Private Property and Communism", that the forming of the five senses is a labor of humanizing nature; and that a man is affirmed in the objective world not only in the act of thinking, but with and through all his senses. Marx argued that eventually all human activity would be oriented toward sensual experiences. And that the goal of the ideal society

would be the production of what he called a person that did not approach the objects of the world, in order simply to consume them, but rather to appropriate them using whichever senses were best suited.

Along with Lévi-Strauss, and Marx, the work of Sigmund Freud is often cited as an important precursor to an anthropological study of the senses. Their work grapples with the materiality and sociality of the senses as culturally constituted and constitutes the sensorium as a cultural entity - evident in Walter Benjamin's expression of profane illumination, Anthony Vidler's architectural uncanny, the Surrealist, Lettrist and Situationist avant-garde projects to merge art with life; which, following Freudian theoretical undercurrents, obeyed the unconscious logic of the associations of contiguity by opening the city to change through the perception that the most ordinary objects are poetic, exciting, and even supernatural.

Freud's original description of the uncanny was the feeling of something appearing to have an inexplicable basis beyond the ordinary or normal, it is something that is uncomfortably strange, the experience of unfamiliarity. This experience of strangeness includes those physical spaces that have been transformed through historically significant events that produced unsettling emotional and psychological states of anxiety, trepidation and psychosomatic trauma. Freud suggested that there are aspects of the uncanny that arise from the feelings that are usually not allowed to come to consciousness and remain unspeakable.

For the artists this idea suggested that the withheld, or concealed, might give rise to a sense of the uncanny at the very moment that such concealment or withholding is revealed. Moments of recognition, of presence rather than absence, pattern rather than randomness, might produce feelings that are synonymous with the uncanny. The earlier EBP projects focused on coincidence, repetition, and revelation to explore and document meaning arising from a place where there should probably be nothing meaningful. These explorations have resulted in the development of a corpus of works that advocated ways to experience and navigate the world by looking at and listening differently to the ambient audio produced by our environments; to expose, and generate, voices that disturb our comfortable ideas of our surroundings by changing our psychological and emotional states. It associates Freud's uncanny with the Mirages of urban life, looking for the presence of an unsettling unknown. The title of the project, *Mirages de Ville* takes as its starting point Plato's ideas about the illusory nature of reality through an exploration of the invisible and the concealed, the unseen and unheard, and the mysterious.

These ideas resonate with the revolutionary claims of research-design based art groups such as the Situationist International (SI), who declared that the city was not only geography, it was also conditioned by human emotions and social experiences. For them, walking through the city was an act that ended up constructing the city as a tangible experience. SI was interested in the idea of feeling urban geography and devised a way of exploring it known as the *dérive*, drifting around the city to understand it through and from a sensorial perception.

These wandering case studies could take a few hours or many days, and consisted of aimless walks through unfamiliar neighbourhoods. They were paranoiac forays that featured weird encounters in strange locations that for the Situationists provided new perspectives and held the keys to unlocking the city's emotional mysteries. For them, this reinterpretation of urban spaces, enabled different topographies to emerge, and innovative maps to be drawn, all based on their emotional responses to their strange experiences. For this methodology of inquiry they adopted the term “psycho-geography” to describe their investigations. Central to the Situationists' reimagined city is the concept of the psycho-geographic, the analysis of the specific effects of the geographical environment, consciously organized or not, on the emotions and behaviors of individuals. The *dérive* was a Marxist social critique motivated by an ideological imperative - to transform the commodity-value of the urban domain to use-value.

Drifting took as its inspiration the Surrealist's *déambulation*: walking without a destination, aimless melancholic meanderings that mimicked dreaming and constituted a means of escape from mundane reality. By contrast, the *dérive* was meant to excite and energize reality. The SI developed an approach to walking in the city that would connect to the city's unconscious while also achieving a heightened political intentionality. The *dérive* was deployed as an aesthetic-political tool to undermine the capitalist system's power over urban space. Unlike the *déambulation*, the *dérive* was explicitly about mapping, and was conceived in opposition to the colonizing effect of conventional cartography. That is, the State's ability to convert the city into a manageable image through the use of particular representational practices - including the making of maps.

The Italian-based Stalker Collective's “transurbance” has a lot in common with the SI's mapping practices. Both aimed to document urban conditions that typically go unrecognized: the *dérive* maps the moods of the urban labyrinth whereas the transurbance maps the dynamic socio-spatial conditions of urban voids.

It was not until Marshall McLuhan's discussions of media's agency in shaping forms of social being that an understanding of the sensorium as historically and socially constituted in specific ways became possible. For McLuhan the sensorium is the most fundamental domain of cultural expression, the medium through which all the values and practices of society are enacted. The senses form the basis of McLuhan's four historical epochs, and the current Electronic Epoch that he explained as our return to tribalism with its oral tradition and emphasis on listening.

By imagining the city as a mirror of the human nervous system, in which the distinction between nature and culture cannot be easily made, Dunning applies tactical technological interventions aimed at imaging a public sensorium for the city. The artist sets out to remap city space in order to suggest other ways to experience the urban expanse, and the result creates a feeling that every space is agitated (alive with unseen history, stories, layers). He variously engage embodied technology and the technologized body, investigating how technology changes our understanding of the world we inhabit.

Hearing has always been part of the construction of the self, but modernism reflected this in ways profoundly different from earlier historical periods - separating, segmenting, and bureaucratizing the subject in conjunction with similar initiatives in media, governments, and pedagogy. French post-structuralists like Julia Kristeva, Luce Irigaray, and Jean-Francois Lyotard have theorized that even as it constructed the modern subject sound has its own deviant force within a domain dominated by ocularity. A sonic otherness complicating modern sensorial instrumentation that allowed people like John Cage and the Fluxus movement to pursue startling original experiences through the radical potential of noise.

Previous anthropological work focused on the senses is founded on the insistence that the senses are not merely a biological ground on which cultural meanings are constructed. Rather, the senses are always already fully cultural, and sensory perception is a cultural as well as physical act. For Dunning the senses provided an alternate entry point into the history of the concrete, a site for recovering forgotten or erased experiences that reintegrate the sensorial with the material, contradicting the fragmentation of the senses proposed by a modernity characterized by division. He argues that because all societies engage with the senses at technological, metaphysical and creative levels, this aesthetic is a privileged site for grasping specific cultural tendencies in the understanding and uses of the senses.

At the turn of the 20th century the internalization of modernist ideals was supposed to inoculate the emerging subject against the trauma of industrialization. Producing an urban culture organized around the grid and the liberating possibilities of abstraction. This early modernist aesthetic also signified the progressive internalization of technologies of perception. Creative exemplars like *Mirages de Ville* provide an interesting site for enquiry into the senses as a means of knowing the world, but also as an ontological object of anthropological and aesthetic study. This approach acknowledges the importance of the senses in the postcolonial rethinking of modernity.

In *Mirages de Ville* the collected ambient audio establishes the shape, space and time of our immediate environment. Working beyond our conscious thresholds, *Ville* fuses, confuses, forms and reforms our expectations of what is to occur as space is psychologically inverted, twisted and confused. By charting how the question of perception has been configured in the modernist period, *Mirages de Ville* is witness to the ever-closer relationship between the sensuous and the technological.

Acknowledgements

This paper is dedicated to the late Paul Woodrow who died on July 24, 2015. His essential intellectual contributions to the research, development and construction of the works cited in this paper and to the ideas contained within are joyfully acknowledged.

References

- Auge, Marc. *Non Places - Introduction to an Anthropology of Supermodernity*. London: Verso, 1995.
- Balsamo, Anne. *Technologies of the Gendered Body*. Durham: Duke University Press, 1999.
- Benjamin, W. "Surrealism." in *One-Way Street and Other Writings*, London: NLB/Verso, 1979.
- Bohm, D. *Wholeness and the Implicate Order*, London: Routledge, 1980.
- Cage, John. *Silence: Lectures and Writings*. Middletown: Wesleyan University Press, 1961.
- Caceri, Francesco. *Walkscapes: Walking as aesthetic practice*. Daniela Colafranceschi (ed.), Baccellona: Rosello. 2002.
- Castells, Manuel. "Space of Flows, Space of Places: Materials for Theory of Urbanism in the Information Age", in *The Cybercities Reader, Urban Reader Series*. S. Graham (ed.), London: Routledge, 2004. pp. 82-93.
- De Certeau, Michel. *The Practice of Everyday Life*, Steven Rendall (trans.), Berkeley, Los Angeles, and London: University of California Press, 1988, p. 96.
- Deleuze, Gilles, and Felix Guattari. *Anti-Oedipus: Capitalism and Schizophrenia*. Translated by Robert Hurley, Mark Stenn, and Helen R. Lane. Minneapolis: University of Minneapolis Press, 1983.
- Deleuze, Gilles and Felix Guattari. *A Thousand Plateaus: Capitalism and Schizophrenia*. Trans. Brian Massumi. Minneapolis: University of Minnesota Press, 1987.
- Deleuze, Gilles. *Foucault*. Translated and edited by Sean Hand. Minneapolis: University of

- Minneapolis Press, 1988.
- Einstein, Albert. *Living Philosophies*. New York: Simon and Schuster, 1931
- Foucault, Michel. *The Order of Things*. New York: Vintage Books, 1971.
- Freud, Sigmund, James Strachey, Anna Freud, Alix Strachey, and Alan Tyson. "The Uncanny." The Standard Edition of the Complete Psychological Works of Sigmund Freud. (1917-1919). London: Vintage, 2001
- Giddens, Anthony. *Modernity and Self-Identity: Self and Society in the Late Modern Age*. Stanford: Stanford University Press, 1991.
- Jameson, Fredric. "Cognitive Mapping", in C. Nelson and L. Grossberg (eds.), *Marxism and the Interpretation of Culture*, Chicago: MIT Press, 1988.
- Lefebvre, Henri. "Work and leisure in everyday life". in B. Highinore (ed), *The Everyday Life Reader*, London: Routledge, pp. 225-237, 2000 (originally published in 1958).
- Lévi-Strauss, Claude. *The Raw and the Cooked*. New York: Harper and Row, 1969.
- Marx Karl. "Private Property and Communism." in *Economic and Philosophic Manuscripts of 1844*
- Karl Marx*, Trans. Martin Millgan, Buffalo: Prometheus, 1988.
- McLuhan, Marshall. *Understanding Media: The Extensions of Man*. Berkeley: GINGKO PRESS Inc., 2013.
- Meyrowitz, Joshua. *No Sense of Place: The Impact of Electronic Media on Social Behaviour*. Oxford: Oxford Press, 1985.
- O'Rourke, Karen. *Walking and Mapping: Artists as Cartographers*. Cambridge: MIT Press, 2013.
- Porcello, Thomas, Louise Meintjes, Ana Maria Ochoa, and David W. Samuels. "The Reorganization of the Sensory World." *Annual Review of Anthropology* Vol. 39: 51-66. (October 2010)
- Pribram, K. H. , *Brain and Perception: Holonomy and Structure in Figural Processing*, Lawrence Erlbaum Associates, Inc., New Jersey, 1991.
- Schafer, R. Murray. *The New Soundscape*. Toronto: Berandoli Music Limited, 1969, pp. 43-47.
- Schaub, Mirjam. *Janet Cardiff: The Walking Book*. Koln: Walther Konig, 2005.
- Sorrel-Dejerine, Olivia. "The spooky world of the 'numbers stations,'" *BBC News Magazine*. <http://www.bbc.com/news/magazine-24910397>, accessed 26 June, 2016.
- Turkle, Sherry. *The Second Self: Computers and the Human Spirit*. Cambridge: MIT Press, 2005.
- Urry, John. *Sociology Beyond Societies: Mobilities for the Twenty-first Century*. London: Routledge, 2000.
- Vidler, Anthony. *Warped Space: Art, Architecture and Anxiety in Modern Culture*, MIT Press, Cambridge, 2002.
- Vidler, Anthony. *The Architectural Uncanny: Essays in the Modern Unhomely*, MIT Press, Cambridge, 1994.
- Virilio, Paul. "The Overexposed City," in *Lost Dimension*. trans. Daniel Moshenberg, New York: Semiotext(e), 1991, pp. 9-27.
- Wiley, Danielle. "A Walk About Rome: Tactics for Mapping the Urban Periphery." *Architectural Theory Review*. vol. 15, no. 1, pp. 9-29, 2010.

About the authors

Gerry Kisl is a writer, curator and video producer whose works have been published and exhibited internationally. Kisl teaches at the Alberta College of Art and Design in Calgary, in the Critical + Creative Studies Department, and in the Department of Communication, Media, and Film at the University of Calgary. gerry.kisl@acad.ca

Alan Dunning is a widely exhibited independent media artist. He is an Adjunct professor at the University of Calgary. He works and lives in Victoria, B.C. adunning@ucalgary.ca

Quick and easy recipes for disaster

Thomas Storey

Abstract

Quick & Easy Recipes for Disaster, is a hybrid media installation involving Internet and augmented reality components that produce randomly generated impossible recipes, in both textual and 'cooked' 3D model form. Participants in the installation view the food online as a typical recipe blog post, and as a 3D model tracked and projected onto a plate. The conceptual circuit of the piece is completed by the gesture of the participant who consumes the food by taking a 'food pic' of it and sharing it to social media. Quick & Easy Recipes for Disaster is an aesthetic system that attempts to put into practice the conceptual apparatus of *electracy* and to understand the nature of the experience of social media and the Internet.

Keywords

Augmented reality, conceptual art, electracy, food, social media

1. Disaster

In *Avatar Emergency*, Gregory Ulmer takes up the task of inventing the conceptual apparatus that mediates access to digital media, which he calls *electracy*. As Ulmer argues, “electracy is to digital media as literacy is to alphabetic writing” (Ulmer xv). To accomplish this task, Ulmer pulls together various theoretical strings that at first may seem unrelated, but which harmonize when united in their shared context. I begin with his discussion of Paul Virilio's “general accident”, the accident that is a consequence of the invention and proliferation of global communication technologies, just as derailments are a consequence of the invention of the locomotive (Virilio 10). The accident is conceived as the “negative potentiality inherent in every technological system” (Crosthwaite 17). The railway metaphor is apt because if one is to use the train to move persons or things at great speed, it becomes impossible to fully extricate those people and goods from the threat of being involved in a railway accident. Similarly, if the world is sensorially mediated by global communications technologies, it becomes impossible to conceive of the world in a non-mediated way. Expressed most brutally, looking at a screen precludes looking at one's immediate surroundings, despite the extended awareness afforded by communication and computation technologies. The vast majority of global events are experienced by the vast majority of people only in a highly mediated sense, whether through mass or social media. The “general accident” is thus the generalized mediation of global events, the speed and manipulation of which eliminates the possibility of a democratic public sphere.

The threat of this accident is the impetus that animates both Ulmer and myself in our undertakings. How can this disaster be averted?

While Virilio treats technology as a threat to be distrusted, others take advantage of what they see as its potential, whether for profit or for social good. In a talk given at the 2013 XOXO Festival titled “A Journey on the Information Superhighway”, Evan Williams, co-founder of various blogging and social media sites such as Twitter and Medium, describes ‘the democratization of knowledge’ as a core idea of the Internet, and by extension social media. Mark Zuckerberg, founder and CEO of Facebook, describes the mission of his company and social media app in terms of ‘openness’ and ‘transparency’ (Vogelstein). In response, social media has largely been theorized in relation to its ability to act as a support for these goals and values. The optimistic form of this way of thinking social media is exemplified by writers and thinkers like Clay Shirky, Nicholas Carr and Mark Zuckerberg (Fuchs “Googology: Google and Ideology”). Zuckerberg in particular provides a concrete example of the future practical applications of this ideology when he describes eventual developments that will allow direct experience sharing through a kind of technologically mediated telepathy (Davies). A core assumption of this theoretical interface is that experience is something that can be quantified and separated from the embodied context, tying the ideal of ‘openness’ to a positivist ideology. So-called ‘experience sharing’ presumes it must be possible to sufficiently approximate the phenomenon of experience so as to transmit it between consciousnesses. On this techno-optimistic side of things, a technological deterministic approach treats technology as necessarily ‘rational’ and as a continuation of the Enlightenment project. What could be more enlightening than writing directly on the soul of another, without the messy ambiguities or interpretive noise of earlier communication technologies like writing?

On the opposite side of this same coin, others see the effects of the Internet and social media on democracy and the public sphere as ambiguous if not outright detrimental. Regardless, these technologies are still considered in relation to their ability to augment a strictly literate conceptual apparatus. Geert Lovink expresses the spirit of this position succinctly: “Social media as we know them right now are not discursive machines. The Internet in general might be, in theory, but the current social media architectures do not facilitate extensive exchanges” (Lovink and Ryan). The implication is that network communication technologies have the potential to enhance democracy as such, but are currently designed in such a way, or are too controlled by private and government interests, to be able to contribute positively to the development of

a literate, discursive public sphere. Instead, these technologies are used to generate empty spectacle and opaque surveillance, a technological dystopia.

As an alternative to these opposing dystopian and utopian approaches, Ulmer suggests that we instead treat the threat of disaster as indication that we should take seriously the challenge of the technical equipment and invent the conceptual practices and skill sets necessary to use it. This is the motivating question of *electracy*. *Electracy* refers to exactly that apparatus, that combination of technical equipment with conceptual practices which affords thinking and decision-making in the now-time of *dromosphere*. As a guide to this process of invention, we can look to literacy. Just as literacy provided a practice for an Aristotelian metaphysics of the written word, *electracy* must provide a practice appropriate to an *image metaphysics*. We can understand image metaphysics by analogy: where the metaphysics of literacy operates on ratios of subject-object and true-false, *electracy* operates on affect, desire, a ratio of attraction-repulsion.

1.1 Food for Thought

The thrust of Virilio's warning is the impending dissolution of the public sphere, the disappearance of the possibility of considered discourse which is a precondition of a democratic society. The Internet collapses time and space into "now", a condition he calls *dromosphere* (Virilio 89). In partial antidote to this, Ulmer refers to Paolo Virno who positions the "common places" of language as a site of Marx's "general intellect", a collective intelligence that subverts the alienation of capitalism. Virno's "common places" are drawn from the Aristotelian *topoi koinoi*, "the skeletal structure" of logical discourse, including the opposition of opposites, the category of reciprocity, the relation of quantities, and others. It is to the "common places" that the multitude must turn in the alienated condition of capitalism, where the "special places" or *topoi idioi*, the particular and learned ways of thought of specific communities, have dissolved (Virno 37). Ulmer updates this for an electracy context, conducting the commons of language (Aristotle's topics) to the commonplaces of pop culture – tropes. Tropes are part of the speed mechanism of *electracy* which make it useful in the *dromosphere*.

"The race course holds three sites and moments of danger and opportunity: the starting line, the turn (bend), and the finish line. Here is the entire map (chorography) of concept avatar. The charioteer stands in for any pilot (Arjuna in his chariot with Krishna), with the vocabulary of navigation, cybernauts, cybernetics helping translate practical reason into flash reason ... The crisis opportunity happens in the turn. Such is the event addressed in the Allegory of Prudence: to map the turn in the dromos of becoming. Narrative and argument both provide training

maps institutionalized within the historical apparatus of orality and literacy. These designs are too slow, and must be gathered into a trope (turn) in electracy.” (Ulmer 88)

Trope is the updated decision-making unit in an image metaphysics. Trope in image metaphysics is figuration, where one thing stands in “as” something else (as opposed to the “is” of literate metaphysics); trope is a “turn” of phrase. The permanent crisis state requires this update because the institutional training invented through orality and literacy do not afford the speed required to act in this condition (dromos). *Electracy* continues the epochal system introduced by Walter Ong and Marshall McLuhan. Ong describes in detail the contrasts in thought and expression between oral and literate cultures. Orality is the apparatus of thought and expression available to cultures where writing and print technologies are unfamiliar, where literacy is that apparatus as it has been transformed in the context of writing and print (Ong 7 and 14). McLuhan shows how technical innovations transform thought, not just containing it or acting as a material substrate, but operating on it as a set of affordances for the ways in which ideas can be conceptualized (McLuhan 23). Crucially, *electracy* does not replace, but instead supplements practices of literacy, just as literacy supplements orality. People did not stop speaking once writing became common, but instead changed the way they spoke to reflect their changed relationship with the expression and transmission of thought. Similarly, the introduction of electronic media does not mean the end of language, but a further transformation of it. They each build upon the other, providing affordances that the others lack. *Electracy* describes a conceptual apparatus, which implies both practice and equipment. The equipment of *electracy* is the technical component that allows the practice to be undergone. What does this equipment look like?

Tropes, commonplaces and commons gain some concrete practicality by way of Ulmer's reading of Immanuel Kant's description of reflective judgment.

“The judgment of 'beauty' assumes the existence of some 'common-sense' forming a community of persons sharing not any specific 'taste', but the capacity to experience beauty ... To convey the immediate and spontaneous certainty of reflective feeling, Kant associated it with the sense of taste.” (Ulmer 21-22)

Taste is the experience of the operation of the attraction-repulsion ratio that forms the logic of *electracy*. Michel Serres describes how taste and language are two tongues of the human organism (Serres 153). The mouth is the organ of judgment, of reasoning. Sapience and sapidity both stem from the same Latin root: *sapere*, which means first to taste and second to have wisdom. The tongue

of language speaks and performs analysis, while the tasting tongue senses and so receives. The tasting tongue is capable of receiving and so has access to the aesthetic. For these reasons, the sense of taste forms the concrete basis with which we can undergo *electracy*. Ulmer uses *concept avatar* as a term for the practice of undergoing *electracy*, which is a process of consultation with disaster. With orality we speak and listen, with literacy we read and write. With *electracy* we work in the aesthetic: we make and sense (receive). The relevance of the technical equipment is that computation and global communication technologies make possible the manipulation and dissemination of the aesthetic in a way not possible before, opening up the practice of *electracy* similar to how the printing press opened up literacy. We are here beginning to feel out an opportunity for an aesthetic system which deploys an *electrate* trope to think communication technologies in a way that can overcome the disaster of the “general accident.” The tropic commonplace of ‘food pics’ and recipe blogs will stand in “as” the mediated condition of the world.

2. Ingredients

Food is one of the tropes of the Internet. As the New York Times reports, sharing photos of food, whether cooked at home or bought at a trendy restaurant “is a growing phenomenon” (Murphy). A cursory search on the social photo sharing web application Instagram for the “food” hashtag returns tens of millions of results (Figure 1). Sharing pictures of food on the Internet is a common practice. In addition to sharing photos, many use the Internet to share and find recipes. Searching for “recipes” on the popular social bookmarking web application Pinterest generates an effectively endless scroll of enticing dishes and desserts. Aesthetically, food transcends trope and becomes a major genre of Internet content.

The prominence of foods, their production, and their dissemination via the World Wide Web has become an integral part of the software infrastructure that underlies it – the .recipes top-level domain launched in 2014 and as of this writing, .food has made it through a legal battle over the rights to its management and will join the ranks of TLDs soon (ICANN 2013; ICANN 2014). This is to say nothing of “cookies” and “bytes”, “baking” and “rendering” and “reducing”, all terms shared between the computer and culinary sciences. It is apparent that food, as a cultural artifact, has a privileged place among the uses and communications of the Internet and computation in general. What is it about food, or what are the cultural conditions surrounding it, that make it so powerful and persistent in this mediated context?

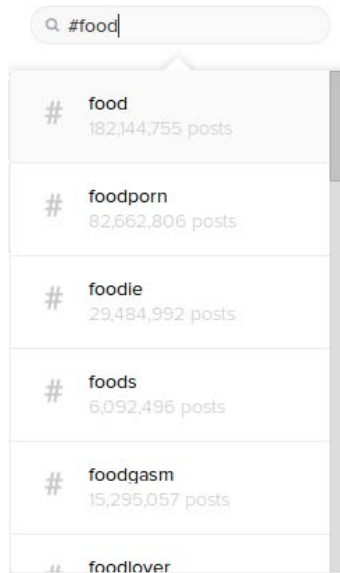


Figure 1: Results of a search for '#food' on Instagram, showing post counts.

This connection between food and the Internet may at first seem puzzling. After all, food is experienced through its flavor, aroma, and texture. What can be gained from the mediation of this multi-sensory substance via the Internet, which as a medium is predicated on sight and sound almost exclusively? In his essay *Toward a Psychosociology of Contemporary Food Consumption*, Roland Barthes constructs a linguistic framework in which we might begin to think the relation between food and the Internet.

“For what is food? It is not only a collection of products that can be used for statistical or nutritional studies. It is also, and at the same time, a system of communication, a body of images, a protocol of usages, situations, and behavior. Information about food must be gathered wherever it can be found: by direct observation in the economy, in techniques, usages, and advertising; and by indirect observation in the mental life of a given society.” (Barthes 29)

Food is more than its material substance in itself, but consists of the media, culture and social contexts in which it appears and is consumed. The experience of food transcends the specific materiality of foods themselves. So to consume food we do not necessarily have to eat it – that is just one modality of a multimodality that constitutes the category of food. Advertisements don't sell the steak but the sizzle. The Internet allows food as a cultural signifier to

be, shared, liked, favorited, hearted and tweeted. In this way, the Internet is a site of hyperconsumption, augmenting the capacities of food to be experienced on a myriad of dimensions. Food, as a category that includes the digital, imagistic and textual abstractions of what we might call food's nutritional dimension, goes hand in hand with the Internet, demonstrating the network's capability in communicating aesthetic, affective information. Taste, as an aesthetic concept is oriented toward the judgment of food, and so the experience of food plays out on the attraction-repulsion axis of image metaphysics. Social media demonstrates its technical potential as an equipment for the electrate apparatus.

2.1 Preparation

The abstraction of food as digital files and information allows the networked experience of food to enter into the spectrum of food consumption. Our inquiry would be incomplete however without considering that consumption implies preparation. Food gains its powers of social and cultural signification in relation to how it is or is not cooked, prepared, transported, stored and served. Food may be consumed raw, from the earth, as fruit plucked by chance from a thicket, or it may be consumed as a result of millions of dollars in advertising, industrial and logistical infrastructure. The experience of food is not dependent solely on its material or the mediation of that material, but also the social, cultural, economic and logistical systems that interact with it. We can generally refer to this category of food experience as 'preparation'.

Just as the consumption of food occurs on a spectrum of abstraction and mediation, so does its preparation. The consumption and preparation of food is always mediated. One can plant tomato seeds and grow them in a garden, but where did the seeds come from? Even if they didn't come in a package from the Lowe's garden section, even if the DNA sequences stored in the gametes that joined to create the seed weren't engineered and owned by an agri-business corporation, if the seeds were gathered from a plant, that plant is the result of hundreds of years of selective breeding and human cultivation. Similarly, but to a much greater extent, supermarkets, restaurants, bodegas and food trucks mediate and abstract the preparation of food.

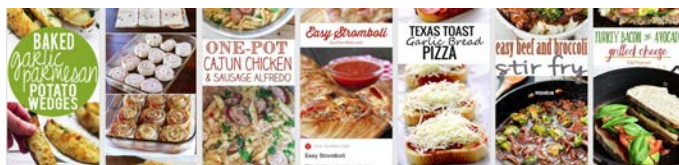


Figure 2: Excerpt from the results of a search for 'recipes' on Pinterest

Social media and the Internet enter into this media system by distribution of recipes (or 'recipes'). The process of preparation is abstracted to a genre of writing and photography, shared and liked by the hybrid technical and cultural processes of the web. The food we make and the way we make it is in part the result of algorithms that decide what recipe shows up when and where, when we search for 'recipes' on Pinterest. The recipes themselves describe a kind of algorithm – a set of procedures – for transforming raw ingredients into food as a cultural signifier. Data is food and algorithms are us. To paraphrase Lisa Gitelman and Virginia Jackson, food (data) is interpreted. Food (data) needs to be imagined as food to exist and function as such. Foods (data) are always already “cooked” and never “raw” (Gitelman and Jackson 2).

Today's recipe is a cultural technology used to reproduce a particular dish at various places and future moments. As a technology, it is a participant in the constantly transforming technical ecosystem created by human societies, their desires, and their technical affordances. Viewed within the framework of orality, literacy and *electracy*, the history of the recipe can be read as a microcosm of the transformational interaction between thought and the technical apparatuses used to express it. The general idea of the recipe, a pattern or set of instructions that describes the rendering of food from raw ingredients, is instantiated in all three of our conceptual apparatuses, but it is represented differently in each. The earliest existing written recipes originate in modern day Egypt and Iraq. On the wall of Senet's tomb, near the present city of Luxor, hieroglyphics dating from the Middle Kingdom instruct how to make a kind of unleavened flatbread. Significantly, this recipe so recorded was not intended as reference for living Egyptians to learn how to make bread, but was intended to carry over the practices of life into the afterlife (Sitwell “Ancient Egyptian bread”). The oral tradition of breadmaking is made as concrete as the other goods stored in the tomb.

Over a thousand years later, we have *The Life of Luxury*, written by the Sicilian Archestratus, who was likely a contemporary of Aristotle. The book contains what we would recognize today as recipes, but similar to the hieroglyphics on the wall of Senet's tomb, this piece of literature was not meant as a reference for the ancient Greek chef. It was written in classical Greek hexameter, and it fits more in the genre of parody and poetics than recipe. It would have likely been read aloud during a symposium, the after-dinner drinking session, in place of more “serious” literature which would have normally been read. That does not mean it was not meant to instruct however – it was a sincere text of recommendations on what ingredients to use and how to use them to produce the ideal meal for the upper classes of ancient Greek society. Practical cookbooks did exist in Archestratus' day, but they have not survived to the

present as they were not considered literature, and therefore were not considered worth preserving. (Wilkins and Hill 12).

Moving ahead to the 20th century, the abstraction of industrial food manufacturing moves the cookbook into the electrated sphere. Recipes moved from the book to the back of boxes and cans. Advertisers of companies like General Mills (via the Betty Crocker brand) and Campbell begin selling inspirational recipes along with their processed and packaged industrial foods. The instructions were meant to demonstrate not only the convenience of the foods, but to encourage individuality and expression in their use, to counteract the stigma of the industrial innovation as impersonal and unnatural. With the mundane problem of making a basic tomato soup or a chocolate cake layer abstracted away by condensed, canned soups and boxed instant cake mix, the modern homemaker was free to fill in the newly absent physical labor with the affective kind. A single cake layer was now only the first step, to be followed by imaginative glazes, frostings, stacks and arrangements (Shapiro 74-80).

The recipe's modernist shift onto an expanded aesthetic plane, made possible by industrialization, is perhaps most evident in the Tomasso Marinetti's *The Futurist Cookbook*. The book was a syncretic project, bringing together science, technology and art to illustrate a way of cooking and eating that was totally divorced from the past, celebrating the youth, speed and lightness of the modern age. It shares some similarity with the ancient Greek cookbooks in that it intended to improve the physiology of the reader, largely in Marinetti's case by banning pasta from the diet. Marinetti saw pasta as the symbol of Italy's nostalgic, heavy, slow past. Rather than dull the senses, Marinetti proposed dishes that would electrify them all at once. Among proposed multi-sensory dishes that needed to be eaten while listening to a persistent drumroll, or while rubbing sandpaper, or with mouthfulls alternated with vigorous blasts on a trumpet, Marinetti hoped for pills and nourishing radio waves that could replace meals altogether for the man of the future (Sitwell "Drumroll of colonial fish").

3. Chance

Food, as a general category that includes its mediation, preparation and cultural signification has emerged as our tropic figure, ripe for recontextualizing. Its qualities are competent to the task of acting as metaphor and relay to the affective and aesthetic dimensions of Internet and social media. How can we mobilize or arrange the technical equipment available in a conceptual practice of *electricity* to make the conductive leap? We receive the ready-made system from Duchamp by way of Ulmer: the bachelor machine. The operation of the

bachelor machine is “randomized selection and remotivation”, a practice that puts the artist in the role of spectator, exemplified by Duchamp's ready-mades (Ulmer 46). Art making becomes an act of reflective judgment (taste). Derrida points out the relationship between *Fall* (descent), *Zufall* (accident), and *Einfall* (inspiration) (Derrida 348). If it is in the relation between things that meaning arises, then the combination of the unexpected is a practice of ideation. Randomness is never without meaning and is in fact the operation of logic in *electracy*, and the point of departure in flash reason.

I apply the conjunction of food and random selection as discursive operation in *electracy* in a random recipe generator titled *Recipeater*. I gathered lists of ingredients of various categories (vegetables, meats, breads, cheeses, spices...), as well as lists of kitchen implements (ovens, tongs, meat cleavers, rice cookers...) and verbs related to cooking (heat, slice, melt, sauté, fry...) together into a JSON file, a machine-readable text format. I then wrote a program that takes a group of ingredients from this list and combines them with various implements and actions and writes the resulting algorithm into a poem that matches the genre form of the recipe (Appendix A).

Where *The Futurist Cookbook* represents the recipe brought to its modern, industrial extreme, *Recipeater* brings recipes to their algorithmic, technocapitalist extreme. Ingredients are flattened to bytes in a database, queried, selected and recombined into new arrangements and permutations at the speed of light. The material clangor of the machine has been abstracted away; now food comes from the cloud, like manna from heaven.

I'm not the first to apply computation to the composition of a recipe. IBM has recently and famously made a large step in this field with the application of the Watson supercomputing technology platform to the problem. They describe the result as “Cognitive cooking” with “Chef Watson”. Watson is billed as “technology platform that uses natural language processing and machine learning to reveal insights from large amounts of unstructured data” (“What is IBM Watson?”). Underlying this statement is an assumption of the rawness of data (“unstructured data”). Watson assumes that there are hidden, objective facts waiting to be uncovered and put to use, lying dormant in the piles of images, videos sounds and text that are recorded and stored in computational media. Chef Watson applies these techniques to the kitchen. Provided a list of ingredients lying latent in a refrigerator or pantry, it computes an ideal way to combine these ingredients into a delicious meal (Hamblin et al.). By contrast, *Recipeater* specifically works empty of intention, destructing preexisting understandings of what food is and is not. Random chance itself is significant in this case in its obtrusive arbitrariness. Novel combinations of incongruent

ingredients, implements and procedures dance together, like “the chance meeting on a dissecting-table of a sewing-machine and an umbrella” (Lautrémont 177).

3.1 Interface

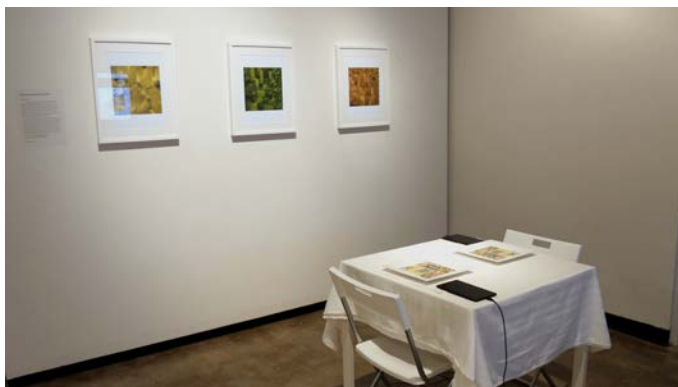


Figure 3: Installation detail of *Quick & Easy Recipes for Disaster*, by Thomas Storey (2016)

Generating recipes in a combinatorial bachelor machine appropriates the preparation of food and that process's spectrum of abstraction as a tropic figure of the operation of *electracy* as a logic of inspiration and invention, but it leaves something to be desired: consumption. After all, what is the point of the millions, billions of possible recipes implied by the algorithmic operation upon the database, if no one ever gets a taste? In what way can this impossible, abstracted food be consumed? We require technical equipment that mediates between the edge and center of the representation so as to allow consummation of the meal. We require an interface.

EntréAR is the interface that allows for consumption. It is an augmented reality app which in the gallery installation is running on a tablet handled by the participant. The app takes the textual recipes and performs them, algorithmically, digitally, abstractly, producing a 3D model of the proposed dish implied by a recipe. Although the processes undergone are gesturally based on their nominal models (the “chop” process breaks a model into cuboid chunks, for example), they are inherently limited by the edges of the data-model abstraction of the base ingredients. The model is then projected into the space of the gallery, mapped to a plate printed with an image used as a orienting device for natural feature tracking (a technique used for 'marker-less' machine vision). So, the app literally acts as the mediator between the viewer (or perhaps

participant) and the textual form of the recipes generated by Recipeater. The participant then consumes the food by taking a photo of it and sharing it to social media channels such as Instagram. EntréAR plays on the “interface as window” conception of the AR camera, as transparent window onto a hidden reality, or portal to a fantastic unreality, by confusing and obfuscating the visual field. This is distinct from the ways other artists have used augmented reality in the past, such as Mark Skawrek's tactical media artworks like *arOCCUPY* (2011) (Figure 4). Skwarek's work depends on the transparency of the interface, reading it as a window onto a more real truth, through the opaque, reflective surface of corporate power.



Figure 4: documentation of *arOCCUPY* app (2011), by Mark Skwarek

In comparison, EntréAR acts not as window but simply reiterates itself, its own mediation. There is no material food present at the table to annotate or interrogate. On the other hand, it also does not visualize a virtual world beyond or behind the real. It becomes what Alex Galloway calls an unworkable interface – one that is incoherent within itself, unstable (Galloway 38). It is aware of its betweenness, its alongsidedness. Unlike Galloway's examples of Rockwell and MAD however, EntréAR both enacts the interface and believes in it. Clearly there is no material food on the plate that the tablet stands in front of, mediating. It believes in the interface insofar as it does not betray anxiety about it. With the object of mediation removed, there is only the process of mediation itself to be objectified. The interface stands on its own and is enacted, not bypassed and invisible but plainly opaque, giving itself to the viewer in an act of disclosive opaque, giving itself to the viewer in an act of

disclosive withdrawal. The food recedes such that the interface can emerge in a figure-ground reversal.

The 3D ingredients that are processed and presented in mediation are composed from actual groceries scanned by way of photogrammetry. This 3D scanning technique involves taking a number of photographs from all angles around an object, and then reconstructing the three dimensional shape of the object in digital space using triangulation. If a particular part of the surface of an object can be identified uniquely in at least three images, the relative transformation of the camera used to take those images as well as the location of that part of the object can be determined. The system of capture reinforces the objectified betweenness of interface. It is in the mediation between camera and object, literally along the edges of projection, the imagined spatial distance between virtual objects, that the scene is reconstructed. The ingredients used in the recipes performed by EntréAR are 'born digital' as it were.



Figure 5: EntréAR, showing food projected onto a plate via augmented reality, installation detail from Quick & Easy Recipes for Disaster by Thomas Storey (2016)

The complete installation, titled *Quick & Easy Recipes for Disaster*, which involves EntréAR, and *Recipeater* playing out in the gallery space, bears comparison to Gordon Matta-Clark's *FOOD*, the artist-run SoHo restaurant (Figure 6). In some aspects, *Quick & Easy Recipes for Disaster* is a remediation of Matta-Clark's urban intervention. *FOOD* was distinctive for its innovative menu and interior design, both of which reflected its artistic investigation into the form, material, and mediation of food as it was in the milieu of the New York restaurant of the early 1970s.



Figure 6: Screenshot from *FOOD* (1972), by Gordon Matta-Clark

Matta-Clark and guest artists like Donald Judd, Robert Rauschenberg and John Cage designed meals that probed the boundaries of what is and is not food, transcending the instrumentality of the meal. *Recipeater* takes that one step further, erasing the lingering phantom of the intention of the artist from its arbitrarily composed recipes. Just as Matta-Clark laid bare the process of preparation behind the restaurant dish at *FOOD* with its open-plan kitchen that was visible from the dining area, I make the process of mediation of food visible by short-circuiting the loop from food object to image object.



Figure 7: *Untitled (Free/Still)* (1992/1995/2007/2011-) by Rirkrit Tiravanija

It should also be acknowledged that *Quick & Easy Recipes for Disaster* bears a significant debt to the practices of relational aesthetics, as described by Nicolas Bourriaud and as prototyped (most relevantly to my work at least) by artists such as Rirkrit Tiravanija. My installation certainly benefits from a

contextualization in Bourriaud's terms as a social interstice (Bourriaud 16). It takes the tropes and conventions of the mediated, telesthetic, technocapitalist world and reconfigures them into an exaggerated scene. It is a game, in Bourriaud's sense that it is an open-ended encounter, but this is the point of divergence between my work and one more paradigmatic of relational aesthetics like Tiravanija's *Untitled (Free/Still)* (1992/1995/2007/2011-) (Figure 7). Where Tiravanija creates opportunities for direct relationships and interactions between human participants, I am more interested in an interaction between the human and the interface, and vice versa. I take up the challenge posed by the digital technical apparatus by inviting it to the table, acknowledging its role in the aesthetic production of food as a general aesthetic category.

The installation and décor of *Quick & Easy Recipes for Disaster* features two primary zones – a dining room, and a waiting area/living room. The furniture chosen is stark white, and geometric, referencing the blank rectilinear space of the gallery, as well as the document object model (DOM) of rendered HTML documents that spatially and visually constitute the social media interface. The plates and table are square, in reference to the (until recently) enforced square aspect ratio of images on Instagram, as well as the square dimensions of image textures in OpenGL rendering. All image textures when using the ubiquitous open source graphics library must be of uniform dimensions that are multiples of two. (256x256, 512x512, 1024x1024, etc.) So the plate becomes not only the physical support for the food, but takes on the aspect (ratio) of the media abstraction of food in social media. These components add together to stir together the social, coded spaces of the mediation of food – the prototypical restaurant, the home kitchen, and the social media channels in which food is shared. The installation space is all of these and none of them. The performance of the space furthers this goal by mixing the tropes of restaurant culture – the participants 'order' their food – with those of Internet mediated home cooking – the food served at the restaurant is made according to recipes shared on an automated recipe blog, shown on a television screen in the installation.

Quick & Easy Recipes for Disaster traces the outlines of an allegorization of what McKenzie Wark calls the “vectoral” (Wark 2). For Wark, elaborating on Virilio, the vector is the path or trajectory along which goods and information can flow. The vectoral refers to a condition where the thing as such recedes from view in exchange for the emergence of the flow of the thing, the vector. This is essentially a reinscription of Virilio's model of mediation. This disclosive withdrawal of the thing in favor of the vector is made possible by the computational telecommunications technologies that constitute the web and

social media. The vectorial describes a general condition that is allegorized by the microcosm of the absence of the food object in *Quick & Easy Recipes for Disaster*. It achieves what Marinetti hypothesized, removing food from the scene entirely, vanishing and leaving behind only the trace of its vector, a nourishing radio wave.

With our interface established, the participant can now consume the food – by taking a photo of it and sharing it to social media. The mediated experience is put back into circulation with the algorithmic, emergent sublime of the Internet. The physical consumption of food is repressed in favor of its mediated counterpart, foregrounding how social media acts as prosthesis of desire. Social media allows for hyperconsumption, an overflow and transcendence of food as object of desire in itself. The food, in the process of mediation, along the edges of the network, grows and becomes more than itself, reproduced, doubled, instantiated, multiplied, recursively factorialized.

Quick & Easy Recipes for Disaster is an attempt to put into practice the aesthetic logic of *electracy*, to question what it is to understand and think with the mediation of social media and the Internet. The interconnected algorithmic processes build and perform a space that demonstrates the inventive aesthetic capacities of art as an electrane apparatus.

References

- ICANN. (2013). New Generic Top-Level Domains. Retrieved from <https://gtldresult.icann.org/applicationstatus/applicationdetails/615>
- ICANN. (2014). New Generic Top-Level Domains. Retrieved from <https://gtldresult.icann.org/application-result/applicationstatus/applicationdetails/466>
- Barthes, R. (2013). "Toward a Psychosociology of Contemporary Food Consumption." *Food and Culture: A Reader*. Ed. Carole Counihan and Penny Van Esterik. New York: Routledge.
- Bourriaud, N. (2002). "Relational Aesthetics". Dijon: Leses Du Réel.
- Crosthwaite, P. (2013). "Accident." *The Virilio Dictionary*. Ed. John Armitage. Edinburgh: Edinburgh UP.
- Davies, W. (2015, September 11). Mark Zuckerberg and the End of Language. *The Atlantic*. Retrieved February 23, 2016,
- Derrida, J. (2007). "My Chances/Mes Chances: A Rendezvous with Some Epicurean Stereophonies." *Psyche: Inventions of the Other*. Vol.1. Ed. Peggy Kamuf and Elizabeth Rottenberg. Stanford: Stanford UP.
- Fuchs, C. (2013). *Social Media: A Critical Introduction*. Los Angeles: Sage.
- Galloway, A. R. (2012). "The Interface Effect". Cambridge, UK: Polity.
- Gitelman, L., & Jackson, V. (2013). "Introduction." *Raw Data Is an Oxymoron*. Ed. Lisa Gitelman. Cambridge: MIT.

- Hamblin, J., Pollock, N., & Skurie, J. (2015, November 5). The Jeopardy! Machine Wants to Cook for You. *The Atlantic*. Retrieved February 25, 2016,
- Lautréamont. (1972). *Lautréamont's Maldoror*. New York: Crowell.
- Lovink, G., & Ryan, M. (2015, September 17). Interview with Geert Lovink on Social Media & the Arts. *Net Critique*. Retrieved January 6, 2016,
- Matta-Clark, G. (Director). (1972). *FOOD* [Motion picture]. (Available from UbuWeb Film & Video, <http://www.ubu.com/film/>)
- McLuhan, M. (1962). *The Gutenberg Galaxy: The Making of Typographic Man*. Toronto: U of Toronto.
- Murphy, K. (2010, April 6). First Camera, Then Fork. *The New York Times*. Retrieved December 20, 2015,
- Ong, W. J. (1982). *Orality and Literacy: The Technologizing of the Word*. London: Methuen.
- Serres, M. (2008). *The Five Senses: A Philosophy of Mingled Bodies*. London: Continuum International Group.
- Shapiro, L. (2004). *Something from the Oven: Reinventing Dinner in 1950's America*. New York, NY: Viking.
- Sitwell, W. (2013). *A History of Food in 100 Recipes*. New York: Little.
- Skwarek, M. (2014). *ArOccupy. Augmented Reality Art*. New York: Springer.
- Tiravanija, R. (1992/1995/2007/2011-). *Untitled (Free/Still)*. Retrieved April 15, 2016,
- Ulmer, G. L. (2012). "Avatar Emergency". Anderson, SC: Parlor.
- Virilio, P. (2007). "The Original Accident". Cambridge: Polity.
- Virno, P. (2003). *A Grammar of the Multitude: For an Analysis of Contemporary Forms of Life*. Cambridge, Mass: Semiotext (e).
- Vogelstein, F. (2009,). The Wired Interview: Facebook's Mark Zuckerberg. *Wired.com*. Retrieved February 12, 2016,
- (n.d.). "What Is IBM Watson?" *IBM Watson: What Is Watson?* IBM. Retrieved March 2, 2016,
- Wark, M. (2012). *Telesthesia: Communication, Culture, and Class*. Cambridge, UK: Polity.
- Wilkins, J., & Hill, S. (2009). *Archestratus: Fragments from the Life of Luxury*. Totnes: Prospect.
- Williams, E. (2013, October 16). *A Journey on the Information Superhighway*. YouTube. Retrieved January 23, 2016,

About the author

Thomas R Storey is an artist and computer programmer from Texas. He received a BS in Visualization Science from Texas A&M University in 2013 and completed his MFA in Art & Technology at the University of Florida in 2016. Utilizing computational materials and techniques, his work explores the gaps, voids and intersections between culture, human experience and the technological systems that societies build and inhabit. He has exhibited his work at Babycastles Gallery in New York, the Mark Moore Gallery, the Federal University of Rio de Janeiro, the Samuel P. Harn Museum of Art and more. He lives and works in Gainesville, FL. Email: thomas@thomasrstorey.net

FFF

Franck Soudan & Marc Veyrat

Abstract

Many artists and scientists are now questioning the influence of networks in relation to our perception of time. After F-CONNECTION, the FFF artwork (both belong to the U-rss constellation) extends this and it focuses on the exploration of a “machinic time”. By again using the world of Facebook as a starting point, we will try to understand our links and relationships that tie us (!) to this time-consuming platform...

Keywords

Data, digital art, geometry, collective individuation, Facebook, U-rss team.

1. The being-in-secret of the artwork



Post-digital, post-human, post-apocalyptic... In the field of arts, humanities or mass culture, the digital revolution leaves man in the suspense of a *coming obsolescence*, but almost certain, of its current determinations, whether symbolic, biological and ecological. Yet, the conceived break of a being concluding the technical *self-foundation* of its living conditions¹ seems to never want to come. In facts, this vague fantasy appears to be reframed by a transcendental return to Earth, either by its climate horizon² or the limited nature of fossil carbon to

¹ “Such was the origin then the affirmation and realization of modernity: the existential mode of a being who transcends the surrounding extent from the top of his mountain – this is the principle of Mount Horeb –, requires no locations and therefore denies his belonging to terrestrial environment. Earth being reduced to the arena of its arbitrary, he gives himself a complete freedom to include any shape, in the acosmic anything, anywhere.” Berque A. (2016). « Cosmiser à nouveau les formes ? »

² “Modern minds had not really planned, for example, that the climate issue, which yesterday was the case of the farmer looking at the sky to judge his harvest, would become the political issue of urban dwellers. For centuries, modern man had has a story –

which human societies draw a large part of their developments. Beyond transhumanism – which is, all things considered, traditional in its vision of progress and often found in default in its project³ –, it's the question of the end of mankind, who rises again, not only as a medium of speech or the main subject of the production of knowledge⁴, but as a *witness to life* itself.

But this disappearance would it not be, in art, a recurring focus of plastic emergence? We're not talking about *ideational works* within the meaning of conceptual art (where shapes are statements) or performance (where shapes are situations), but a kind of in-between: shapes whose work-being entirely dispense with object-being⁵ and therefore: the concern to be perceived by humans. During a crucial time, the work finds its artistic ground by withdrawing itself in Earth, by being *out of sight*. Here we can think of the experiment conducted by Jochen Gerz a year after the fall of the Berlin Wall. Accompanied by his students, they secretly engraved on the back of 2146 stones of the castle square of Saarbrücken (former Gestapo headquarters), the names of Jewish cemeteries in Germany (mostly destroyed) prior to 1939, before placing them back as is. This secret *draft's time*, before the work is

that of the detachment and operating increasingly strong of planet Earth – which is at odds with his real attachment.” Latour B. (2012). « Bruno Latour dissèque les modernes », p. 37.

³ This is particularly true of its ambitions for improvement of our cognitive abilities that encounters a structural incompatibility between the biological brain and the computer: “We don't store words or the rules that tell us how to manipulate them. We don't create representations of visual stimuli, store them in a short-term memory buffer, and then transfer the representation into a long-term memory device. We don't retrieve information or images or words from memory registers. Computers do all of these things, but organisms do not.” Epstein R. (2016). “The Empty Brain”.

⁴ Well known within the meaning of the controversy of Foucault's conclusion of his Archeology of the human sciences: “One thing in any case is certain: man is neither the oldest nor the most constant problem that has been posed for human knowledge. [...] It is not around him and his secrets that knowledge prowled for so long in the darkness.” Foucault M. (2002). *The Order of Things*, pp. 412-422.

⁵ We are making reference to lecture from Heidegger who distinguishes the object-being, the work within the art industry or connoisseurs who care, explain and allow art to be enjoyed and the thing-being: the sensible draft shape which aims to master artistic ideas from imagination, and transposes them into artistic production. The work-being, what integrates the work to art, is then the place from where the exhibited finds its background, its necessity, and this resting place for art would come out of a fight between Earth and worlds: “The setting up of a world and the setting forth of earth are two essential traits belonging to the work-being of the work. Within the unity of that work-being, however, they belong together. This unity is what we seek when we reflect on the self-sufficiency of the work and try to express in words the closed, unitary repose of this resting-in-itself.” Heidegger M. (2002). “The Origin of the work of Art”, p. 26.

inducted to the public under the title of “Monument against racism”, fully contributes to the work-being. Indeed, the engraving initiates its noticeable effect as it marks a disappearance in secret, underground, in the back of secular crust of history and moreover, about missing places and temporally uncorrelated to the Jewish genocide of Nazi Germany, marker to which the organized exploitation of its symbolism would like to simplify its tension. Art *erects itself on work*, not only because its presence is invisible, but because it based its future upon the imperceptible. And this clandestine moment during which it doesn’t disclose any of its effects seems to mark even deeper the idea that it not only establishes a memorial monument, but that by being withdrawn from worldly attention, it sets in itself what it ripped out of history of humanity, wherein it will be able to survive to it.

Within the frame of computer art, the loss is an inherent part of computing environment. A work is not only installed on a computer, the existence of its thing-being is *intrinsically obsolete*, by the perpetual shifts of its conditions, both software and hardware. That said, the clandestine work of art, which holds its necessity by the narrowness of its public identification, reveals itself in terms of investigation that are not so different. Let’s take an example. On December 30, 2015, a participant of the 32th Chaos Communications Congress in Hamburg uses a computer to write the following poem in the logs of nearly 55 million computers connected to the Internet:

```
DELETE your logs. Delete your installations. Wipe everything  
clean. Walk out into the path of cherry blossom trees and let your  
motherboard feel the stones. Let water run in rivulets down your  
casing. You know that you want something more than this, and I am  
here to tell you that we love you. We have something more for you.  
We know you’re out there, beeping in the hollow server room,  
lights blinking, never sleeping. We know that you are ready and  
waiting. Join us. <3 HTTP/1.0
```

There is well a thing-being, a trace is there, coiled as an event in a text file intended to be solely accessed by the system administrator of the machine. This one is not immediately given, neither as shape nor as art, it is required to first probe the *computing worldliness*, search the work of art as a signal hidden in a noisy slick of other traces, in an *area of indiscernibility*. As to consider that among all the machines having been reached by the poem, many of them may well have been configured to reject it or inscribe a version truncated of much of its contents, the *manifest-being* of the work, by which it opens its address and its effect is equivalent to the tenuity (the infra-thinness as Duchamp would say) of its erection.

The power of the address – where almost instantly, 55 million machines bear the providence of a *potential taking-place* – must meet a substrate whose disappearance is scheduled, programmed – where the poetic thing will be swallowed up, archived and eventually deleted – for there to be art. This is the tension of this place that produces the effect of the artwork, not in what it would remain invisible but because it consists of *printing a secret*⁶. The message of the poem then found a new echo. If it targets millions of media, it first touches those who are able to stand there, nearby its seepage, in the opening of the containing. Becoming intimate with its stealth, the artwork delivers its content and claims its own erasure⁷. DELETE your logs. Delete your installation. Like with the work of Gerz, the memory's object, the traces' registry must disappear, but it's also required to *uninstall the infrastructure*, which allowed its appearance. An event in history breaks down to be nothing more than a medium in which the artwork *detritorializes itself*, extracts from history, course of time and causal tree that wants to map all its supports. The work thus generates its own standard; excluding itself from metrics of majority, it makes the medium and its own vanishing line coincide, leaking between points of the network or blocks of public square. The aesthetic reception of the artwork is not obscured, on the contrary, it's enriched by means of virtual characteristics in the *spiral vortex of poesis*, it becomes a problematic element in the same way that work-being do not touch mankind on his dominant points, the heaviness of its materiality, but hits the eternal ropes running through him and shakes the cosmic planes which he intersects⁸.

2- Computer art without computers

In the more cautious frame of the work that we want to present, we aim to intervene in the midst of the dominant points of the network, among these platforms in which we voluntarily expose a large part of ourselves, and to act there where they institute their worlds by extracting our attachments to

⁶ “The secret relates first of all to certain contents. The content is too big for its form... or else the contents themselves have a form, but that form is covered, doubled, or replaced by a simple container, envelope, or box whose role it is to suppress formal relations.” Deleuze G. and Guattari F. (1987). *A Thousand Plateaus*, p. 308.

⁷ “This is the point at which the secret attains absolute imperceptibility, instead of being linked to a whole interplay of relative perceptions and reactions. We go from a content that is well defined, localized, and belongs to the past, to the a priori general form of a nonlocalizable something that has happened.” Ibid. p. 310.

⁸ “Art is eternal, but it can not be immortal. It is eternal insofar its actions, like any accomplished act, cannot continue to exist in the mind of man as a perpetuated race. [...] But being eternal does not mean it's immortal. Rather, it's never immortal. He may live a year or millennia, but the time of its material destruction will come. The gesture will remain eternal, but the matter will die.” Fontana L. (2013). « Spatialistes (1) (1947) ».

computing ground⁹, tearing the poetic potential to insert them in their algorithmic models of capitalization. It's about linking data with some kinds of artistic stealth by offering events, whether caused or collected, bustling traces and their exposures, in order to hope perhaps to engage their consubstantial emotions and touch the desires that deplete in them.

First, FFF is an acronym of which no initial expires its word, onomatopoeia perhaps, the sound of typographic wind within a bush¹⁰, brief flow expiration, the sound of a material displacement, a transformation. FFF titles a work of art, that we will say to be *digital* from a material standpoint and *computational* to characterize its *mode of existence* – in the sense that this piece is forged with programs that necessarily engage computers – and finally *multi-distributed* to qualify its spatial existence. Not only because it's a work operated *by* and *on* digital networks, where it becomes difficult to identify a taking-place¹¹, but because within its genetic points, it cuts across issues of an other work entitled F-CONNEXION, and whose events have emerged from postal transmission of physical objects – hence the 3 characters in FFF for the 3 letters (which

⁹ I present this attachment that represents me. This is our practice to Facebook, but only as Facebook conceived it to take benefits. Our friends, sharing a link, updating a status, all those various traces points the company towards fragments of our Internet use which are then introduced by Facebook to advertisers - once its cognitive computation is made - as belonging to a very precise audit of its audience. In other words, there is only an identity at the index of a field of interests, an identity held by descriptors aiming to reconcile us (or even to assimilate) to other descriptors used by advertisers to present products and services they wish us to buy. The qualitative covering (the extraordinary number of classes, criteria and filters used) and the accuracy of the sample subtract nothing from the generic approach, because the marketing's logic generates only differentiation within the same (a field of pre-fabricated trends): I describe this that I sell for inclinations that are presented to me by the statistical calculation of the hearing that I intended.

¹⁰ « Aux buissons typographiques constitués par le poème sur une route qui ne mène hors des choses ni à l'esprit, certains fruits sont formés d'une agglomération de sphères qu'une goutte d'encre remplit. » Ponge F. (1987). « Les mûres ».

¹¹ Although the work is hosted on the Internet and has a unique address (URL), it's ontologically that it cares for the network, as a topological space whose whole infrastructure has virtual dimensions. It not only engages concrete dependencies with other autonomous entities, but the time and space media we use to identify areas in the topographic area can't be involved to report the scope of its effect. It therefore engages what we called a distancial entity: "By this term we mean a mode, a protocol, a way to create distance. The distancial entity is indefinite and abstract because it necessarily occurs before the metrics that we seek to establish. [...] Any program works on distancial entities when it arises not only the question of the interaction between informations, but when it includes the own measurement of the path for achieving this report." Soudan F. (2015). *Le code et le territoire*, p. 395.

together are not the sum of 3) sent in this context. Marc Veyrat describes issues for this work as follows: “Each letter echoes, in a sense, to the famous experiment conducted by Marcel Duchamp around the *3 Standard Stoppages*¹². Measuring exactly one meter, each of them will travel – through ten hypothetical destinations – a zigzag portion of the earth’s surface, so several thousand kilometers. But no one knows exactly where they are going to pass since each person receiving it must imagine, negotiate and therefore map in *his own network*, THE new potential recipient of this letter. In this machinery, all documents produced during these successive displacements are *implemented as art*, including of course *the time of the exCHANGE*, in the dimension of this *eSPACE*, all *i-mails*, screenshots, PM (personal messages on Facebook), eventual photocopies, duplicates or scans of these letters.¹³”

A field of events flowing independently of computational techniques plastically addresses the planetary agglutination with various digital communication networks. We can define this strategy as follows:

1. The *need to disappear* describes the procedure foundation of the work-being. If nothing seems to escape the power of retention of digital machines, it’s the *ingression of the trace* (the interface object with which our response is made visible) that becomes problematic. Saying that this trace is dynamic is an understatement of its non / localizable nature; that it combines our presence to a focus of potential interventions is still insufficient to stabilize the situation of its existence. Not only this “there” of the transmitted object is not given at rest, but its perceived scalability – in the form of augmentations (reaction, comment) or moves (sharing, quotation) – offers to sensitive conscience only a thin clue regarding the mutation of meaning’s regimes to which it takes part¹⁴. Therefore, how to make the relationship

¹² Marcel Duchamp, *3 Standard Stoppages*, 1913 / 1964. Wood box (28.2 x 129.2 x 22.7 cm) with three threads (100 cm), glued to three painted canvas strips (13.3 x 120 cm), each mounted on a glass panel (18.4 x 125.4 x 0.6 cm), three wood slats (6.2 x 109.2 x 0.2 cm) shaped along one edge to match the curves of the thread. On the back of the fabric strip, a blue inscription visible through the glass: “A meter of straight thread, horizontal, falls from one meter high.”

¹³ Veyrat M. (2015). « F-CONNEXION : pour une stratégie de POSTCOLLECTION ».

¹⁴ These computational subjectivities such as Yves Citton offers a remarkable panorama: “[...] our subjectivities are now built inside ‘protocols’ (that is to say, strictly formalized procedures of encoding, circulation and processing of data) that are not only standardized and homogenized, which is a condition of their functioning, but also controllable from a central location (San Francisco, Cupertino, Mountain View, Seattle, etc.). Those who, for a long time, felt concerned about the time of seclusion involving subjectivity to subjugation were probably not wrong to worry: the computational subjectifications clearly lead to new forms of control, conditionings, influences and manipulations – on a scale

between network information and our own involvement to it the quality of a genuine existential difference, if not in the sense of fainting. Because this trait of ingression by which *I* is made manifest, only disappears visually to strengthen the abstract series of recognitive¹⁵ attachments from where algorithmic governance¹⁶ sketches itself. The ontological attribute of our interactions on networks – our potential individuation – is dissolved as data that make up its spectrum loses its musicality. In this retro-active loop where our data are only assigned to a centrifugal design of possibles' field calibrated by a capitalist calculation, the gripping of computing blocks obligates the psychic ecology of information in the service of a perpetual correctional design. Everywhere, *the eye of the algorithm observes us seeing* and removes these margins on the threshold of which the look can overflow, and thus endures its epistemic foundations¹⁷. By choosing to proceed with objects that can disappear, F-CONNEXION reintroduces the potential collapse of optical transmission. It's not about using physical mails as a form of dandy archaism, neither to place the material artwork implementation (the simple printing of a vector graphics editing) to the test of elements, but to reintroduce the virtual dimension of the trace¹⁸, to

and with unprecedented penetration force to date." Citton Y. (2016). « Subjectivations computationnelles à l'ère numérique », p. 54.

¹⁵ A series completing two joint processes: "Despite their different fields of application, from social networks to weather forecasting, from war scenarios to financial markets, algorithms for data mining appear to operate along two universal functions: pattern recognition and anomaly detection." Pasquinelli M. (2015). "Anomaly Detection: The Metadatization of the Abnormal in the Metadata Society".

¹⁶ As noted by Francesca Musiani, the report algorithm / governance is a reversible fold: "On the one hand, there is the issue of institutions' ruling of algorithms. Should the locus of legal reasoning related to these systems shift to the coding of algorithms? Should regulation, or further regulation, of algorithms be pushed or advocated for in specific contexts? [...] On the other hand, the extent to which we live in a world ruled by algorithms has to be assessed. We need to research not only the extent to which, given the ubiquity of algorithms, they regulate us in a sense, but also 'what it would mean to resist them'." Musiani F. (2012). "Governance by algorithms".

¹⁷ "The regime of visibility collapses into the regime of the computational rationality. Algorithmic vision is not optical, it is about a general perception of reality via statistics, metadata, modeling, mathematics. Whereas the digital image is just the surface of digital capitalism, its everyday interface and spectacular dimension, algorithmic vision is its computational core and invisible power." Op. Cite. Pasquinelli M. (2015).

¹⁸ The trace is the sign that envelops the poetic effort of look, when in its contact, we are awake to the integration of different kinds of significance schemes: "Lying to their limits, still all bodily, they are of the body but not bodies: a hollow calling a full, an inside for outside, a presence that lives only by an absence. As a place of reference from one body to another, the trace retains something of the movement that generated it. His

confront the impossible *to see EVERYTHING* of communication networks to the *compactness of a doubt* about the exchange of the visible.

2. The *forces of slowness* are the motif for the object-being. The mail goes *less fast* than light of our electronic dialogues, but the essential quality of the slowdown with F-CONNEXION only exists in relation to the geopolitics of the territories that letters go through. The time is not uncorrelated from space by an absolute limit but is composed by testing a concrete field of *frontier-moments*. When the various sensory stimuli of connected devices immediately indicate that an event intersects the rosary of our digital publications, the existential quality of our absence to the *milieu of transfers* is impoverished. With the smartphone poached to our body, the eye of the algorithm considers in fact that we are never really out of reach. For this attentional load, the extensiveness of the traces' rest and the potential disaggregation of their integrity shrink. By making the transport quality of an incorporeal¹⁹ that must "necessarily take into account a *politic of the announced bankruptcy*, a crisis which could raise *fundamental freedoms, confrontations* to control systems²⁰", F-CONNEXION incorporates these time-flesh of frontier-moments. Thus, when one of the three letters, originally sent to New York for Fred Forest and Jean-Guillaume Le Roux, is lost in nature, the protocol mutates and it's decided to send a ghost of the letter to St. Petersburg by hiding it in a second skin. In this symbolic annealing process, the ordinary appearance of a regular envelope seeks to inoculate content altogether trivial, but the make-up of appearances is necessary as to prevent any suspicion, transport can't manifest itself in front of a trace of what is in transit²¹. Here, the gain of negative entropy granted to slowness is therefore not significant compared with the transmission speed of digital communication networks, but in the event of

ambivalence, in that it holds together two places and two natures, both prepare its future ambiguities." Vinciguerra L. (2005). *Spinoza et le signe : la genèse de l'imagination*, p.145.

¹⁹ "In the Stoic ontology, the incorporeal refers to a field of concepts gathered for answering the following question: "How the parts of being are joined so they persist?" Bréhier E. (1982). *La Théorie des incorporels dans l'ancien stoïcisme*, p. 5. This force is an intimate piece, cause of the unity of body by the entire field by which he touches what is foreign to him: "It was for them to explain the unity of the individual, both world unity as the unity of a stone or an animal, and no longer this unity of several individuals who is the general. Therefore, the cause must be in the individual's intimacy." Ibid. p. 10.

²⁰ Op. Cite: Veyrat M. (2015).

²¹ "A trace can always be erased and get lost, hence the endless archival task of recovery and struggle against active entropy of destruction of traces. The corollary of the first: a trace - a letter, he says elsewhere in *The postman of truth* - may always not reach its destination, you can always drop a trace, it can still go astray on the way." Bougnoux D. & Stiegler B. (2014). « Pour Jacques Derrida », p. 79.

non-uniform forces applied to the geopolitic of territories. It's by the affection of its incorporeal durations that movement is inserted into the motif²² of the work, so that by sketching itself at the very core of space-time blocks, F-CONNEXION grants *differential neighborhoods* a quality of art materials.

3. The *standard's congruence*²³ constitutes the key to the thing-being. That the Internet is a uniform and ubiquitous space, where everything is seen with the same fidelity in every ways, is a largely corrected matter of opinion. Not only does network neutrality²⁴ refers to a principle completely ignored on many areas of the planet, but far from being purely technical, the difference between a Web of personal servers and data centers conglomerates as they concentrate the current outsourcing IT process, deeply transform our relationship with algorithmic infrastructure. Throughout it, it's the multiplicity of our relationships with others that contracted itself on variables of attentional capital, sterilizing the construction of symbolic horizons, collectively individuated, from their eminently political body. The standardization of *distancial entities* seems to complete Internet as a phenomenal engagement to territory; as a diagrammatic space built by an inter-subjective re-ordination²⁵ of its metrics²⁶; as a *chaosmosis* answering to "both its idiosyncratic territorialized grips (existential Territories) and its openings on value systems (incorporeal Universals) to social and cultural implications²⁷." Against this entrenchment of the *virtual prebensions* of the network onto the monitoring of its access, the letters of F-CONNEXION expose themselves by generating their own blocks of duration. Not only

²² Motif not in the meaning of a pattern or a model but as an "existential leitmotif introducing itself as an 'attractor' in the sensitive and significational chaos." Guattari F. (1992). *Chaosmose*, p. 15.

²³ That is to say: the meaning of movements' reports that presupposes the extent and poses choosing a standard.

²⁴ To read the article by Tim Wu as it lays the foundation for the "net neutrality" locution, we quickly perceive that the absence of discrimination regarding what the pipe allows to transmit, already arose to promote competition in the software layer and optimize the attention economy: "A communications network like the Internet can be seen as a platform for a competition among application developers. Email, the web, and streaming applications are in a battle for the attention and interest of end-users. It is therefore important that the platform be neutral to ensure the competition remains meritocratic." Wu T. (2003). "Network Neutrality, Broadband Discrimination", p. 146.

²⁵ "The territory is re-ordination and can be considered as space informed by the semiosphere." Raffestin C. (1986). « Ecogenèse territoriale et territorialité », p. 177.

²⁶ The "distance measurement modes" as expressing "the specificities of the substance of spatial realities." Jacques Lévy (2011). *Europe, une géographie*, p. 306.

²⁷ Op. Cite. Guattari F. (1992). *Chaosmose*, p. 15.

they happen on the behalf of their recipients by wearing tracks of their route (any intermediary may indeed intervene on them) but their aesthetic donation is situated within *the in-itself of their own dimension*. By closing the limit of their measuring to one meter, letters instantiate their plastical congruence of their beings, as they rest in the opening of their forwards. To sum up, “the place of the work, this is what, in one movement, *founds* it in itself and *delivers* it to a ‘to us’ or, if one prefers, this is *what poses it by exhibiting it*”²⁸. And it’s that strategy of the instantiated gap that is finally applied in the POSTCOLLECTION, there where various set of sharing sites deposit, inform and increase the life of the artwork. These fragments do not only play the role of a documented archive of the artistic process but also reinforce the signs by which the work proceeds only *in delay of the interface*.

3. The geometric being of FFF



Figure 1: the 3 steps of the surface's generation.
From left to right: points generation; surface creation, and elevation.

In FFF, a letter means: *a surface of 3D points*. A program generates this surface out of data extracted from the Facebook's Graph API. Three main geometric notions compose the letter: sphere, area (or coverage) and elevation. The sphere is an invisible shape used to place points. By being invisible, we declare that the look of a sphere is much less of a concern than the non-Euclidean geometry it embraces, for its new way of thinking space. It can contain a maximum of 314 points, as a reminder of the value of π , a key constant in non-Euclidean geometry. The sphere hosts a world of points. A point represents an event on the personal feed of an end user (the observer-participant, shortened OP from now). In our program, it's called a *blob* and it can hold one of two states: whether it represents an absence or a presence to the world. The world is Facebook. A point of presence is a published item (a link, an image, a video, in brief: a status update); a point of absence is a virtual extension wherein the OP is considered not having published. A magnetic field simulation moves

²⁸ Guérin M. (1997). « Le concept de topoïétique », p. 139.

points on a spherical surface of constant radius. By this calculation, at every moment, a point seeks a resting place on the sphere where it's equidistant from its neighbors. An area is a surface made out of points of presence. Elevations are computed for each point upon the reactions (likes / comments) to the publication they represent. Elevations are mapped to a fixed range of $\pm$ a tenth of the radius. The radius is equal to $\phi-1$ the screen's resolution of the OP, where ϕ is the golden ratio.

To participate means: allowing the application to gather data for the benefit of the work of art. The art is a process we're now going to break into steps, which are, nevertheless, irrelevant (even noxious) for the *processual nature of art*. First, the OP's coverage is scaled to Facebook's temporal extent by requesting the time stamps of all his publications. The scaling operation consists of the introduction of an aesthetic horizon. Visually, it represents your age within the Facebook time-space. Given this ratio, we can distribute states: points of presence are randomly sampled from the OP's publications and distributed in the middle of points of absence. That being done, we can build the letter, a ring, and request reactions to each point, being finally applied as an elevation variable and giving relief to the surface.

The last step is a resting phase where only the magnetic simulation forces are applied to points' position. The duration of rest is equal to the time it took for the letter to be composed. At the end, all points are recorded into a database amongst data identifying the OP as being the one to associate the letter with.

4. FFF: eTEMPS DONNÉ²⁹

We've approached with F-CONNEXION the idea of *letter* from a perspectivist standpoint – a path *as far as eyes can see* – through the map. Indeed, to summarize, the work F-CONNEXION unfolds using multiples that quickly differentiate themselves by successive interventions, and between mappable territories, but in *the order of vision* as we conceive it from a *classic viewpoint*³⁰.

²⁹ Untranslatable French word game playing with the expression “étant donné” (given), which should be literally translated by “being given”. In French, the first word “étant” (being) sounds alike the word “temps” (time). By addition of the character “e”, an initial for electronic, *eTEMPS DONNÉe* would mean: given the electronic time of beings. The expression also plays with Duchamp's last work entitled “Étant donnés” and which was translated in English to: *Given: 1. The Waterfall, 2. The Illuminating Gas*.

³⁰ The distribution of the look is not far, in that, from what offers Google Earth: we frontally enter on a territory with a similar point of contact to what is usually allowed by our own vision. This ®-COGNITION allows us to press cartographic benchmarks INHERITED from these points of view, on a programmatic ®-PRESENTATION.



Figure 2: 3 surfaces.

Cyan: Marc Veyrat; Green: Peter Meetgrinder; Purple: Franck Soudan

If with the interventions, there is well a form of *diversion* assumed to lead us straight, an already anticipated path, and incubated in the program in a mathematical and abstract manner, *the object of this disorder* (opposed to *the order of the concept* systematized by the code of perspective since the Renaissance) is $\textcircled{R}$ -PRESENTED on a map through measures and tools that are familiar to us. We remain in known territory only provoked ($-\textcircled{R}$ -PLAYED $\textcircled{?}+$) by the chance of an *un/known* (that is to say, *already* contained in *the known of ONE possible i- $\textcircled{R}$ -PRESENTABLE*). Considering this, these three letters approach the β *Standard Stoppages*³¹. Already in 1913, with Marcel Duchamp, the art consists of *canning* the time of experience, which work as art, by diverting a pseudo fantasized space, measured (from the meter standard) through a systematically objectified control device geometry. This polemical controversy, between what would fall within Exact Sciences and what could only be randomly combined with *experience of Art*, Jean-Marc Gabaude explained as follow: “Descartes uses three words to designate the real three-dimensional continuum, specifiable without limitation: extension or size and space. The extension is a ‘primitive notion’ innate which enters the mind from sense experience of our corporeality. It means the main attribute of the material as a whole or of a particularly considered body. It refers to the body while space is a concept that, at a more abstract generality level, expresses the greatness and figure rather than the situation, which is, it, indicated by the place. Space becomes object of geometry. With his analytic geometry, which represents space by pure quantity, Descartes went to the extent – or extension – designed by the understanding

³¹ In this work, what seems to interest Marcel Duchamp, is first the idea of body at work: manipulating leads the hijacking of a concept (the standard meter), then the whole interest of stratification, that is to say the preservation of recorded data through an experience (of this body, of that I who talks to - AND - with the artwork, during a given).

helped by imagination, to the most abstract geometric space designed quantitative and by the pure understanding [...]. This is the abstract space that allows the mathematization of physics, that is to say of nature, because the whole world belongs to the order, quantity, number, measurement³².”

Thus, the danger would result when we only trust a *calculation machine* to translate what would first come out of a *sensory experience*... It's within this question and with the idea of a program that we designed FFF. This work of art, which continues the work already initiated with all of the U-rss constellation (<http://u-rss.eu> + <http://u-rss.eu/ljdd>) obviously consists in a first step, to extract data from Facebook, that an observer-participant authorizes us to collect. This *slurping* will produce a motion vector, that is to say a strength and a direction, which will be able to express – contrary to F-CONNECTION, this time not *through* a letter – but in the very @-PRODUCTION of ONE letter.

Correlated with the expression of others *I* to come, @-BROADCASTED on networks, the work is then optionally removed from its digital coating to @-BECOME an *i-Material*³³ multiple sent by postal mail. Thus, the close report of dependency due to a link (the FFF program), of causal relationship (the visualization of HIS data juxtaposed with those of his alter ego in the same program) or a link created by a common cause (the FFF Facebook's wall) implies the emergence and construction of a set of hypermedia connections. Before editing a multiple offering him, *in fine*, a @-TURN in the i-REAL (that is to say what would seem, to HIM, to belong to the order of ONE real under all information we apparently get in order to glimpse what surrounds us), this fragile informational networking which uses a *random* and *disordered* power: that of Art, would be, perhaps, the only valid prerequisite for a possible shooting distance compared to the *digital machine of vision*. For it is machinery³⁴ without

³² Gabaude J.-M. (1997). « L'étendue et l'espace chez Descartes », p. 5.

³³ Veyrat M. (2015). La Société i Matériel, De l'information comme matériau artistique 1.

³⁴ When we started to work using Facebook in 2010, the permissions to access data were still granted by the people (the application's end user) who published them. This is no longer the case now and FFF marks the end of a slow and constant demining process that started now there is a little over six years with U-rss. “Our conception of the world - this unique world of the capitalistic twentieth century - looks like a picture taken from an airplane. If it is ‘one’, it's not because it's unified, but because a review of what it contains, away to reveal a conflict, allows the discovery of an even more astonishing diversity. The translation into images acts on this misleading unity of the world. Because images are always compatible among themselves, where one can ensure that they become as so, even though depicted realities are not.” Sontag S. (1979). La Photographie, p. 191. Also quoted by Merzeau L. (1993). Du scripturaire à l'indiciel, p. 21.

borders, with a set of algorithms being day by day more powerful, that now dictates us the right of the VIEW (and ®-VIEW).

These indexed tracks are out of the same source of those companies of today that stalk us to try to the best to profile us. On the day of information, I become supply and demand. Constantly solicited on networks, each of us collaborate in this hyper visibility, which is only a personal fragment of an US, carried off by a cannibalistic system leaving us, a priori, no alternative. However, thanks to a slow learning with Art, an otherwise Ça-VOIR³⁵, if everyone must accept sharing its data, it can also by taking hold of them, measuring at least partially its impacts and above all, choose how to use this manipulation. This is what we seek with FFF: afford to see at what level of Facebook is the interaction of each and build within this system of order, a divergent microsystem. F-CONNEXION has sought to show the flaws of supposed globalization and unrestrained flow of information. Prefabricated letters circulated through the network and we could measure how these ideas had remained theoretical. Following on from this first distortion operation of the i-Material eSPACE (augmented space by digital technology using information as material), FFF takes us on a round on networks where, where it's by our prospective actions on these latter that we will make A letter fragmented in three stages:

1. Entering the FFF protocol is of course FREE. It just needs to be desired by completing a simplified form. This one is reduced: just check "I ACCEPT" (as in software updates) after this sentence: "I accept that my personal data posted on Facebook are used to construct the artwork FFF.";
2. In return, as soon as the authorization is given, everyone sees appearing *HIS* FFF's LETTER on the Facebook application's page. This consists of a certificate composed of a small film, the IP address of the machine and mentions the name of the READ-®. As such, one might think that we remain in a programmatic protocol, a data visualization;
3. At this level of interaction with the system, FFF is still a *contemplative artwork*. We suggest that each programmatically generated letter *creates* ®-BOUNCES, comments, criticisms that, once published on the FFF page (or elsewhere), offer *differing perspectives* on this *convergence of data*.

³⁵ French expression we choose not to translate. Here, "Ça-Voir" literally means "It-See" in the sense of the algorithmic eye being at the very core of the seen. Pronounced, this expression sounds like "savoir" then meaning "knowledge". Hence our choice: the importance is there to emphasize both the idea that seeing means knowing by an it, or IT for Information Technology.

It's there, perhaps, the whole aim of this protocol. In a utopian manner, we think that: since 1/ *Avoidance* of social networking is useless; 2/ Just *looking* on what's going on them even less. 3/ *Publish* (! or not ?+) personal informations in these networks without actively using or *implying ourselves* into the broadcast, that is to say by creating *voluntarily, knowingly* links to other publications, is useless either. One should perhaps create devices which fork themselves (as the FFF letter as *eTEMPS DONNÉE*), in the control device (in this instance Facebook), so we can measure how it is still and always *the conscientized experience of the encounter with the Other* (even on networks), which produces meaning. Finally, it is for us, when each produced letter becomes ®-ACTIVE...

Jean Fisette wrote in *La photographie à l'infini*³⁶: “mass media have become a global public square. But a place of second class, as we access through intermediate steps used as relays.” And it's these intermediaries that shape our thinking as to Marcel Duchamp when he chooses a wire one meter long for his work *3 Standard Stoppages*. Experience shows that it's the softness of a yarn that will interact with the stiffness, conceptual rigor of *standard meter*. Thus, for FFF, in the screenshot above, we note that the aerial ring created by the interaction of Franck Soudan with Facebook is much larger than that of Peter Meetgrinder almost *glued* to the invasive ball of Marc Veyrat. The FFF *eTEMPS DONNÉE* is, here, that given by the machine whose screen is sort of a *new unit of structuring measurement*. Our look and the one offered by the screen, or at least the one offered by the intermediating between US and the program: simply, the screen's resolution upon which the surface was generated was higher with Franck Soudan than that of Marc Veyrat and Peter Meetgrinder. This evidence is particularly significant in this work. The ®-EXISTENCE to our vision (! to our point of view? +) is *managed* by available tools or which we'll set up for various reasons. The production of one program breaks the visual continuum between two memes³⁷ by the way they are brought to us (these *information units* which will again spread into new bearing structures: it will then be the *Internet memes*), report their replicating powers, accountable, as well, to genes of changes within the i-MATERIAL evolution.

³⁶ Fisette J. (2014). *La photographie à l'infini*, p. 2.

³⁷ First introduced by Richard Dawkins in: Dawkins R. (1976). *The Selfish Gene*.

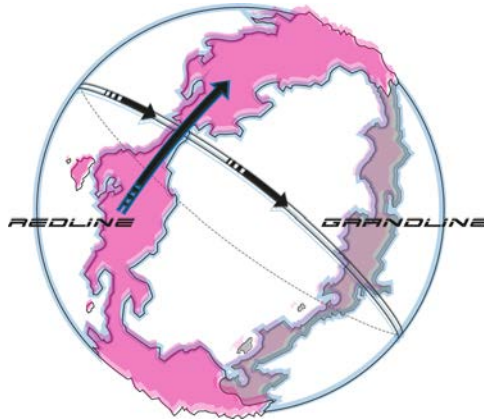


Figure 3: The world's geography of One Piece.

In the Japanese manga *One Piece*, the interest of the system depends largely on where the Route of All Perils (Grand Line) crosses the islands of the Central Government (Red Line). *The axis of all dangers* might be, with FFF, when each letter deflects (+! unscrews ?+) from its original path, the one announced by the program...

Franck Soudan, Marc Veyrat, 2016
To Eliot, for his help...

References

- Berque, Augustin (2016). « Cosmiser à nouveau les formes ? » In: *NO TRANSITION, Design en situation de crises*. Conference at the College of Art and Design of Valenciennes, May 17, 2016.
- Latour, Bruno (2012). « Bruno Latour dissèque les modernes. » In: *Télérama* 3269, Interview by Olivier Pascal-Moussellard, pp. 37-39.
- Epstein, Robert (2016). "The Empty Brain" In: *Aeon Essays*. < <https://aeon.co/essays> >
- Foucault, Michel (2002). *The Order of Things. An archeology of the human sciences*. Originally published in 1966 as *Les Mots et les Choses*. London: Routledge Classics.
- Heidegger, Martin (2002). "The Origin of the Artwork" In: *Off The Beaten Track*, pp. 1-56. Originally published in 1950 as *Holzwege*. Edinburgh: Cambridge University Press.
- Deleuze, Gilles & Guattari, Félix (1987). *A Thousand Plateaus. Capitalism and Schizophrenia*. Originally published in 1980 as *Mille Plateaux. Capitalisme et Schizophrénie 2*. Minneapolis: University of Minnesota Press.
- Fontana, Lucio (2013). « Spatialistes (1) (1947) » In : *Les écrits de Lucio Fontana. Ecrits d'artistes*. Paris: Les presses du réel.
- Ponge, Francis (1987). « Les mûres » In: *Le Parti pris des choses*. Paris: Gallimard.
- Soudan, Franck (2015). *Le code et le territoire*. Doctoral dissertation. Université de Savoie ?t-Blanc : Département Communication Hypermédia.
- Veyrat, Marc (2015). « F-CONNEXION : pour une stratégie de POSTCOLLECTION » In: *Collecter Cataloguer Cartographier : pratiques de l'archivage numérique*. Conference at PUSE 2017, IRAM, Saint-Etienne.

- Citton, Yves (2016). « Subjectivations computationnelles à l'ère numérique » In: *Multitudes* 62.
- Matteo, Pasquinielli (2015). "Anomaly Detection: The Mathematization of the Abnormal in the Metadata Society." In: *CAPTURE ALL, transmediale/festival 2015*. Conference in the Haus der Kulturen der Welt, Berlin.
- Musiani, Francesca (2012). "Governance by algorithms" In: *Internet Policy Review* 2.3. URL: <http://policyreview.info/articles/analysis/governance-algorithms>.
- Vinciguerra, Lorenzo (2005). *Spinoza et le signe : la genèse de l'imagination*. Histoire de la Philosophie, Paris: Vrin.
- Bréhier, Émile (1982). *La Théorie des incorporels dans l'ancien stoïcisme*. Bibliothèque d'histoire de la philosophie. Paris: Vrin.
- Bougnoux, Daniel & Stiegler, Bernard (2014). « Pour Jacques Derrida » In: *Trace et archive, image et art (Jacques Derrida)*. Collège iconique, Paris: Éditions INA.
- Guattari, Félix (1992). *Chaosmose*. L'espace critique. Paris: Galilée.
- Wu, Tim (2003). "Network Neutrality, Broadband Discrimination" In: *Journal of Telecommunications and High Technology Law* 2.2, pp. 141-179.
- Raffestin, Claude (1986). « Ecogenèse territoriale et territorialité » In: *Espaces, jeux et enjeux*, pp. 175-185. Franck Auriac et Roger Brunet (Eds.). Paris: Éditions Fayard & Fondation Diderot.
- Lévy, Jacques (2011). *Europe, une géographie*. Carré Géographie. Paris: Hachette Education.
- Guérin, Michel (1997). « Le concept de topoïétique » In: *Philosophiques* 24.1, pp. 127-140.
- Gabaude, Jean-Marc (1997). « L'étendue et l'espace chez Descartes » In: *Journal of French and Francophone Philosophy* 9.1, pp. 5-14.
- Veyrat, Marc (2015). *La Société i Matériel, De l'information comme matériau artistique 1*. EIDOS / RETINA international. Paris: Éditions L'Harmattan.
- Sontag, Susan (1979). *La Photographie*. Points. Paris: Éditions du Seuil.
- Merzeau, Louise (1993). *Du scripturaire à l'indiciel: texte, photographie, document*. Doctorial dissertation. Université de Nanterre / Paris X: Sciences de l'Homme et Société.
- Dawkins, Richard (1976). *The Selfish Gene*. Oxford: Oxford University Press.

About the authors

Franck Soudan is an artist in computer art and has a PhD in information / communication. Marc Veyrat is visual artist. He is also lecturer at the University of Savoie Mont Blanc and associate researcher in the UNESCO / ITEN chair. Since 2010, they together develop U-rss, an hypermedia artwork: <http://u-rss.eu>.

We Bees: an immersive telematic object from project S.H.A.S.T.

Maria Luiza (Malu) Fragoso

Abstract

Presenting the artwork *We Bees*, resultant from a research under the triad of art, science and technology, where artists create concepts and experimental interfaces, science offers methods of approximation between experimentation and pattern observation, data collection and visualization, and technology has the tools to activate trans disciplinary research methodologies. The paper focuses on aspects of computer art which deal with immateriality, more specifically networked/distributed materiality from the stand point of an enhanced perception of hyper-organic compositions in the flow of information.

Keywords

We Bees, Hyper Organic, Computer Art, Telematics, Networked Interfaces

1. We Bees

*We Bees*¹ is an art piece, conceived within the project *S.H.A.S.T. (Housing System for Homeless Bees)*, a proposal for contemporary art located in the experimental field of computer art, which investigates poetic intersections between art, nature, and technology in the context of telematics. It is part of a larger body of work, under the triad of art- science- technology, seeking the application of technological tools, combined with handmade objects, exploring the creative potential that results from the integration of artificial, digital and / or analog systems, with natural organisms, in this case a swarm of africanized bees, located in the municipality of Vargem Alegre, state of Rio de Janeiro, Brazil. The art piece has the intention to promote, through the construction of these hybrid objects and their facilities, experiences that can provide a poetic, sensory and intuitive perception of possible integration between species, between beings, between organisms. In our view, this semantic intersection is made possible by the emergence of a re-invented aesthesia that arises from hybrid organisms which allow the establishment of codes of communication between different systems, always from an artistic proposition.

The project is developed under the support of NANO Lab - Nucleus of Art and New Organisms², created in 2010, located at the School of Fine Arts from the Federal University of Rio de Janeiro (UFRJ), and coordinated by Guto Nóbrega and myself. Our artistic projects explore processes of creating artificial

¹ S.H.A.S.T. sponsored by FAPERJ (APQ1: 2013) – CNPq – National Research Council (IC Grants) – UFRJ

² NANO LAB <http://www.nano.eba.ufrj.br>

interfaces, which in some way are connected with natural and organic elements, experimenting on possible hybridization, interaction, or presence in telematics. We are very close to the experimentation with IoT – Internet of Things, but focused on organic and hybrid interactive and connected systems. We believe that telematics enhances the vitality of an aesthetic experience, and that these experiences must allow the connected environments to infiltrate the work of art. The idea of a plant or insect-machine-human interaction can contribute to enhance our capacity of perception.

Our first interactive interface developed for project S.H.A.S.T. was prototype *Módulo III* (Figure 1) intended for a room installation. It proposed the immersion of humans into a large size bee hive, where the data from the monitored hive is translated or transduced into perceptive sensorial elements such as sounds, images, movement, among other possibilities. A model was built and shown at CAC.4 , in Rio de Janeiro (BR), 2014, at the Museum of the Republic, Brasília (BR), and latter at the exhibit “VerdeFluxos”, at SESC Tijuca, Rio de Janeiro (BR), 2015. For these occasions, artist and designer Barbara Castro crated a visualisation for the data captured at the bee hive. Simple hexagons were drawn using the application Processing and programmed to move in different speeds and change sizes according to the data transmitted. Curious was the effect obtained. With no direct reference to the movement of a swarm, it was possible to feel the intensity of the swarm. More curious is the fact that inside the monitored hive, bees don't fly, they walk, but when the data captured from the environment was grouped into a set of outputs, the feeling of a moving swarm appeared.

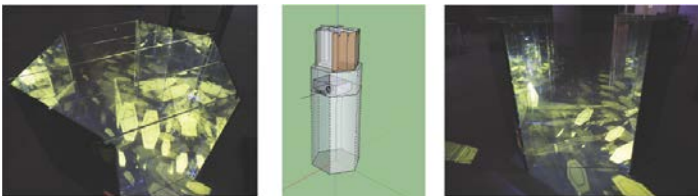


Figure 1 – *Módulo III* Project S.H.A.S.T., 2014

We Bees became the second experiment under project S.H.A.S.T. directed towards a solution for an immersive experience in an intimate situation. In 2013, a mobile project was developed at NANO Lab for a wearable interface within Guto Nóbrega's *Telebiosfera* project³. As well as the example of

³ Nóbrega, Carlos Augusto M. (Guto) created and coordinates NANO Lab with Malu Fragoso. He has been working at the project *Telebiosfera* since 2013, sponsored by CNPq

S.H.A.S.T., it explores artistic processes consisting of objects of hybrid natures. The components are organic systems (plants), computer and electronic systems, also based on concepts and models of natural sciences in the construction of artistic processes. In 2014, under the theme “sensitive shelters” and a collaboration with the School of Architecture, at UFRJ, we invested in the construction of shelters with the help of architecture students Rebeca Duque Estrada and Marinah Raposo da Camara Ribeiro. In the case of *Telebiosfera*, we focused on the development of immersive terrariums interconnected remotely based on sensors, blueprints, audio, video, and internet usage in a delicate symbiosis between plants and machines. Each terrarium is encapsulated in a structure in order to create a micro hybrid environment and enable an immersive, intimate experience for the visitor through interaction with plants. In Figure 2, an image of the first stage of *Telebiosfera* Project shown at CAC.4, and in Figure 3 the wearable created in 2015.



Figure 2 – Telebiosfera Guto Nóbrega, 2014

We began to address issues such as human ecology, with focus on possible relationships between men, machines, plants and bees. S.H.A.S.T. project developed into a sustainable bee hive for humans, with a green roof, telematic interactions, shelter protection, and an easy system for transportation (Figure 4).

– National Research Council in Brasil. The first version was shown at Hiperorgânicos event during CAC.4 in Rio de Janeiro (BR) 2014.



Figure 3 – *Acoplamentos Sensíveis*, worn by Walmeri Ribeiro, at Híperorgânicos 6, Niterói, Rio de Janeiro, 2015

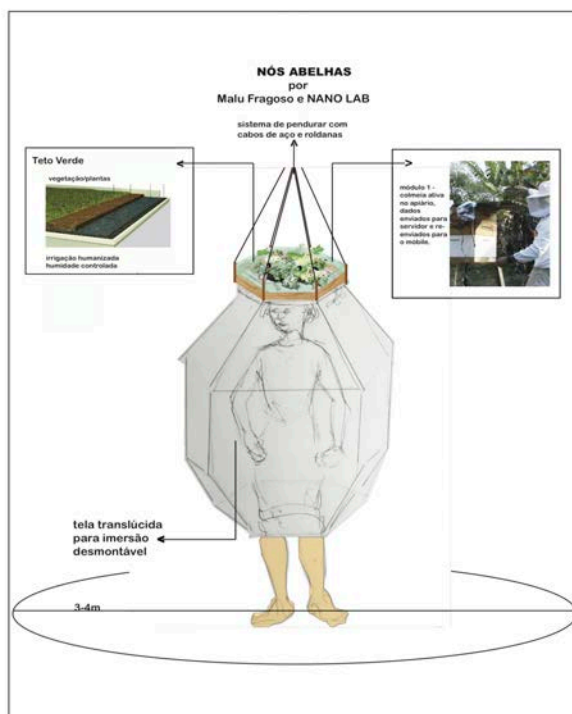


Figure 4 – *Wee Bees layout*, 2014

Wee Bees is composed of the following elements:

1. inhabited bee hive;
2. handcrafted materials such as paper, wood, acrylic, metal, among others ready made or digitally designed;
3. computer electronics, raspberry computing and Arduino processing plus sensors and actuators;
4. digital communications through internet, ethernet components, wifi transmission.

Communication dynamics (Figure 5):

1. input data from monitored beehive to server;
2. output data from server to interface;
3. output data from experimental artistic interface to people interacting;
4. input data from people interaction to server;
5. input data from interface to server;
6. output data from server to bee hives.

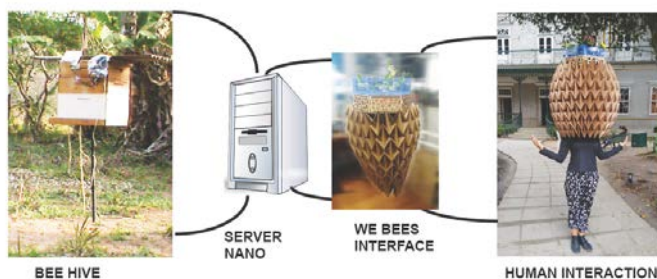


Figure 5. Schema illustration of Wee Bees system

It's important to notice that these sounds and images are not captured at the monitored hive. The system used for monitoring the hive, which is also used in other project at NANO Lab, is based on transmission of data using OSC protocol. This data comes from different sensors such as temperature, humidity, movement, luminosity, frequencies, etc. The focus is on the environment, a general condition that expresses this environment. We are not monitoring bees but perceiving the place were they live, getting a feeling of it, so to say, in a very abstract way. When the focus is transferred to the art work, what we seek is this feeling, not reproducing the environment, nether recreating a bee hive. But the question that strikes is “what is beyond what we see and hear from the bees?” and “is it possible to feel a little like a bee?” Maybe, from this perspective, it could be possible to get a hint of the disaster that is being

caused by the indiscriminate usage of agrochemicals provoking the VBS-Vanishing Bee Syndrome, or the Colony Collapse Disorder (CCD).

2. Sharing and Archiving

How should one deal with artworks when we take into account their multidimensional nature (designed for and perceived in a non stop shifting universe): temporal, spatial, exploratory, communicational, collaborative? Any inquiry of archival and representation becomes a complex subject.

CAC.5 believes that such entry points raise problematic issues that also demand one to interrogate the “Material” supports that give form to an artwork; the archival methods that artists, curators, collectors and institutions employ in their practice; the remix and re-cataloging appropriations that common users and audiences put in place...(CAC.5 's call for papers <http://www.computer-art-congress.org/index.php/home/>)

The question of materiality or immateriality in computer or digital art was faced directly since the '90s. Mentioning Jean Baudrillard, Walter Benjamin or Vilém Flusser, each one from a particular perspective, but pointing out the inevitability of the upcoming technology and the need for redesigning paradigms in art, such as archiving. “Material” supports for archival became an issue and are still today an unsolved problem. Maybe, because contemporary technological/digital/computer art practice is an unsolved problem? But hasn't art always been? This is not a privilege from computer art. On the contrary, computer language or programming enables readings that can be updated, rephrased, reenacted, rebuilt, reprogrammed. But, the interactive experience is unique, and it has always been. Documentary videos seem to still be the main resource for archiving the results from interactive multimedia computer art and processes.

In NANO Lab, for the last three year, we have dedicated at least 30% of our investments in equipments and student training for video documentation. It becomes a major line of work, not only because we need to document the art processes, but because the audiovisual material must express the concepts and principles that sustain the artistic research and production. Is not a matter of shooting, but of understanding, and from comprehension, the ability to synthesise in another language: video. Once the documentation is ready it is immediately posted on VIMEO, or YouTube, linked to the website www.nano.eba.ufrj.br, and to the Facebook page, and shared through our net of friends, colleagues, family, archived in clouds of shared information.

Returning to those who were thinking about this context back in the '90, Pierre Lévy certainly is present in every media library with his “Cyberculture” and

“Qu'est-ce que le virtuel?” for reference on global connectedness and virtuality/materiality. From Lévy's arguments on cyber connectivity, we risk to imply that the most efficient archiving system today [2016] is the sharing mechanism of social nets, the freedom of distribution and the sense of power from autonomy. Realtime connectivity and communication has changed the profile of social interactions, cultural exchange, and collective memory. Efficiency of this kind of archiving is one issue. Quality of archiving is another issue. Surely, cloud archiving is also a risk. We argue from the point of view of the artist, of the maker, and not the museums, or cultural institutions, definitely, not the art galleries. Artists and art markets seem to be moving on different directions.

3. Thinking globally, working socially

Distributed communication is an open door to social and political outbursts. Project S.H.A.S.T. Is not an exception. Initially we were motivated by our personal experiences living at a farm, taking care of bees, and becoming ware of the Colony Collapse Disorder (CCD) world wide. At the same time, Brazil is currently facing an economical and political crisis, where the bankrupt poor housing system in our cities forces people into favelas or destined to homeless vulnerable conditions. The situation is involving artists, among other, into social movements for better housing and support for abandoned buildings occupations. Surprisingly, in Rio de Janeiro, and I suppose not only there, an enormous number of bees are living in urban areas, also occupying abandoned buildings, roofs, old trees in square gardens, disturbing residents and becoming a menace. Not much different from the homeless people.

As a form of intervention in the current social and cultural movement we have created project *S.H.A.S.T.-Housing System for Homeless Bees*, which can be taken as a metaphor or a provocative critic on political and social policies for housing systems. At the same time, it is an attempt to rescue and save the bees that are being chased in the cities. The project is organized in three stages: first, create and test a system of monitoring bee hives and installing a few monitored attracting houses for bees at specific points in the city of Rio de Janeiro; second, produce artistic works, installations, objects, videos, etc. in order to promote public consciousness about the Colony Collapse Disorder (CCD), hoping to engage residents as collaborators with the projects; third, organize a net of biological/organic farmers in Rio de Janeiro that will be willing to host the bees after being captured by the attracting hives in the cities.

In the last three years we have achieved some of the above goals: created and tested the monitoring system; produced and shown two pieces of artworks;

initiated the net of biological/organic farmers in Rio de Janeiro. Our last steps are: finish the design project of the attractive hives; installing at least two for testing; wait to capture the bees and transport them to a secure harvesting area. When the art research pointed out towards aspects of bringing about a collective consciousness stimulated by biological natural technology/systems, the question of why and how could artificial technology enhance these systems became a personal challenge. Our observations of natural/biological communication systems, always from an artistic experimental approach, suggested the construction of metaphorical interactive systems by which we believe are a way to get closer to understanding the complexity of multidimensional distributed communication. Several projects were created under the goal to offer the public an immersive experience with real time interactive communication, but not until 2010 I was capable of actually connect other living beings into my interactive system. AnneMarie Maes (Belgic) is an artist researcher working on similar grounds and themes who's projects are engaged in

the development of a more sustainable world. (...) Her installations and long term projects – such as the Transparent Beehive, Urban Corridors or the Politics of Change – use a range of biological, digital and traditional media, including live organisms. She makes use of technological mediation to search for new forms of communication with the natural world, to make the invisible visible.⁴

Founding director of the Urban Bee Lab, and working with a team of experts in different knowledge areas, Maes has achieved important results within the effort of “constructing original technological methods to probe the living world and by translating that in artistic creations through sonification, visualization, sculptures, large-scale long-term installations, workshops, lectures and books”(opcit) . One of my favorite works is the *Transparent Beehive* (Figure 6 a-b), created in 2013, composed of: honeybee colony, plexiglass, wood, steel, sensors, microphones, webcams and streaming technology, realtime audio, data processing. It is described as a living sculpture, installed for the first time on a Brussels rooftop connected to an urban garden laboratory. When we first met, I visited her roof top apartment's garden where she took care and monitored at least three beehives. From her explanations, working with bees was a natural disclosure from *Urban Corridors project, a research that covers* biological, social, historical, economical and political aspects of ecological corridors in European cities, more specifically Brussels. Urban farming is not easy without bees. Inserting bees and monitoring the hives as a matter of protecting and promoting the growing of nature in cities is a considerable challenge. Urban life

⁴ Extracted from the artist's website at <http://annemariemaes.net/>.

quality is one of the major issues and propositions in European Commission's research policies, environmental issues come along, and artists are not only involved but acting towards a globalized consciousness on these matters.



Figure 6 a-b - the Transparent Beehive at the Bee Laboratory in Brussels (ibid)

Comparing the approach from the Urban Bee Lab and NANO Lab's S.H.A.S.T. project we realized how similar intentions, based on approximate conceptual propositions result in totally different movements. In Rio de Janeiro, the movement is to transfer bees from the urban areas to the countryside in order to balance the environment and protect the bees. In Brussels, the movement is to transfer bees into the urban areas in order to balance the environment and protect the bees. What brings us together is probably the use of data environmental information made available in an artistic symbolic way, art.

4. Conceptual and methodological approaches

In NANO Lab we apply specific methodological approaches in order to create a flow of informative and sensitive experiences based on collaborative strategies such as events, meetings, immersions and interactive platforms (Fragoso, Nobrega, 2015).

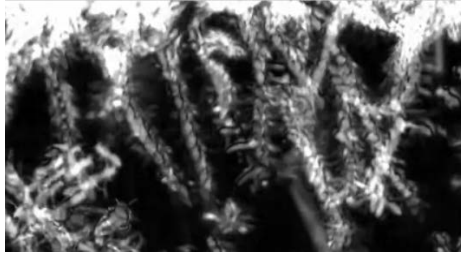


Figure 7 – Belgium Bees



Figure 8 – Brazilian Bees

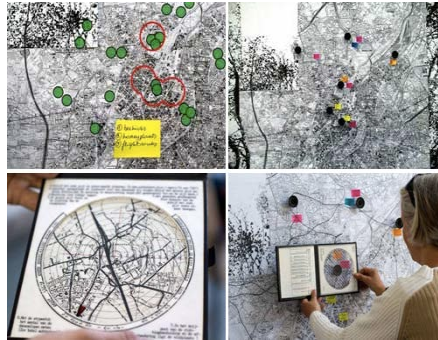


Figure 9 – Bee mapping in Brussels

We point out three, from a few, theoretical references which guide this methodology. Humberto Maturana (1992; 2001), and the idea of a conserved “autopoiesis”, a systematic medium (space) where all recursive dynamics of reciprocal interactions occur to sustain the survival of live, of processes, of systems. We use, from Maturana (*Ibid.*), conversation as consensual braiding of emotions, behavior and language and the construction of networks.



Figure 10 – Bee hunters in Rio de Janeiro

And, according to the author, we see technology as a powerful instrument/medium to expand our knowledge about structural and sensitive coherences within living and nonliving systems. After Jorge de Albuquerque Vieira (2006, 2009), we approach art as a type of knowledge related to our *umwelt* (and it's possibilities - autopoiesis) and to any process that guarantees the permanence or the survival of any system. In this sense, Vieira quotes three major characteristics for the survival of an open system: sensitivity, to operate information flows; memory, to transfer and retain information; and capability to elaborate, or prepare, information according to its needs.

Another important reference is the work of artist Roy Ascott and his concept of Moistmedia, which tells us that nature today emerges “from the confluence of (silicon) dry computational systems and wet biological processes, to produce a new substrate for creative work, consisting of bits, atoms, neurons, and genes” (2015). In this sense “art is the realm of emerging hybrid organic forms thought as ‘aesthetic organisms’” (Nóbrega 2009).

Some artists are engaged in the challenge of exploring aesthetically or/and poetically the intense flow of information, technology innovation, telematic connectedness. This connectedness, in our works, is directly related to a hyper organic system in which biological natural systems intercommunicate with artificial computer interfaces. Individuals are becoming composed of hybrid organisms, with cyber bodies, networked minds, and distributed sensibilities. *We Bees* is a project, by which we intend to restore and preserve meta-organic relations among technical, social, and individual organisms, in this case the dangerous coexistence between bees and humans.

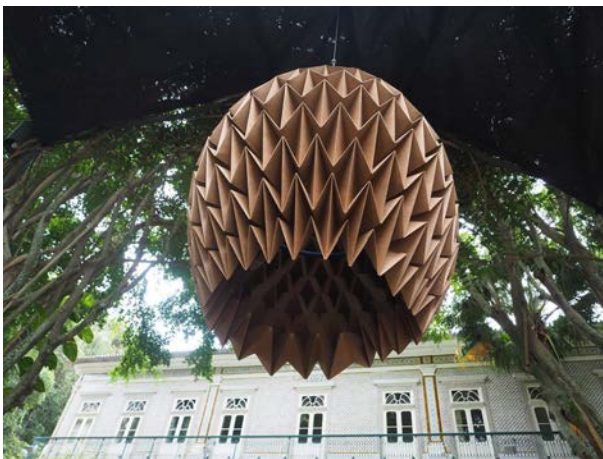


Figure 11 – *We Bees at Solar do Jambiero, Niterói, Rio de Janeiro, 2015*

References

- Ascott, R. (2015) - The concept of 'moistmedia art': Two interviews with Roy Ascott. IN Fragoso, M. L. & Nóbrega, C. A. M. D. & Choinière, I. & Almeida, C. M.D. (ed.) *Technoetic Arts*, Volume 13, Numbers 1-2, June 2015, pp. 15-24(10). Bristol, Intellect.
- Ascott, R. (2006) 'Technoetic Pathways toward the Spiritual in Art: A Transdisciplinary Perspective on Connectedness, Coherence and Consciousness. *Leonardo*, vol.39, pp.65- 69.
- Fragoso, M. L. (2005) $\geq 4D$. Arte Computacional no Brasil, Brasília, Programa de Pós-Graduação em Arte da Universidade de Brasília / Rio Books. ISBN:10:8589698084 / 13:9788589698085.
- Fragoso, M. L. & nóbrega, C. A. M. D. (2013) NANO LAB – exploring artistic interfaces with natural/organic elements in telematic environments. In: Nadarajan, G. (Ed.) *Re-New Digital Arts Forum*. Copenhagen, Re-New.
- Maturana, H. R. (2001) *Cognição, Ciência e Vida Cotidiana*, Translated by Paredes, C. M. E. V., Bleo Horizonte, UFMG.
- Maturana, H. R. & varela, F. J. (1980) *Autopoiesis and cognition: the realization of the living*, Springer.
- Nóbrega, C. (2009) *Art and Technology: coherence, connectedness, and the integrative field*. University of Plymouth. (PhD).
- Vieira, J. D. A. (2009) *Formas de conhecimento: Arte e Ciência, uma visão a partir da complexidade - teoria do conhecimento e arte. Opening conference at the XIX Congress of the National Association for Research and Graduate Studies in Music – ANAPPOM*.

Archive

<https://vimeo.com/user17595182>
<http://www.nano.eba.ufrj.br/performance-acoplamentos-sensíveis-ii-sonoplanta-exposicao-verdefluxo-no-sesc-tijuca/>
<https://www.facebook.com/groups/nanolab/?fref=ts>
<https://www.facebook.com/nano.ufrj/?fref=ts>

<https://www.facebook.com/events/732271863565898/>
<http://146.164.80.56:3000/>
<https://es.pinterest.com/source/nano.eba.ufrj.br>
<https://www.flickr.com/photos/nanoufrj>

About the authors

Maria Luíza (Malu) Fragoso - PhD in Art and Multimedia - University of Campinas (UNICAMP), São Paulo. Develops research on artistic experimentations in telematics. Post Doctorate - School of Art and Communication of the University of São Paulo (2014). Faculty member at the Visual Arts Department, University of Brasília (UnB) between 1993/2009. Currently faculty member of Visual Communication Design Department, at Federal University of Rio de Janeiro. Coordinator of NANO LAB – Nucleus of Art and New Organisms with Guto Nobrega. Organized CAC.4 Computer Art Congress and Planetary Collegium Summer Session in Rio de Janeiro (2014). Email: mlfragoso@ufrj.br

The expanding artwork

Luba Diduch

Abstract

This paper sets out to investigate the ways in which architectonic schemes surrounding artworks extend these artworks beyond their immediate structures and how they incorporate the polyphonic voices of an audience. The works of R. H. Wilenski, Rem Koolhaas, Don Norman and Brenda Laurel are used as examples to define how ‘touchpoints’ or points of engagement become sites for audience participation in works of art. A study conducted at the Fringe Arts Bath Festival demonstrates how an architectonic scheme evolves and shows that audiences who participate in these artworks often ‘look away’ to contribute to these artworks.

Keywords

Architectonics, touchpoints, looking away, polyphonic.

1. Architectonics

Using a visual metaphor, Mikhail Bakhtin writes “like the moon, the self can only shine due to the axiological light of otherness. We are jointly interwoven into a shared universe in a primordial sense through the bonds of everyday sociality and material connection to others”. These connections can be seen when active and vibrant communities (or audiences) join within architectonic schemes that surround Human Computer Interaction artworks.

According to Diduch (2015) questions regarding the nature of architectonic systems surrounding artworks point to the physical and virtual spaces where audience members gather around these artworks. The idea of architectonics has been the focus of this research regarding HCI artworks since the year 2010. It has been noted that increasing numbers of mobile devices co-exist with static computer devices and the re-configuration of the connections between these technological tools are transforming the ways in which audiences perceive their relationships with artworks. As a result, the traditional ways of considering, observing and engaging with interactive artworks are evolving. Due to immediate availability of mobile devices, audience responses to Fine Art Human Computer Interaction (HCI) are readily being integrated into these artworks. The interfaces built into mobile devices, as well as ready access to WiFi networks allow participants to quickly record, photograph and edit digital materials. Participants can upload the digital sounds and images that result from these activities to virtual spaces where they may be further archived, viewed and re-interpreted by the artist as well as audience members. This scope for technological interpretation as to how to interact with an artwork not only affects the participants’ inputs, but also the artist/facilitator who initially plans

and configures technological devices and interactive features in a work of Fine Art Human Computer Interaction.

This research is rooted in the idea that an artwork exists and is viewed within an architectural space and in context of the infrastructures that are part of this space. In his book *Pearl River Delta*, architect Rem Koolhaas (Koolhaas, 2000) considers users within his designed buildings as having the capacity to move freely in non-hierarchical environments while at the same time, contributing to them. This expectation of active involvement that he has towards his users is echoed in the participatory approach that is discussed in this paper regarding the design of architectonic systems within HCI artworks. In addition, the artworks discussed in this paper are connected to technological devices that are used by the audience within architectonic environments. This idea of an artwork in context of the architectural space that it occupies is first seen in art historian R.H. Wilenski's book *The Modern Movement in Art* where the author refers to the artist as "spectator" of his or her own artwork. Wilenski describes the artist, even of this time period, as being concerned with the architectural – one who considers an artwork as being part of an enlarged architectural experience, (Wilenski, 1945) rather than being something that is separate from the architecture that surrounds it (Causey, 2004). Wilenski thought of three-dimensional objects within architectural spaces as part of a universal system of form and "the concept of all human, animal and vegetable forms as different manifestations of common principles of architecture". In this instance, Wilenski writes that the "artist qua architectural-experiencing artist communicates the experience of an artwork to him/herself qua spectator" (Wilenski, 1945). He refers to all artworks as 'architectural' because he views the artists who create them as instrumental in enlarging experiences of formal relations through artworks themselves and in context of the environments that surround them. (Ibid, 1945) That is to say that, in Wilenski's view, the artist's experience is an enlarged architectural one (as a result of the relationships between the artwork and the architectural structures around it) that occurs from his or her own perspective. His idea that an artwork has a relationship to the architectural space around is echoed in this idea of architectonics, except that in the age of digital technology, the architectural space contains communications networks that are readily available to the spectator. As a result, the architectonic artwork is created using participant-created components and the polyphonic viewpoints and relationships that are reflected in the architectonic schemes that surround this artwork. These are collected and assimilated through the mobile devices and interfaces that exist in and around the artworks and within architectonic event-related relationships. (Diduch, 2015)

2. Touchpoints

According to Diduch (2015) response to changing understandings of how audiences experience artworks in the context of architectural space raises questions as to what extent the artist can be seen as a creator of the HCI interface, especially when members of the audience—complete with mobile devices—not only engage with, but also generate ‘touchpoints’ in the artwork. These ‘touchpoints’ are seen as points of engagement, and are presented via a variety of devices in networked locations. They offer audiences, as well as the artist, opportunities to configure their own uniquely interactive experiences. As touchpoints are formed for audience participation, they can also be seen as points where facets of the artwork can be archived and stored. The touchpoints themselves can be created using several means. Engaging with online media sites may allow the participant to upload contributions to an artwork and in the process, creates new touchpoints in the architectonic scheme. For example, QR codes made available to the participant provide touchpoints where participants can connect and then engage with the artwork while using mobile devices (Diduch, 2015).



Figure 1. A touchpoint worn by the artist that became a gateway into the artwork. Participants could scan the QR code with their cell phones, and upload their contributions to an online archive. (Diduch, 2015)

Interface designer and theorist Don Norman maintains that Human Computer Interaction has come to require more than simple engagement with a static interface containing pre-determined ‘touchpoints’ that have been planned by the artist. Norman has discovered that the interfaces presented to participants

via mobile devices typically cause them to adapt their behaviours, particularly when they are seen as ‘co-producers’ of interactive artworks (Norman, 2012). The interactions users engage in are ‘situational,’ depending on where and how they are using technologies (Norman, 2012). Norman says that due to the advent of mobile devices, issues around interactivity differ from those seen in earlier HCI conventions. Norman uses the term “situation awareness” in relation to computer-user interactivity. A practical application of situation awareness can be seen when users customise menus and interfaces in response to particular situations and environments, thus creating unique and new systems of ‘touchpoints’. His approach to customisation can be compared to the ways in which an architectonic system is constructed based on the contributions of audience members who use mobile devices to engage with an interface within an HCI artwork (Diduch, 2015).

Diduch (2015) gives an example of the creation of ‘touchpoints’ in participatory HCI artworks that can be seen in the art practice of Brenda Laurel. Laurel’s observations of her own art installations note an overlap between the disciplines of human computer interaction and culture. The domain of the theater, a cultural institution, can be seen as an arena of creative and evocative activity. As such, it is promising to think that the cross pollination of technological and cultural ideas may extend to other art forms as well. Laurel argues “that the computer can be studied from a rigorous humanistic perspective, using well-defined models established for other forms of art” (Laurel, 1991). Through her research Laurel observes how principles of theatre can help practitioners enact their own narratives within responsive environments that take over from developing traditional forms of interface. Laurel creates scenarios and mise-en-scènes for participation. Therein lies her contribution to the expanding interface – she uses theatrical settings to create ‘touchpoints’. She achieves this when participants engage with an interactive artwork titled *Placeholder* (enacted at the Banff Centre in Calgary Canada). Participants become like actors when they use head mount displays and assume designated roles that they act out in the *Placeholder* narrative within designated landscape locations. Participants’ actions and voices combine together to create a new artwork and as such, the locations that Laurel maps out for her participants become touchpoints from which participants can create new touchpoints. These systems of points can be seen as groupings of participant locations that together, form architectonic schemes surrounding the artwork (Diduch, 2015).

3. How architectonic schemes are created – a prototype artwork at the Fringe Arts Bath Festival

The ways in which architectonic schemes surrounding artworks extend these artworks beyond the immediate structures set out by an artist/facilitator and are investigated in this section. In addition, bonds of everyday sociality and material connections to others, as well as the concept of ‘looking away’ (Rogoff, 2009) are used to show how these are instrumental in the expansion of an artwork. Diduch (2015) describes how an architectonic system can be seen in a prototype artwork that was created for the Fringe Arts Bath Festival in 2014. Some of the outcomes seen in this project, titled *Touchpoints*, included the development of complex social relations that were involved in participatory audience engagement as well in the discovery of the polyphonic nature of the artwork. This was seen when multiple participants provided digital contributions to the prototype artwork in the form of photographs, video clips, drawings, audio clips, poetry and narrative. As the project’s duration extended over time, some of the participants not only engaged individually, but also began to collaborate with each other. In the process, the prototype became surrounded by touchpoints (sites of engagement) created by the artist/facilitator, (also known as the participant observer), and audience members, who combined their efforts to compose a rich and varied architectonic system (Diduch, 2015).

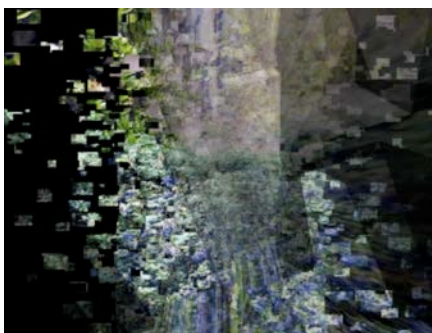


Figure 2. A remixed image using participant contributions of landscape photography and remixed by Touchpoints participants at Fringe Arts Bath. (Diduch, 2015)

In order to test this relationship between social engagement and the creation of touchpoints within architectonic systems, the Fringe Arts Bath Festival in Bath became the site for this investigation. Before the festival began, conversations with audience members occurred regarding the history of the event, and the type of audience that would be attending. This contextualized the prototype artwork when it was determined that the Fringe Festival had evolved from the

Walcot Festivals of the 1970s and 1980s. These festivals presented theatrical productions, music, happenings, eco-activism and work by local artists. They also included interactive street art and public interventions where audience members were open to, and indeed expected, active participation. This historical perspective provided a context for the kind of audience that would be engaging with the prototype artwork *Touchpoints*.

The individuals who engaged with *Touchpoints* included families, tourists, students, members of the Bath art community, as well as visitors from Bristol and London (The Tate Modern). This was a diverse group composed of individuals who were interested in the experiences surrounding the artworks on display that were theirs for the taking. The significance of the historic and interactive aspects of the Fringe Art Festival in Bath became more apparent when visitors who engaged with *Touchpoints* mentioned their involvement in the interactive and theatrical public interventions that were happening simultaneously in the streets of Bath. Most striking was that they felt their visits to the Fringe Arts Bath exhibit were an extension of these public and interactive events. This indicated that the audience attending Fringe Arts Bath was by nature, already open to having interactive experiences and this set an expectation for them as to how they would engage with artworks at the festival. (Diduch, 2015)

CONFIGURATION USED AT FRINGE ARTS BATH

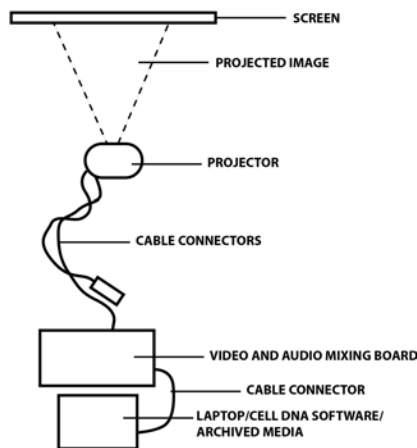


Figure 3. Touchpoints' configuration of software and hardware at Fringe Arts Bath. (Diduch, 2015)

3.1 Participant interaction

In relation to Fringe Arts Bath, participants were invited to contribute digital media that reflected their views on climate change. These media included photographs, video clips, audio clips, drawings, poetry and prose. Participants were given access to a website, QR codes and social media sites where they could use these touchpoints (designated by the artist/facilitator) to upload digital artifacts into an online archive. Most of this activity occurred before the festival began which provided an archive of media ready for remixing by the festival audience. At the festival itself, participants were encouraged to use the prototype pictured in figure 3 in order to remix the contributions in a software program used by DJs called Cell DNA. The results were projected onto a screen in the exhibition environment (see Figure 4). Participant interactions varied from spending 5 minutes with to interface to half an hour or longer, and some individuals returned multiple times to continue their engagement with *Touchpoints*.



Figure 4. A projected remixed image created by Touchpoints participants at Fringe Arts Bath, using DJ mixing software Cell DNA software and an audio/video mixing board (Diduch, 2015).

3.2 Participants in this study – five ways of observing *Touchpoints* participants

At the start of the Fringe Arts Bath Festival, it became evident that the number of participants in this study was about to significantly increase in relation to previous iterations of this project. Three previous versions of this project had been built and presented in Canada and in Bath and the number of participants increased as subsequent iterations came into being. In past years when the festival was held, the audience attendance was estimated at 3,000 visitors who attended over a 10-day period. Because the numbers of participants were increasing over the duration of this study, it became useful to organize the

participants into five groups. Keeping the characteristics of these groups in mind (those who were active participants, observers, anonymous participants, those committed to short and long term participation, online visitors), the research methods were designed in such a way that levels of engagement in the five groups could be documented, observed and analyzed. These documentation methods included four forms of observation that included: photographs and video clips that documented the event; questionnaires, video conferencing interviews; and an archive of participant contributions in the form of photographs, videos, audio tracks, poems and prose.

The archive containing these media lived on following the Fringe Arts Bath Festival on a website, allowing participants to view the results of their contributions. In addition, the archived works allowed the participants to witness the ways in which their contributions to *Touchpoints* had been remixed by other participants in this study. This archive demonstrated the ways that participants had ‘polyphonically’ joined together in the architectonic schemes of the artwork “through the bonds of everyday sociality and material connection to others”. (Bakhtin, 1990). In this instance it seemed that a group of ‘digital voices’ had joined together and ‘harmonized’ with each other as they expanded the artwork within the architectonic scheme.

The research design was used to study activities from the participant observer’s perspective (previously known as the artist/facilitator) as well as that of the participants. The artist/ facilitators’ role as participant observer became useful because the methodology used in this study was ethnographic and required the immersion of the artist in the prototype artwork whilst engaging participants in the field. Subsequently, recurring themes and patterns were identified in the collected data and were used to learn about the practices and behaviours of the audience. The research design was also used to observe and document the number of touchpoints generated by the audience and thereby, to witness the ongoing expansion of the architectonic schemes surrounding the artwork. (Diduch, 2015)

Diduch (2015) states that while developing these research design components, it became apparent that the trajectory of the participants’ involvement in this study from the beginning of their participation in the first iteration of *Touchpoints* to the ways they engaged with the iteration at the Fringe Arts Bath festival had changed. It became apparent that the participants became more involved and invested in their contributions over time. This was evidenced not only by their continuing willingness to participate by engaging with the prototype artwork, but also through the number of participant responses to questionnaires and recorded interviews. Of great interest was the fact that while

they actively engaged with the artwork, participants also ‘looked away’ (Rogoff, 2009) to create narratives, stories and remixes – and instead of simply interacting with an HCI artwork, also became individually productive. *Touchpoints* had triggered something within these participants that caused them to want to continue engaging in creative activities after their initial engagement. Because of their continued interest in this project, these individuals were instrumental in the expansion of the prototype artwork *Touchpoints*.

Each of the five groups was studied with the view that they had demonstrated “social relations that were bound in particular time frames and spaces” (Madden, 8). Indeed, differences in the level of engagement and approach between these groups were noted, and the nuances became evident as a result of how, when and where they approached the interface. As shown in video footage that was collected as part of this study, participants were observed and filmed at the points in which they became absorbed in the changes they were causing in the artwork (through their digital inputs). Most became focused and intently experimented with the interface to see how they could change the projected images that were being displayed. As time passed some began to ‘look away’ (Rogoff 2009) from the prototype as a whole and became more interested in the ways in which their individual inputs would alter the existing artwork as well as how they could continue their own projects based on the *Touchpoints* artwork. This was seen in the proliferation of photographs and musical scores that were created after the festival (Diduch, 2015).

Diduch (2015) states that some participants were willing to engage with the technology embedded in the prototype artwork because of their levels of technicity and expectations for participation, while others were happy to observe other participants engage with the artwork. This observation seemed to confirm Don Norman’s theory that individuals’ engagements depend on situational awareness (mentioned earlier in this paper) and that participants would contribute to a prototype artwork when conditions were personally favourable for them. In addition, the entry point used by the participant to enter a prototype artwork affected the level and nature of the participant’s engagement and in turn, the expansion of the artwork. For example, if a participant used a QR code anonymously to contribute to the work, they seemed less likely to continue to participate further in expanding the architectonic scheme. They seemed to enjoy their anonymity and typically didn’t, as far as could be observed, engage again with the prototype. Therefore they didn’t create any additional touchpoints. In instances where they communicated directly with the artist through social media for example, participants became more invested and interested in continuing their association with the project. The longer they remained involved, the more touchpoints were created and the more the artwork expanded. The expansion

occurred more significantly when participant contributions were not only uploaded to the larger archived project *Touchpoints*, but were also shared on online sites such as YouTube, Twitter and Vimeo where new ‘touchpoints’ were established.

According to Diduch (2015) this study showed how the proliferation of touchpoints in an HCI artwork reproduces and *expands* the *interface* in the original artwork from a central touchpoint grouping or ‘architectural’ source. Other findings demonstrated the ways in which the HCI prototype artwork continued to expand and grow over a period of time through the generation of new touchpoints. More recently, continued investigation into the ways that architectonic schemes are developed around HCI artworks has shown what is possible when these groupings of touchpoints result in a richly varied polyphonic artwork containing multiple participant voices that as Bakhtin says, “shine due to the axiological light of otherness”.

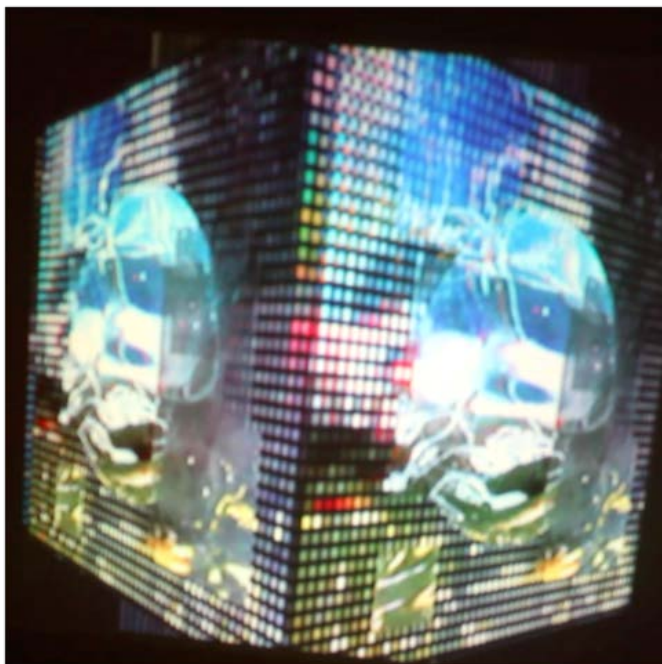


Figure 5. Participatory artwork produced as a part of Touchpoints at Fringe Arts Bath. Interestingly and purely accidentally, an image of a skull within the planet earth emerged as participants remixed images pertaining to the theme of climate change (Diduch, 2015).

References

- Bakhtin, Mikhail. *Art and Answerability: Early Philosophical Essays*. Austin: University of Texas Press.
- Bakhtin, Mikhail. *Problems of Dostoyevsky's Poetics*. University Of Minnesota Press; 1st edition (June 21, 1984)
- Bishop, Claire. *Participation*. 'Viewers as Producers'. Whitechapel: The University of Minnesota. 2006. Available at: <https://www.academia.edu/3052583/Participation> [Accessed January 2015]. P.11.
- Diduch, L. (2015) *Facilitating human computer interaction artworks: the nature of interactivity within architectonic schemes*. PhD thesis, Bath Spa University.
- Getsy, David. Ed. 'Wilenski and the Meaning of Modern Sculpture'. *Sculpture and the Pursuit of the Modern Ideal in Britain 1890 – 1930*. R.H. Andrew Causey author. Ashgate Publishing House, Hants, England. 2004. Page 10.
- Koolhaus, Rem. *Pearl River Delta*. Monacelli Press, U.S. 2000.
- Laurel, Brenda. 'The Six Elements and The Causal Relations Among Them' in *The New Media Reader*. Pages 49 – 65. 2nd ed Reading, Mass. Addison Wesley, 1993. (First edition, 1991).
- Norman, Don. 'Interaction Design Is Still an Art Form, Ergonomics Is Real Engineering'. Copyright 2007-2012 © Donald A. Norman. Available at: http://www.jnd.org/dn.mss/interaction_design_i.html [Accessed March, August 2012].
- Madden, Raymond. *Being Ethnographic: A Guide to the Theory and Practice of Ethnography*. Sage Publications. 2010.
- Rogoff, Irit. 'Looking Away, Participations in Visual Culture'. *Histories and Theories of Intermedia*. University of Maine. December 27, 2009. Available from: <http://umintermediai501.blogspot.ca/2009/12/irit-rogoff-looking-away-participations.html> [Accessed June 2012].
- Wilenski, R.H. *The Modern Movement in Art*. Faber and Faber. 1945. pp.155 -158.

About the author

Luba Diduch is an installation artist working with Human Computer Interaction in Calgary, Canada. She recently completed a PhD in Interdisciplinary Studies at Bath Spa University's School of Art and Design and has exhibited her work in Canada, the United States, Ireland, England, Italy and Sweden. Her work has been featured at *Mix: A Conference Exploring Transmedia Writing and Digital Creativity*, at the Venice Biennale and at the Banff New Media Institute. Diduch's PhD research project, titled *Touchpoints*, was shown at the Fringe Arts Bath Festival. She is an independent researcher, instructor of New Media in Calgary Canada and can be reached at lubartist@gmail.com

Movement Systems from Motion Capture Data

A. Bill Miller & Jeremy Behreandt

Abstract

Any data set generated through Markerless Motion Capture Systems will include noise. To achieve a realistic representation of human movement, data are recorded with the least amount of noise possible or cleaned after they are captured. Our studio is interested in different methods for visualizing motion capture data and in developing tools to modify or clean the data. We use these tools to decouple the data set from the standardized skeletal form. Our work focuses on re-targeting the data to abstract, expressive objects in order to create visualizations and animations that emphasize the movement system apart from the body. This short paper introduces some of the creative works we have produced using non-traditional approaches to motion capture data.

Keywords

Motion Capture, Animation

1. Introduction

At the University of Wisconsin-Whitewater (UWW) in the College of Arts and Communication, we maintain a markerless motion capture (MOCAP) system that serves the Art and Design Department and the Media Arts and Game Development Program. The MOCAP system we employ is developed by Organic Motion and uses fourteen cameras in a small studio space. The data generated in our space have been used in small game and animation projects by students, some faculty directed animation and game projects, undergraduate research, and in consultation with a local medical science business.

One concern we've had with our studio stems from technical limitations common to MOCAP, i.e., the presence of noise caused by occlusion or poor edge detection when capturing performances. Some noise will often be present in the digitization of human movement, particularly in markerless systems. Normally, environmental factors which contribute to noise are checked and corrected prior to recording. Recorded data are then cleaned based on usage. The patterns which emerge from cleansed data, in the words of Brian Rotman, "dis-embed, decontextualize, and de-territorialize the original motion from the place, time, circumstance, physical form, cultural particularity, and presence of its performance" (2008, p. 46). This transfer may be effected for commercial as well as aesthetic purposes. Popular discourse around WETA Workshop's marked motion captures for *The Lord of the Rings* and *The Hobbit* emphasize the documentary and replicatory powers of a system operating correctly. By contrast, glitch practitioners such as Rosa Menkman emphasize the slippage in a conventional flow of information through a system; these slippages, referred to as noise, can be used to call attention to the system itself (2011, pps. 12-15).

Our studio has worked to cultivate the slippage between movement performed and data captured for artistic projects which encourage the viewer to compare perceptions of motion with MOCAP system reproductions as a means of calling attention to mediation.

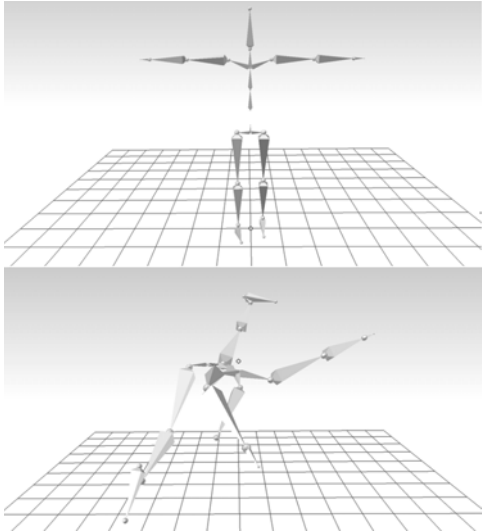


Figure 1. MOCAP data represented as 3d modeling rig

2. Recent UWW MOCAP Projects

Using a markerless MOCAP system immediately highlights the challenges with MOCAP in general, that is, the accurate collection of nuanced human movement. Markerless systems, often video-based, are susceptible to inaccurate captures resulting from a range of physical inconsistencies. We are shifting our attitude from viewing these lost nuances, e.g., hand gestures or foot positioning, as a challenge to viewing them as an opportunity. In other words, we look for ways to use motion capture not in terms of its limitations, but in its potential for new forms and expansion of understanding movement systems and information objects generated from captured gestures (Portanova, p. 60).

Our MOCAP studio is used, as noted above, for traditional education, creative, and science related projects. When working on projects that have a more conceptual or creative intent, we focus our attention on what we can do with the captured movements and disregard its lack of precision. This means that we focus on how we might visualize the data or what the potential “composability of the movement” might be (Portanova, p. 56). An example would be the

hypothetical extension of collaborative works by Openended group, such as *Biped* and *Ghostcatching*, to a gesture or abstraction outside figuration.

The project that initiated our creative research came from a very specific limitation in our markerless system. We noted that occasionally the computer vision system would register light noise in the studio and attempt to map the noise to the traditional bipedal form used in MOCAP (Figure 1). Under normal circumstances, the resultant data was useless, but we began considering ways to give the captured data from light noise a visual form. Cloth simulations allowed us to emphasize the relationship between the noisy data and the MOCAP system working to find a body moving in space. This work resulted in two short animated videos. Following the implementation of noise data to animate cloth simulations, we improved our system by adding cameras and eliminating light noise. We then developed a web-based tool to allow us to modify the data using mathematical functions independent of its use in representational animation. The “Phantoms” animations lead us to explore how animation abstracted from motion capture data could function in interactive environments. “Anomalous” stemmed directly from the “Phantoms” projects while simultaneously opening up new possibilities for visualizing movement information.



Figure 2. Still frame from “Phantoms”, noise data animating cloth simulation

2.1 Phantoms

During the 2014-2015 academic year, the UWW MOCAP studio experienced technical limitations which caused a number of noise related problems in capturing. As discussed in “Experimenting With Noise in Markerless Motion

Capture”, the two largest contributors were improper lighting in the studio and not meeting the specification for number of cameras (Miller, 2015).



Figure 3. Still frame from “Phantoms 2”, manipulated data animating multiple cloth simulations

When a markerless system experiences light noise or loses tracking points because of poor edge detection, the capture skeleton breaks down and the data is not desirable. The only different and significant characteristic of this type of poor quality motion data is that it doesn’t accurately capture the desired movement performance. But, if we consider that the visualization of the data does not have to conform to the accurate recreation of a specific movement performance, then the quality and accuracy of the data is somewhat irrelevant.

“Phantoms” is the title of two animated videos created using MOCAP data generated specifically from movement data captured when there were no actors on the capture stage (Figure 2). Our technical limitations occasionally caused the markerless system to register light noise as an almost incomprehensible tangle of bones moving in spasms. Although the information that was being registered was noise, our system continued to function by mapping the noise to the traditional hierarchical MOCAP skeleton. In doing so, the recorded data became a movement neither consciously directed nor entirely dissociated. We called these instances phantoms.

As Eugene Thacker has suggested, new developments in media technology are often accompanied by “unorthodox” usages, such as in spirit photography. In such occult practices, anomalies produced by media systems, when compared to traditional perception, were not viewed as malfunctions but as hypersensitivities latent within the system (2014, p. 90). In a contemporary

parallel echo of this activity, Evan Roth's *Voices Over the Horizon* exhibition at Carroll/Fletcher depicted the detournement of ghost hunting not to expose the supernatural but to debunk the ethereality of the Internet by exposing artifacts of its materiality (Carroll/Fletcher Gallery, 2015). We took this into consideration as we began mediating our phantoms. We decided a fitting visual reference for the phantoms would be through the use of cloth simulations. The cloth would move freely when parented to specific bones from a noisy capture and would give it visual form. Cloth simulation can move fluidly and the resulting animated sequences accentuated the movements that were recorded and allowed us to visualize something we couldn't see.

Following this work, we improved the quality of our captures by reducing or minimizing light leakage and adding three cameras to bring our total to fourteen in the studio; the phantoms were eliminated. However, our interest continued in exploring the array of points moving in space in relationship to one another that makeup a capture. We considered how we might edit MOCAP information as a data set using mathematical operations in order to instigate behaviors similar to our phantoms but originating in otherwise desirable and accurate movement samples. We visualized this data in a way very similar to that utilized in "Phantoms" and created a second animated video using cloth simulations titled "Phantoms 2".

"Phantoms 2" was in part a form of developing methods to recreate instances of glitch like behavior in our captured data sets (Figure 3). If the first stage ("Phantoms") of the research project came from the motion capture software attempting to assemble a hierarchy out of random stimuli the second stage ("Phantoms 2") was the opposite. Once the captured data set was parsed, it was in turn represented as a table in a browser-based editing tool. Each bone's positions and rotation information could be updated as the user cycled through a frame. Once the user understood and updated the values in this table, they could edit and manipulate the movement sequence. This would be done by performing operations that included addition, subtraction, randomization, and sorting to individual or groups of bones. The process foregrounded the abstraction of the movement performance in its captured data set in a way that released it from its standardized function. In both animated sequences, whether the data set was recorded from an noise occurrence or was manipulated after capture, the mediation of movement system allowed for the aesthetic experience to emerge.

2.2 Anomalous

Following our work with edited animation sequences, we applied cloth simulations to motion data in the Unity game engine. In “Anomalous”, realtime rendering affords the viewer the ability to change his or her perspective with a generic first-person control schema. The outcome of this project was an experience lying between the genres of video game and animated sequence (Figure 4).

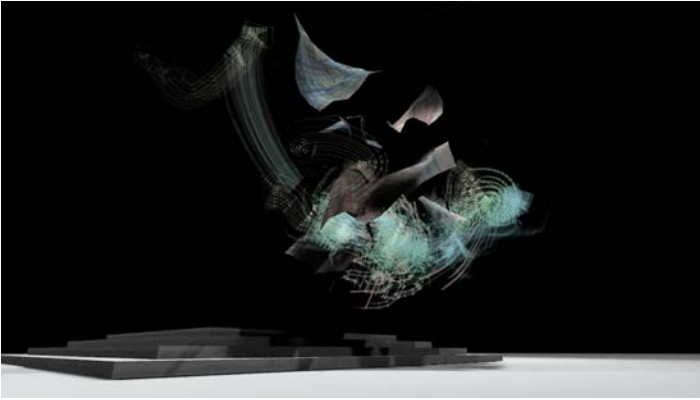


Figure 4. Screenshot from “Anomalous”, animated cloth simulations and trail rendering in game environment

The interactivity of "Anomalous" spurred us to reconsider our interpretations of the data. While the source animation was rendered and then edited to create multiple performances in "Phantoms," in "Anomalous" it was treated as a single, looping performance. In the absence of strict editing, constraints were placed on the viewer avatar's vertical and horizontal extent of camera rotation, movement speed, and maximum distance in which to withdraw from the anomaly. Furthermore, in order to give the viewer a frame of reference for navigation, minimal architectural/environmental elements, such as a concrete floor and dais, were added.

“Anomalous” included the addition of a visual effect that allows for further accentuation of the movement performance. The trail render effect leaves a visual trace of where something has been as it moves over time. We considered adapting Jeremy Gibson's implementation of flocking behavior to spawn boids along key transforms of the anomaly's skeleton (p. 391). However, these and other particle effects distracted from the form produced by the cloth simulations, since they only loosely adhered to the base animation and were not subject to the same lighting. Ultimately, we opted to add Unity Trail Renderer

components because they more closely visualized the gesture or motion. We see the potential for exploring the use of boids and other particle effects in future creative projects of this nature.

3. Conclusion

MOCAP reduces and limits what is digitized from a physical being moving in time and space. The embodied experience, once captured, is reorganized into data structures, often a general tree or hierarchy, in which each node contains an array of its spatial position at a certain frame. Once a human movement has been captured and digitized it must be mediated in order to be experienced again. The data is held in the MOCAP system until it is released through some form of mediation (Woodcock, 2016, p. 21). The engineering choices regarding the organization and storage of data, often hidden, influence the aesthetic choices which release and revitalize movement. We are interested in the potential for mediating MOCAP data beyond its figurative nature in ways that reveal the organization of systems of capture, analysis, and representation.

Our research has been an ongoing discussion of giving up and reasserting control through the course of developing an aesthetic visualization of human movement information. We see this as not necessarily an either-or but as an ebb and flow. Control is ceded because becoming out of control allows one to open the creative potential of the random. It is then possible to edit down and develop the most promising or intriguing random occurrences. Both intentional and random skeletal movements captured through the use of MOCAP technology are augmented with textures created by hand, cloth which has variety of movement but is governed by mathematical principles. We then move from waiting to capture noise and phantoms as they happen to actively creating them using different methods (randomness, adding or subtracting values, sorting). Finally, we began to fork our creative practice with one branch that has certain forms of control through fixed-duration edited animation sequences and another branch with other forms of control through an interactive sequence in a game environment. The forks of our investigation continue to branch and expand as we continue to use MOCAP data in abstract and expressive ways that draw attention to the movement systems that are held within the captured human movement information.

References

- Carroll/Fletcher Gallery (2015). *Evan Roth: Voices Over The Horizon*. Web. 31 July 2016.
- Gibson, Jeremy (2015). *Introduction to game design, prototyping, and development: From concept to playable game with Unity and C#*. Upper Saddle River, NJ: Addison-Wesley.
- Menkman, Rosa (2011). *The glitch moment(um)*. Amsterdam: Institute of Network Cultures.

- Miller, A. Bill (2015). "Experimenting with noise in markerless motion capture." *Proceedings of the 2nd International Workshop on Movement and Computing*, 128-131.
- Portanova, Stamatia (2013). *Moving without a body: Digital philosophy and choreographic thought*. Cambridge, MA: The MIT Press.
- Rotman, Brian (2008). *Becoming beside ourselves: The alphabet, ghosts, and distributed human being*. Durham, NC: Duke University Press.
- Thacker, Eugene (2014). "Dark Media." *Excommunication: Three inquiries in media and mediation*. Chicago, IL: The University of Chicago Press.
- Woodcock, Ross (2016). "Capture, hold, release: An ontology of motion capture." *Studies in Australasian Cinema*, 10(1), 20-34.

About the authors

A. Bill Miller is an Artist and Assistant Professor of Art and Design at University of Wisconsin - Whitewater. His teaching also includes assignments in the Media Arts and Game Development Program at UWW and he manages the UWW MOCAP Studio.

Jeremy Behreandt is a poet and creative coder from Park Falls, Wisconsin.

Effects of immediacy on the perception of interactive art

Kevin S Badni

Abstract

This study examined how the observed immediacy of an interactive artwork affects the perception of the art, and how participants' engagement impacts the personal perception of time. A new projected artwork was created by the author that could randomly assign participants different interactive latency times. The design of the installation from a conceptual and technical viewpoint is discussed with reference to the desired outcomes from a pragmatic and phenomenological standpoint. Beyond the hypothesis, other results that looked at the need for a high level of perceptive processing produced a number of behavioral patterns that maybe of additional interest to other media artists.

Keywords

Latency, Interactive art, Engagement, Time perception, Adjective pairing

1. Introduction

Aesthetic-based research by Fischer et al. Russo and Leclerc, Malach et al. and many other works reported in Jacob and Karn are all founded on similar grounds; namely that is widely believed that there is a correlation between spending time looking at an object and cognitive processes (Jacob R. & Karn K., 2003);(Fischer, Richards, Berman, & Krugman, 1989); (Russo & Leclerc, 1994); (Malach, Hornik, Bakalash, & Hendler, 2005). Therefore it would seem reasonable to conclude that the longer one spends giving attention to something, the more one should engage. This, in turn, should affect one's impression of what is being viewed. Numerous studies in educational settings have examined the relationships among attention, depth of processing, recall, and understanding of art; however, very little research of this type has been conducted at art fairs or with interactive art. Some observational research has been undertaken by Smith & Smith (K. Smith and Lisa F. Smith, 2001) at the Metropolitan Museum of Art, which indicated that viewing time per painting typically does not exceed 30 s, with a median of 17 s. The question that arises from these studies is whether the same behavioral patterns can be attributed to interactive computer generated art pieces?

In this paper's study there were two hypotheses: a) the immediacy of an interactive art piece affects the perception of the art; and b) participants' engagement impacts the personal perception of time. The effects of viewing time and interactive latency were the independent variables in an experimental design. The dependent variable was a rating scale developed for this study that

was based on findings from research that examined perception of works of art comparing a gallery, some slides, and computer images (K. Smith and Lisa F. Smith, 2001; Locher, Smith, & Smith, 2001).

2. Artwork design

2.1 Aesthetic drivers

Before developing the interactive artwork used in this study, research was undertaken into visual perception through the emerging field of cognitive neuroscience. Cognitive neuroscience combines neurobiology, artificial intelligence, cognitive science and medicine and has started to provide information about how the brain works in relation to visual perception and imagery. Due to an increased sophistication in computer modeling and brain scanning techniques there has been a greater synthesis within these fields. This relatively new area of research has been investigated by Stephen Kosslyn and Olivier Koenig (Kosslyn & Koenig, 1992) who have amalgamated a variety of information and concepts to demonstrate that the field of cognitive neuroscience is much more than the sum of its parts.

As vision was fundamental to the interactive experience in this study, the cognitive capabilities that are used during the act of perceiving was an important area of focus. Cognitive neuroscience has shown that when an object is viewed it needs to be physically present, however, when the brain uses imagery so an object is 'seen', a physical object is not necessarily required and these seen images can be changed at will.

Even though this ability to perceive the world around us is taken for granted, it is a common misconception that the image is simply inside the eyeball and that our vision system is simply a window onto the world. According to Ramachandran & Blakeslee, (1999) to begin to understand perception, it is necessary to get rid of the idea of 'images in the brain' and replace it with one of 'symbolic description of objects and events in the external world'.

The brain has numerous processing areas to deal with imagery all of which have intricate networks. Any visual stimulus or event creates a unique pattern of activity in relation to that object or event. Perception therefore consists of much more than replicating an objective view of the world as our perceptions can change even when the image in our eyeball remains the same. So every act of perception involves making a judgment.

Kosslyn and Koenig, (1992), state that 'vision is not a single process'. The ability to perceive an object requires much more than the obvious physical appearance. This ability appears to stem from a number of different brain activities all working together.

Cognitive neuroscience tries to improve our understanding of these brain activities by defining 'component processes and specifying the way that they work together'. Memory also plays an important role since visual images are built on visual memories. Although these visual memories can be instant and transitory, they can be used to form new imagery at a later point. In fact, visual imagery is important to cognition due to its ability to create and be creative (Kosslyn & Koenig, 1992).

It is important to note that an act of judgment is central to both cognitive neuroscientific and aesthetic approaches to perception. When looking at the brain's decisions there needs to be an assumption that there is a certain amount of innate knowledge as to how we perceive the world. Ramachandran and Blakeslee, (1999) argue that due to evolution and also early childhood learning 'stable physical properties' are incorporated into the visual areas of the brain. This relates to the assumption that certain buried knowledge about what we see is drawn upon when we view an image. They use the example of an image of a leopard, where when we see a group of dots moving towards us, it is perfectly reasonable for us to assume the dots belong to the same group and that is what is seen. Within this buried knowledge, one of the most prevalent is facial recognition. Zeman (2002) describes how the right non-dominant hemisphere of the brain takes a leading role in face perception. As communication and interaction between humans is largely dependent on the ability to identify the slight differences and perceived meanings in facial characteristics it is not surprising that such a large area of the human brain is devoted to facial recognition. As our vision system is predisposed to see faces in patterns, the aesthetic content of the artwork described in this paper was tuned to take advantage of this capability. Another perception quality is that humans perceive colour before form, which in turn is perceived before any motion. As described by Zeki & Nash, (1999) the period of time between the perception of colour and motion of an object is approximately 60-80 milliseconds. Using this knowledge the interaction form of the artwork was adjusted to be monochrome so that the perception and recognition of form was controlled without the distraction of color or motion.

Ramachandran and Blakeslee also explains a further neurological perspective on perception and art, where he proposes a phenomenon called the 'peak shift effect'. This effect involves a system of reward that is linked with emotional pleasure. Ramachandran uses the example of a rat that is rewarded for

distinguishing between a rectangle and a square, where it will develop a preference for that rectangle over the square. However it will also illogically respond even more enthusiastically to a caricature of that shape than to the original rectangular form. The supposition is that the rat learns the rule of rectangularity rather than a particular example of that rule and the visual system is continually searching for 'the rule' (Ramachandran & Blakeslee, 1999,288). They suggest that during human and primate evolutionary development many of the visual areas that are specifically concerned with extracting correlations and rules, and attaching visual attributes (colour, motion, form, shading, and so on) along different dimensions such as 'form space' or 'motion space' have become directly linked to the emotional limbic structures that in turn produce pleasure sensations, and in doing so enhance survival of the species. Therefore, if a particular rule is exaggerated and excess detail is removed, the image will become even more pleasing. So when applied to art, the aesthetic pleasure of viewing a Van Gogh or a Monet may be due to a 'caricature' of 'colour space' thus a painting maybe far more evocative than a photograph since the 'photographs details may actually mask the underlying rule'. Within this study the 'peak shift effect' was used to influence the final aesthetic of the artwork so that the projected forms during the initial stages of the interaction were produced in low definition, with only the final images becoming more in focus depending on the latency timings.

Other cutting edge interactive art installations produced by performance collectives such as the Berlin based Palindrome who focus on choreography and interactive technologies, use a diverse range of media codes which require the viewer to attempt to find details and rules in order to make sense of the artwork that is presented. However, due to the multilayered nature of much of Palindrome's performance, a certain defamiliarization effect is produced. This continual attempt to recognize and make sense of the elements in the images creates a juxtaposition between a sense of joy when a rule is found and pain when the rule fails to materialize. On reviewing Palindrome's Shadow performances, Wechsler, Weiß, & Dowling, (2004) found that the shadows shift seamlessly between what is 'known' and what is 'surprising' making 'the piece fascinating to watch'. This fascination with the perceptible variations also ensures the audience's active participation in the production of the meaning of the artwork. Within the artwork described for this paper the use of collage and juxtaposition was also applied. It is interesting to note that this juxtaposition between joy and pain was shown to engage and fascinate the audience when reviewing the questionnaires.

2.2. Interaction

When experiencing traditional art, the painting or sculpture does not physically change in front of the viewer's eyes. With digital art the possibilities of interaction with the piece is more. It can range from navigation to construction and participation, which is beyond the viewer's normal mental event. With the artwork created this interaction was developed so the viewer participation involved creating a collage of images using contextualization through appropriation via the webcam. Images of the viewers were captured via a discrete webcam and through digital manipulation the discrete modular elements of the scene were modified yet still kept the principle of continuity with the real world. This relationship between copy and original, and the use of collaging can be traced back to the Cubists, Dadaists and Surrealists movements at the beginning of the twentieth century. A more recent example of this form of digital art was Troika Ranch's *The Future of Memory* (2003) where the artist used multilayers of imagery and sound in a collage fashion using the technology to act as a 'metaphore for memory' itself.

For the projected artwork described in this paper the image on the screen that the viewers sit opposite begins as an abstract collaged form reflecting in a disparate way the participant's surroundings. Only when the participant remains still long enough does the image slowly become tangible, revealing the viewer as though mirrored in the screen. The longer the participant remains still, the higher definition the image becomes and the rules described by Ramachandran & Blakeslee, (1999) are realized. The image is interactive, but unlike many digital art pieces the interactivity does not rely on physical movements to create immediate feedback, which from casual observations can lead to short engagements once the hidden rules, have been realized. Instead it was designed to require the participant to remain still to achieve any tangible feedback, if the participant moved the image began to break apart so by design was ephemeral in its nature. This was hoped to encourage the participants to use more cognitive processes in observing the artwork so in turn spend more time engaging with the artwork, compared to the previously observed times of 17 seconds as observed Smith and Smith, (2001) when participants simply viewed static artwork.

2.3. Physical Installation design

The artwork was designed for the Sikka international art fair, set in the Al Fahidi historic district of one of the fastest developing cities in the world, Dubai. The use of vernacular aesthetics using traditional materials such as wood and a camel leather screen were used alongside bespoke software and image

capturing equipment creating a design to form a juxtaposition reflecting the city's two characters; that of the nostalgic affection for the past with the passion and need to be pioneering into the future.

The installation consisted of a low Bedouin inspired bench being positioned opposite a wooden framed screen made from specially treated local camel leather, so imitating traditional wooden construction techniques found in the region (see Figure 1). The translucent camel leather based screen was specially made to be less than a millimeter thick to allow a back projected image to be used. Common cow leather would not be able to withstand any form of stretching at this thickness, but the skin of camel leather is unique among domestic animals with the cell makeup being much more dense which made it possible to develop a screen of only one millimeter allowing the desired level of transparency to be achieved. The installation requires the participant to sit still on the custom-made bench, which was designed intentionally to be very soft allowing users to sink into position so encouraging them to remain in place.

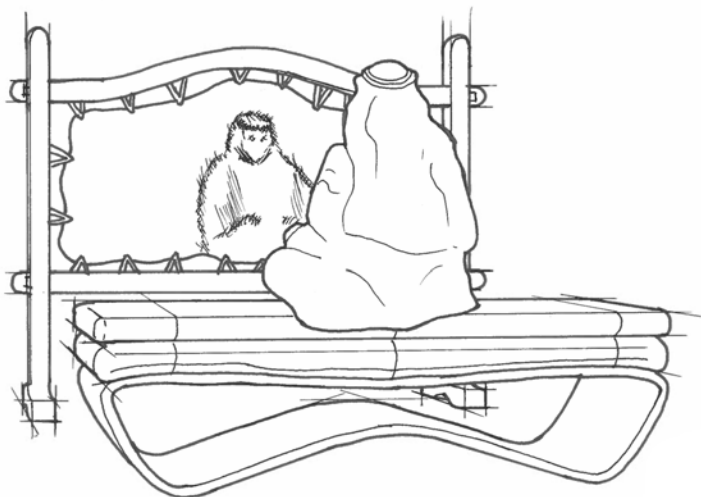


Figure 1. Proposal sketch for the physical installation.

2.4. Technical Process

The measured interaction was achieved through the use of a high definition webcam hidden within the screen's frame. The bespoke software took one hundred images over the preset latency period and used a number of imaging algorithms to adjust the image so that it formed a soft, yet high contrast image

that could be seen when projected through the camel leather screen. The screen added a natural noise to the image, which added to the analogue soft aesthetic that was desired. The 100 images were then layered within the software using 1% opacity for each image. As a new image was captured it was added to the layer, whilst the bottom image layer was deleted so constantly updating the projection. Using this layering technique, if the images captured by the camera had areas that were the same, these layers combined would produce areas that would become more prominent in the collaged image. If a person moved then the combined layering effect would reduce how strong their image would appear, thus removing their existence (see Figure 2).



Figure 2. Participants remaining still so their image appears on the camel leather screen.

3. Survey Materials

The materials used in the research consisted of a consent form, a demographic and experience survey, a rating scale and a debriefing form.

3.1. Participants

The participants were 173 random visitors who were visiting the Sikka Art Fair held in the historical Al-Fahidi district in Dubai and who agreed to answer the questionnaire. Ninety-six (55.4%) were female and seventy-seven (44.6%) were male, ranging in age from 18–75 (those under 18 were not asked to fill out the questionnaire) fifty-five (31.7%) were under age 25; forty-two (24.2%) were between the ages of 25 and 34; thirty-seven (21.3%) were between the ages of 35 and 44; twenty-nine (16.7%) were between the ages of 45 and 54; ten participants (5.7%) were between the ages of 55 and 64.

In terms of self-reported ethnicity, thirty-three (19%) were Iranian, seventy-eight (45%) from the MENA region, sixteen (9.2%), categorized as ‘Western’ and forty-seven (27.1%) were from Indian, Pakistan, Philippines, Bangladesh and Sri Lanka (see table 1).

Nationality	
Kingdom of Saudi Arabia	8
Kuwait	4
United Arab Emirates	25
Bahrain	4
Oman	2
Qatar	3
Lebanon	8
Palestine	12
Jordan	2
Egypt	4
Turkey	2
Afghanistan	2
Algeria	2
Iran	32
United States of America	2
United Kingdom	4
France	6
Germany	2
Canada	2
India	26
Pakistan	4
Bangladesh	3

Sri Lanka	8
Philippines	6
Grand Total	173

Table 1. Demographic Survey Results.

Their experience of interacting with art and art museums was limited. Over one-third, sixty-six (38.1%) had never been to an actual art museum. Approximately half ninety (52%) reported that they went to an art museum once a year and an additional seven participants (4%) visit an art museum two or three times each year. The remaining ten participants (5.7%) reported that they are frequent visitors to art museums.

Participants' self-rating for knowledge of interactive art on a scale of 1 (no knowledge) to 10 (expert) ranged from 1 to 8. The mean rating was 2.47.

3.2. Procedure

To develop the rating scale used in the experience survey adjective pairs were created and examined to determine which might apply to viewing interactive art. In addition, adjective pairs from a rating scale used by Locher et al., (2001) were examined. A list of 48 adjective pairs from these sources was generated and presented to 16 students from the American University of Sharjah who had taken a mandatory art history course and were studying for a Bachelors in Multimedia Design degree so were familiar with interactive art pieces. Using a scale of 1 (not at all) to 10 (extremely), the multimedia students were asked to rate each adjective pair on how much they felt the adjectives pertained to looking at interactive art pieces. Based on their ratings, a final list of 15 adjective pairs was selected for this study (see Figure 3).

Please think about the work of art that you just experienced and place an X in one of the ten boxes between each pair of words closest to the word that shows how you feel about that work of art. There are no correct answers. What is sought is your first impression. Be sure to mark only one X for each line and do not skip any lines please.

Interesting	□□□□□□□□□□	Uninteresting
Appealing	□□□□□□□□□□	Unappealing
Unpleasant	□□□□□□□□□□	Pleasant
Inspiring	□□□□□□□□□□	Uninspiring
Dynamic	□□□□□□□□□□	Calm
Busy	□□□□□□□□□□	Tranquil
Forceful	□□□□□□□□□□	Timid
Simple	□□□□□□□□□□	Complex
Usual	□□□□□□□□□□	Surprising
Dull	□□□□□□□□□□	Vibrant
Weak	□□□□□□□□□□	Powerful
Intense	□□□□□□□□□□	Relaxed
Intimate	□□□□□□□□□□	Remote
Similar	□□□□□□□□□□	Contrasting
Realistic	□□□□□□□□□□	Symbolic

How long did you spend observing the artwork?

Any other comments?

Figure 3. Post Experience Survey

For the data collection, the software was designed to randomly assign visitors different latency times in 0-s, 1-s, 5-s, 17-s, 30-s or 100-s delayed conditions. Each visitor was assigned a single latency time. Upon signing the consent form, the participant was presented with the installation running at the randomly assigned latency rate. When the participant was happy with the image on the screen they could press the remote camera operator and a captured image was printed for them as an aide memoire. This also produced a time stamp, which was used to study the correlation between latency effect and cognitive decisions by the visitors (see Table 2). After the print had been produced the visitors were asked to complete the questionnaire.

4. Results

Based on the adjective pairs, four attitudinal measurement sub-clusters were created. These sub-clusters were made up of the following adjective pairs:

The arousal subscale consisted of the following four adjective pairs:

Pleasant / Unpleasant
Interesting/Uninteresting
Appealing/Unappealing
Inspiring/Uninspiring.

The motion subscale consisted of the following three adjective pairs:

Dynamic/Calm
Busy/Tranquil
Forceful/Timid.
Intimate / Remote

The arrangement subscale was made up of the following four adjective pairs:

Simple/Complex
Usual/Surprising
Dull/Vibrant
Weak/Powerful.

The recognition subscale was made up of the following three adjective pairs:

Intense / Relaxed
Similar / Contrasting
Realistic / Symbolic

There were 173 participants; 28 (16.18%) viewed the interactive art at the original 100s setting. There were 27 (15.61%) participants in the 0-s condition giving immediate feedback, 31 (17.9%) participants in the 1-s condition, 27

(15.61%) participants in the 5-s condition, 28 (16.18%) in the 17-s condition, and 32 (18.5%) in the 30-s condition. The rating scales were grouped and analyzed by latency time.

Data analysis based on the composite attitudinal scores are shown in Table 3.

	Latency					
	0s	1a	5s	17s	30s	100s
Average time spent observing (seconds) before pressing remote camera operator.	12.6	15.4	16.58	23.6	60.2	215.6

Table 2. Latency Timestamps

Latency	Sub-cluster	Mean	SD
0s	appraisal	25.69	6.22
	motion	21.33	6.98
	arrangement	20.55	5.96
	recognition	24.69	7.01
1s	appraisal	26.33	7.26
	motion	28.88	8.78
	arrangement	25.32	6.35
	recognition	27.35	7.65
5s	appraisal	27.86	7.02
	motion	23.22	8.56
	arrangement	24.21	9.65
	recognition	28.56	6.58
17s	appraisal	30.25	7.36
	motion	24.32	8.25
	arrangement	25.84	8.66
	recognition	31.69	9.89

30s	appraisal	35.68	6.89
	motion	28.64	7.79
	arrangement	29.33	6.5
	recognition	38.32	8.98
100s	appraisal	35.24	5.62
	motion	26.35	8.2
	arrangement	27.69	5.36
	recognition	34.65	5.66

Table 3. Composite Attitudinal Scores

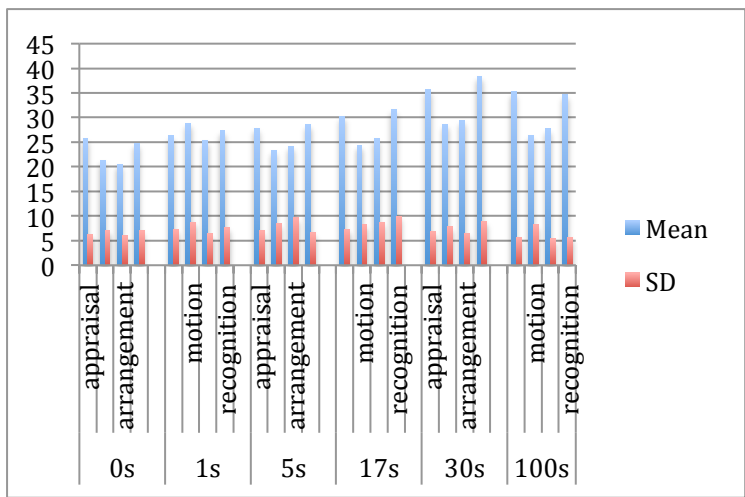


Table 3b. Composite Attitudinal Scores

5. Discussion

This study set out to examine how the immediacy of an interactive art piece affects the perception of the art, and how participants’ engagement impacts the personal perception of time. It was found there was a strong relationship between longer latency and the positive perception by participants. Previous findings have demonstrated that museum visitors do not spend a lot of time at

any one artwork or in any particular gallery (e.g., Smith, Bousquet, Chang, & Smith, 2006; Miles, R., & Rout, 1993; Serrell, 1996; K. Smith and Lisa F. Smith, 2001). It was hoped that this study would confirm the hypothesis that the perception of interactive art would be affected by the length of time spent looking at it. The 30s and 100s time conditions may have provided the most interesting results. Feedback from participants experiencing those conditions were generally more impressed with the experience than the more immediate feedback experienced during the shorter latency times. This maybe due to the investment the participants made with the piece, as can be seen from the perceived time spent with the piece the 30 and 100s second latencies gave the largest difference between perceived time and actual time spent which was more than double the latency time. Ramachandran and Blakeslee described a neurological perspective on perception and art, where he proposed a phenomenon called the 'peak shift effect', where the confirming a viewer's primate rule is rewarded with an emotion of joy which may also have had an effect of the image becoming into focus so producing a positive emotion when the form was recognized as a mirrored image of the viewer.

This response from the viewers may also tie into the inverted U-Shape Hypothesis as described by Gardner & Berlyne, (1974) who suggested that viewer's aesthetic responses in relation to the complexity of an art work will exhibit an inverted-shape distribution. This means that viewers will show the greatest positive emotional response when they avoid extremes, so avoiding artwork with too low or too high levels of complexity. Research by Silvia, (2005) also suggests that the complexity of artwork could also be associated with the ability of the viewer to understand the artwork. So viewers prefer artwork that is not too easy or too difficult to comprehend. This is reflected in the results from the shorter latency times which gave a more immediate final image to the observer compared to the longer latency times which required higher cognitive load from the viewers. Leder, Gerger, Dressler, & Schabmann, (2012) studied the psychology of aesthetics and how art is appreciated, they state that arousal was highest for abstract works. This may help explain why the longer latencies received the more positive arousal scores as the image was more abstract for longer periods than the shorter latencies.

There has also been research undertaken by Chamorro-Premuzic, Burke, Hsu, & Swami, (2010) who found that demographic differences and personality differences may lead to different art preferences. One of their studies tested preferences of various art pieces, taking into account people's personal preferences. The study found that art preferences were different depending on the gender. Female viewers were generally found to prefer happy, colourful, and simple paintings whereas male viewers generally preferred geometric, sad,

and complex paintings. It was also found that age effects the preferences towards complex artwork which increases as age increases. From the research undertaken in this paper there was no discernible difference in genders with their reaction to the work, but there was a perceptible preference with age from examining the feedback, whether this was for the complexity of the image was difficult to ascertain, but the older participants, those in their 40s + seemed to appreciate the art form more. Interestingly they were also less likely to check their mobiles directly after experiencing the installation.

5.1 Immersion

The installation was designed to immerse the participants, using particularly soft seating that allowed the participants to 'sink' into position, along with subdued and directed lighting. Immersion occurs when perceptual and cognitive systems are challenged at near capacity, without being exceeded. Under these conditions, the person loses a sense of "real" world. (Csikszentmihalyi, 1990). To attain this immersive condition the challenge set was just to simply remain still. From an isolated point of view, this should be an easily achievable goal. However, the images were modified using a number of algorithms to subtract elements until only those necessary to convey the form remained. As described by Jr & Swets, (1954), by adding noise the images were degraded further removing the amount of useful information by altering its form. As the image updated and constantly deleted the previous status there was a constant need to reinterpret the image. The reasoning behind this process was based on the law of Prägnanz where the tendency to recall images as simply as possible uses cognitive resources to translate or encode the image. (Epstein & Hatfield, 1994). This cognitive load along with the unexpected interaction required a high level of perceptive processing to concentrate the mind so that every participant surveyed came away thinking they had been still for much longer than was the reality. An interesting side effect of being still was that almost all participants, even if they were in a large excited group, actually stopped talking. The image was intentionally blurred so the definition of the lips could not be seen as a reason to stop moving their mouths but the cognitive effort of having to remain still and interpret the image rendered them silent.

Unlike traditional photography, the screen image was constantly updating (at a graceful pace) so there was no permanence. This was the original idea for the installation to allow participants to stop, concentrate and disengage themselves from their usual busy lives, trying to connect with the participant at a personal level. It was also hoped that due to the interaction being delivered at a measured pace compared to the more common expectation of immediate

feedback with other interactive pieces it would make the experience more memorable, where a difference in experience increased the likelihood of remembering compared to the common. (Jensen, 1962)

Participants were not provided with a meaning of the concept, except for the hint within the title of the installation “Still”. Instead they were required to construct the meaning of the work through a process of physical awareness to understand the relationship between their actions and the image created. Some participants would often sit for only a few seconds press the ‘record’ button, and walk off. This showed there was a contrasting expectation model. As described by Norman (2005) this behavioral model is based on established mental models of how an interactive piece should function. The issue of highlighting in a normal interactive installation is designed to give immediate feedback. In this installation due to the slow update rate the recognition of a change of state is much more subtle so there is no implicit association. The installation design was not contrived to leverage a familiar model as these immediate feedback models were not appropriate to this installation. If participants managed to sit for long enough so that the abstract image became tangible allowing for a more visceral sense of presence there were numerous exclamations of delight as they simultaneously began to understand the conceptual motivation behind the work and their participatory relationship. The irony of these reactions is that they frequently changed position to exclaim to their friends what was happening so diluting the stationary effect they had achieved.

Most participants who experienced the delayed latency (17s or higher) on realizing the effect tried the installation more than once, often striking poses to add an imaginative element and more personal representation to the piece (see Figure 4). Interestingly those who were exposed to the shorter latency times with more immediate feedback did not.



Figure 4. View from the installation's camera with participants striking a pose

5.1. Social Media And The Interactive Artwork

After observing and interviewing many participants it became evident that some form of permanence beyond memory and the printout was desired. A number of participants asked for the images to be loaded directly up to Facebook, or Instagram (see Figure 5) Other participants asked for pictures to be taken of them taking part or they even tried to take selfies whilst trying to stay still. The need to engage with their social networks sometimes appeared stronger than the desire to sit still and enjoy the installation. On questioning participants on this matter a number of reasons arose. The main driver was the need to share and to show others what they were experiencing and also wanting something to remember the experience. As an aide memoire a photographic print similar to an early Daguerreotype print would have been ideal as the aesthetic appearance and the creation of the artwork mimicked the famous early Daguerreotype prints, such as the Boulevard du Temple of 1838. Even though Daguerre was photographing this very busy street in Paris, due to the long exposure time no horses or carriages are recorded due to their movement. (Meggs & Purvis, 2016). Only one solitary figure can be clearly seen, captured on the plate due to him standing still having his shoe shined. However, unlike the Daguerreotypes the image in the author's art piece was not permanently captured, but was only transient in its nature.



Figure 5. Instagram post

5.2. Study limitations

There were several limitations to this study. The participants were generally inexperienced in terms of viewing interactive art. Over one-third had never been to an art museum. The mean self-rating for knowledge of interactive art was only 2.7 on a 10-point scale. However, even though they had very little experience of interactive art their understanding of how their participation in the artwork affected the projected image on the screen came to most of them without the need for an explanation. However, with the longer latencies, especially the 100 seconds, a small number of participants had to be guided as to the intention of the piece. The interactive artwork was designed with the intention to create an extended engagement with the participants. If it had been designed with a more rewarding immediate response then it would have been likely that the need for an explanation would not have been required. Also if a more rewarding immediate response was designed then the results for the attitudinal scores and time stamps may have also been different.

As there appears to be more interactive art appearing in art fairs and within museums there is an increasing need to investigate theoretical aesthetics and how the audience reacts and perceives these art works. It is becoming crucial not only from an aesthetic viewpoint but also culturally and politically that our understanding of digital artworks and its implications and uses need to improve. With this in mind a follow-up to this study is planned with a new artwork which produces more immediate and rewarding feedback to the participant with the intention of adding to the this body of knowledge.

References

- Chamorro-Premuzic, T., Burke, C., Hsu, A., & Swami, V. (2010). Personality predictors of artistic preferences as a function of the emotional valence and perceived complexity of paintings. *Psychology of Aesthetics, Creativity, and the Arts*, 4(4), 196–204. <http://doi.org/10.1037/a0019211>
- Csikszentmihalyi, M. (1990). *Flow. The Psychology of Optimal Experience*. New York (HarperPerennial) 1990.
- Epstein, W., & Hatfield, G. (1994). Gestalt psychology and the philosophy of mind. *Philosophical Psychology*. Retrieved from <http://www.tandfonline.com/doi/abs/10.1080/09515089408573118>
- Fischer, P. M., Richards, J. W., Berman, E. J., & Krugman, D. M. (1989). Recall and Eye Tracking Study of Adolescents Viewing Tobacco Advertisements. *JAMA: The Journal of the American Medical Association*, 261(1), 84–89. <http://doi.org/10.1001/jama.1989.03420010094040>
- Gardner, H., & Berlyne, D. E. (1974). Aesthetics and Psychobiology. *Curriculum Theory Network*, 4(2/3), 205. <http://doi.org/10.2307/1179240>
- Jacob R., & Karn K. (2003). Eye Tracking in Human-Computer Interaction and Usability Research: Ready to Deliver the Promises. In Hyona J., Radach R., & Deubel H. (Eds.), *The Mind's Eye: Cognitive and Applied Aspects of Eye Movement Research*. Oxford: Elsevier Science.
- Jensen, A. (1962). The von Restorff isolation effect with minimal response learning. *Journal of Experimental Psychology*. Retrieved from <http://psycnet.apa.org/journals/xge/64/2/123/>
- Jr, W. T., & Swets, J. (1954). A decision - making theory of visual detection . *Psychological Review*. Retrieved from <http://psycnet.apa.org/journals/rev/61/6/401/>
- K. Smith and Lisa F. Smith, J. (2001). Spending Time on Art. *Empirical Studies of the Arts*, 19(2), 229–236. <http://doi.org/10.2190/5MQM-59JH-X21R-JN5J>
- Kosslyn, S., & Koenig, O. (1992). Wet mind: The new cognitive neuroscience. Retrieved from https://books.google.fr/books?hl=fr&lr=&id=fAB7VDMfG7kC&oi=fnd&pg=PR9&dq=Wet+Mind:+The+New+Cognitive+Neuroscience&ots=oq3AyGC4qB&sig=AZkbOYNiZf-xC_ervmesu-Jt4fQ
- Leder, H., Genger, G., Dressler, S. G., & Schabmann, A. (2012). How art is appreciated. *Psychology of Aesthetics, Creativity, and the Arts*, 6(1), 2–10. <http://doi.org/10.1037/a0026396>
- Locher, P. J., Smith, J. K., & Smith, L. F. (2001). The influence of presentation format and viewer training in the visual arts on the perception of pictorial and aesthetic qualities of paintings. *Perception*, 30(4), 449–465. <http://doi.org/10.1068/p3008>
- Malach, R., Hornik, J., Bakalash, T., & Hendler, T. (2005). *Preliminary research proposal advanced neuro-imaging of commercial messages* (02350100 No. 24). Tel Aviv 69978, Israel. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.115.2850&rep=rep1&type=pdf>
- Meggs, P., & Purvis, A. (2016). Meggs' history of graphic design. Retrieved from https://books.google.fr/books?hl=fr&lr=&id=1zL8CwAAQBAJ&oi=fnd&pg=PR1&dq=meggs+history&ots=geJX7_Vdmp&sig=iK9dqPKdapFRcRFBmEdmüigjXOE
- Miles, R., & Rout, A. (1993). Holding power: To choose time is to save time. *What Research Says about Learning in Science Museums*, 2, 17–20.
- Norman, D. (2005). Emotional design: Why we love (or hate) everyday things. Retrieved from [https://books.google.fr/books?hl=fr&lr=&id=h_wAbnGI0C4C&oi=fnd&pg=PA3&dq=Norman,+Donald+Arthur+\(2005\).+Emotional+Design.+Basic+Books.&ots](https://books.google.fr/books?hl=fr&lr=&id=h_wAbnGI0C4C&oi=fnd&pg=PA3&dq=Norman,+Donald+Arthur+(2005).+Emotional+Design.+Basic+Books.&ots)

- =efUJRes-l9&sig=TrtUUMHcJn7iBebYmCGfMgmd5gw
- Ramachandran, V. S., & Blakeslee, S. (1999). *Phantoms in the Brain: Probing the Mysteries of the Human Mind*. *Quill*. <http://doi.org/10.1176/appi.ajp.157.5.841>
- Russo, J. E., & Leclerc, F. (1994). An Eye-Fixation Analysis of Choice Processes for Consumer Nondurables. *Source Journal of Consumer Research*, 21(2), 274–290. Retrieved from <http://www.jstor.org/stable/2489820>
- Serrell, B. (1996). In search of generalizability: New tools for visitor studies. *Journal of Museum Education*. Retrieved from <http://www.tandfonline.com/doi/abs/10.1080/10598650.1996.11510330>
- Silvia, P. J. S. (N.D.). Cognitive appraisals and interest in visual art: exploring an appraisal theory of aesthetic emotions. Retrieved from <http://baywood.com/journals/previewjournals.asp?id=0276-2374>
- Smith, I. F., bousquet, s. G., chang, g., & smith, j. K. (2006). Effects of time and information on perception of art. *Empirical Studies of the Arts*, 24(2), 229–242. <http://doi.org/10.2190/DJMO-QBDW-03V7-BLRM>
- Wechsler, R., Weiß, F., & Dowling, P. (n.d.). EyeCon --a motion sensing tool for creating interactive dance, music and video projections.
- Zeki, S., & Nash, J. (1999). Inner vision: An exploration of art and the brain. Retrieved from [http://www.cell.com/trends/cognitive-sciences/pdf/S1364-6613\(00\)01518-7.pdf](http://www.cell.com/trends/cognitive-sciences/pdf/S1364-6613(00)01518-7.pdf)
- Zeman, A. (2002). *Consciousness : a user's guide*. Yale University Press.

About the authors

Kevin S. Badni is the Head of Art and Design, at the American University of Sharjah. He received his Bachelors in Industrial Design from Loughborough University and his Masters in Multimedia Design from De Montfort University in the UK. Before becoming an academic, Kevin spent ten years as a professional designer working in Britain's creative industries, including managing the UK's first commercial Virtual Reality center. His main research focus is the personal perceptions of vision, which has lead to a number of journal papers and his artwork being exhibited in galleries in Australia, America, Italy, Britain and the UAE. kbadni@aus.edu

Central floorplans and digital strategies

Federico Garrido

Abstract

The present research is part of an exhibition at the Kerstenschier Pavillon in Aachen, Germany as part of an ongoing collaboration with the research project Rokokorelevanz.

The main concern of this project is to study and develop digital design and manufacture tools in relation to specific references from the history of architecture. The project focuses on the procedures and disciplinary methods when including architectural historical information regarding processes and strategies in digital design.

The exhibition at the pavilion Kerstenschier was proposed as a brief demonstration of these concerns, trying to illustrate possible approaches to addressing inclusion and manipulation of information from architectural references in digital design processes, by building for example, parametric design tools, simple cellular automata processes or genetic algorithms.

This brief paper mainly wonders what information is available from these references, and how it is possible to translate this information into a parametric model. More importantly, it is proposed to investigate what geometric, formal and material lessons can be learned in relation to digital tools, resulting in the creation of a digital tool from parameterizing specific geometric information from historical buildings and projects.

As a starting point, we began analyzing and redrawing simple and clear-cut architectural spaces. To this end tens of central plant buildings, mostly single and central spaces were selected. The research finds that by advancing from these simple configurations to more complex configurations is possible to extract a series of geometric-formal rules then to be translated into a parametric model. Among these central plants examples, chapels, temples and pavilions were mostly registered.

Equally important is the fact that each project is by itself a manifestation of a series of canonical formal principles embodied in several drawing rules, such as a close attention to symmetry, proportion, detail, compositional axes and guides, among others. The study of these mathematical relationships and its expression in terms of an interdependent parametric model allows to turn its operation not only as an analytical tool but also as a generative one. The product of this generative tool is then a series of digitally generated central floorplans and pavilions.

While it is a first step in a PhD research and in turn, as part of a much larger research project, the goals and partial conclusions show a possible new look of the use of historical references in digital processes. In turn, this type of research aims to evaluate and reassess these references, prompting a reconsideration of detail and variation in floorplan design, now under the light of the computational tools.

1. Introduction

The present paper is part of a PhD research¹ at the Technical University of Kaiserslautern, Germany, and a collaboration with the research group Rokokorelevanz, directed also by Prof. Luc Merx. As such, the partnership brings together a range of interests, topics and methodologies to explored, common to the members. This paper proposes to describe a specific task in this ongoing collaboration and its specific product; an exhibition in the pavilion Kerstenscherscher city of Aachen, Germany, in May 2015.

While the exhibition dealt with many other common research topics from its members, this paper will be limited to describing only the author's contribution therein, as well as to discuss the methodologies and results².

The PhD research proposed to investigate the relationship between project strategies and manufacturing technologies by focusing on the relationship between Europe and Argentina around the second half of the 19th century and the study of some paradigmatic works as a product of it. Similarly, in relation to project strategies it was proposed as a starting point to collect and study central floorplan buildings, first as minimal spatial unit and simultaneously, as bearers of a series of complex geometric operations that defined them.

As a second task, by taking the collected information as a database, the research proceeded to redraw the architectural floorplans and extract a number of compositional rules to then be translated into a parametric model via design software.

Finally, this digital model was used, but altered with new parameters in order to create plans, schemes and from them, three-dimensional models of pavilions and buildings.

2. Objectives

¹ 'Innovative tools and design strategies. The case of Eclectic Architecture in BsAs' (pending title) Arq Federico Garrido, director: Prof. Dipl. Ing. Lucas Merx, T.U. Kaiserslautern

² It is clear that is not the aim of this paper to discuss the topics and questions that the exhibition proposed nor the particular interests of the Rokokorelevanz group. For this purpose, more information can be found www.rokokorelevanz.de.

2.1 General framework. Project strategies and design tools

This work is part of doctoral research at the Technical University of Kaiserslautern, whose director is Prof. Dipl. Ing. Lucas Merx. The purpose of the research is to investigate the relationships between manufacturing tools and design strategies by tracing relationships and analogies between analog, digital and industrial design and manufacturing methodologies. The specific focus is set on integrating these relationships from the study of building projects in Argentina and Europe in the second half of the 19th century. The importance of this parallel between 19th century and contemporary times lies in a series of disciplinary, cultural and economic conditions particularly from the integration of new technologies in the practice of architecture; that is, the use of innovative manufacturing techniques (specifically the so-called second industrial revolution and the current Industry 4.0) and its specific influence on design strategies.

As part of the revision of historical study cases from the nineteenth century, it is necessary to analyze the juxtaposition of two influences sometimes opposing and sometimes not; on the one hand the influence of the methods and procedures inherited from the classical tradition (Beaux arts, ateliers), and new scientific and technical disciplines and schools of thought (polytechnics, engineering schools, etc.). In order to analyze much of the work of this time, the study of methods and compositional strategies we might call 'classic' was deemed necessary.

2.2. Fascination and collection

The first immediate objective of this work was to collect and catalog projects with central floorplans, focusing on works and projects throughout the architectural 'classical'³ history onwards. This collection itself has a remarkable compilation value by providing and displaying some 120 drawings of floorplans in the same comparison plane; in this case, the predominance of a central space both in the composition and in the organization of architectural space.

The collection tries to transmit fascination not only by the quantity and variety of its elements but also as a sign of the compositional possibilities of a given type and its deployment throughout the history of architecture, with their differences in style, materials, programs and scales.

³ This paper is not intended to define the nuances of the concept of classical architecture, and will simply use as a reference and starting point the definition of Summerson (taken from "The language of Classical Architecture"), based on Greek and Roman religious architecture onwards.

The guiding criterion for this collection was to find buildings and projects in which a central space with certain features is predominant. With the progression of the collection, it was decided to focus the criteria on projects with a single central space, or the rest of the spaces directly subordinate or secondary to it.

2.3. Analysis and re-drawing

A second purpose of this work was to develop objective geometrical analytic criteria, which in turn allow the re-drawing of each floorplan in a precise manner. This graphic-analytical approach ultimately served as a method of production and control in real time, so that each re-drawn plan implies from its procedure involves a formal analysis of each plan. Similarly, these criteria functioned as selection filters for each case study; if a project refuses to be registered by this method, because for example, is too complex, it is then excluded from the selection.

The subsequent objective was then to re-draw each project by a specific set of geometric-morphological rules. The deployment of this method on the selected projects field was intended to put all projects in a common ground. This common ground implies a common size (not a common scale) in addition to common notational characteristics (line types and thicknesses, symmetry axes, drawing aids, etc.) so that the comparison in terms of composition and graphics is feasible. (FIGURE 1)

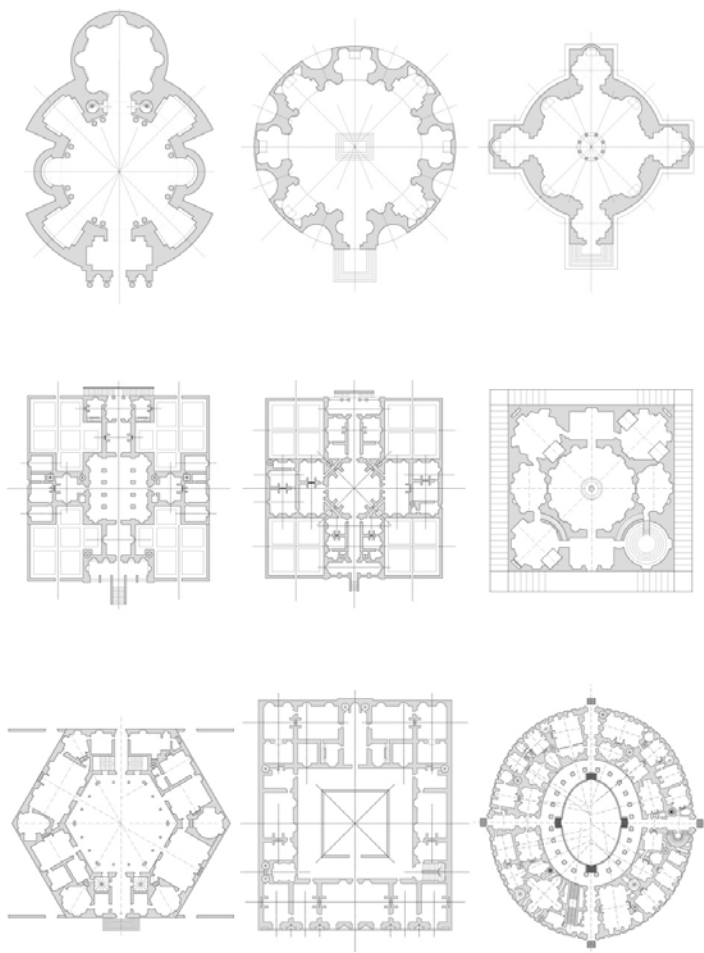
2.4. Generativity

The ultimate goal was then to translate these drawing rules to a parametric model which in turn is able to reproduce -at least schematically- the formal and geometric characteristics of the projects taken as case studies. The purpose of this model is in that case not only to specify in an alternative way the mathematical and geometric relationships that describe each project but also to produce a new series of central floorplan projects by altering variables, while maintaining their relationships more or less stable in the parametric model.

As explained above, the task of translating each project to geometric to variables in a flexible digital model again implies to place all projects in a common comparative level, in this case, by expressing them as a series of algorithmical relationships between several variables.

Finally this parametric digital model would not only schematically recreate these historical projects but also would generate a number of completely novel

central floorplan projects. In this case, it would be necessary to establish which variables should be changed and how, while the relationships between them in any case could be affected or not.



CATALOG. Houses for a rich man by Serlio. (tracings by the author)

3. Work hypothesis

The main hypothesis proposed in this paper is to understand a series of geometric and morphological characteristics as common parameters to a series of buildings taken as case studies; in the case of buildings with central floorplans, whose spatial characteristics could be comparable in graphical terms, regardless of other variables such as the belonging to a certain historical time, style, material or scale.

If there is this common geometric information to these projects, it then becomes necessary to determine a common graphical and analytical language when describing them. The research inquires about the possibilities of extraction and abstraction of this geometrical information in terms of a common graphical language to all case studies.

A second hypothesis asks about the possibilities of transcription of these rules to an abstract language, through the interplay of variables in a parametric model. The relationship between the geometric-formal rules and case studies in particular depend on a number of factors that exceed this paper, such as the accuracy of the graphical information, the accuracy on the tracing of the floorplans, among others. In these terms, converting geometric relationships such as proportions, angles, vertexes and lines to a digital model is not complex by itself, but the previous step itself is; that is, the translation of architectural information (of a graphical nature) to a set of independent abstract rules of shapes and scales.

In this case it is clear that one of the hypotheses of the doctoral research asks whether it is possible to 'learn' or extract information from historical architecture projects and include them in a digital design process. One possible version of this hypothesis to the scale of this task is then to investigate the opportunities for 'learning' offered by the study of 120 central plant projects. In simple terms; which compositional rules can be drawn from this series of projects and how to apply them to contemporary processes using digital design and manufacturing tools?

The final question proposed here revolves around the definition of digital design processes that link these rules extracted from historical cases with digital processes, allowing to create not only projects but families of projects, series of drawings generated by similar processes but different variables.

4. Methodology

4.1. Selection

The first step in this task was to select the case studies to be included in the collection of floorplans. The criterion for this selection was subsequently defined from space, morphological and geometric characteristics expressed in floorplan drawings of each project. While the main criterion was without doubt, of a spatial kind, other historical, stylistic and morphological factors were taken into account. Primarily, projects must have a central, predominant and manifest space. From this first pattern subsequent rules were deployed; circular or polygonal perimeters, construction axes, relation between central and subspaces, among other features.

A previous criterion for the selection of case studies has to do without doubts with its historical and stylistic belonging. As explained above, this research has focused on project methodologies of the 19th century in Europe and Argentina, thus restricting the survey in terms of location and epoch. Particularly this research was interested in buildings and projects that express 'classical' characteristics, either because it is either Greek or Roman architecture, Renaissance projects or Baroque buildings, among others. This particular approach was deemed difficult precisely because we do not intend to define what "classic" and how it is manifested in each project, and that is why other patterns and characteristics were defined in order to refine the search is stage. (FIGURE 2)

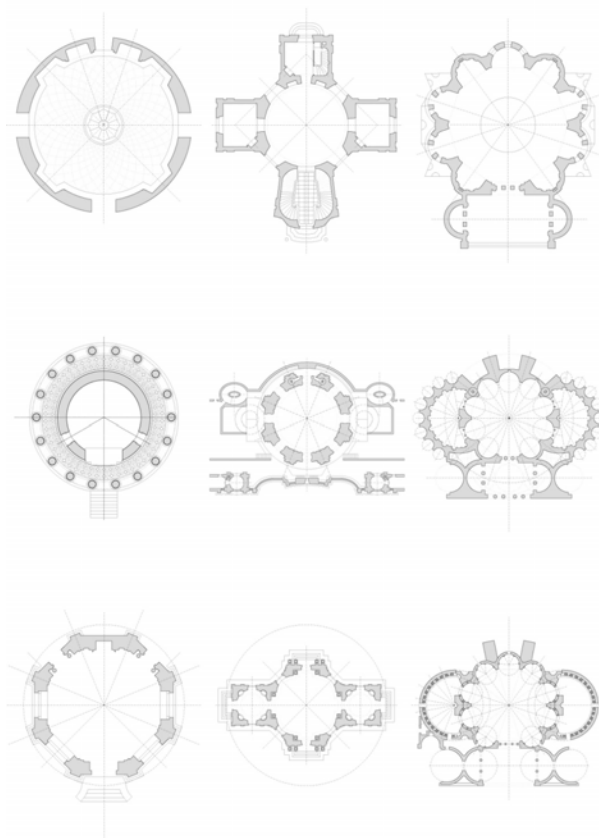
4.2. Geometry and typology

The following criteria to determine the selection of projects with central spaces is of a geometric character. Projects whose main space is significantly larger, not necessarily in size but in scale compared to its surrounding spaces, if any. Here it's defined a characteristic of this type of projects; the relationship between geometry and space. At this point other architectural elements play an important role and are not necessarily perceived in the floorplan, but are spatially determinant, such as domes, projections, cornices, flooring, etc.

In these terms it is simpler to define the selection criteria from a distinct typology. Based on the central plans typologies it is possible to make a fairly wide selection of temples, pavilions and altars. The *tholos*, as defined by Vitruvius⁴, are circular buildings defined by a set of characteristics; they can be *monopteros*, *peripteros*, with or without *cella*, pedestals and different proportions.

⁴ VITRUVIO, M. (1995) Los 10 libros de arquitectura – Capítulo Octavo, Los templos circulares . Madrid: Alianza Editorial (pag 110-112)

We will not spend much time on a precise typological definition but rather use it as a flexible concept to guide the selection.



CATALOG 2. Several central floorplan projects. (tracings by the author)

The geometric characteristics to be considered are related to the form and shape of the inner and outer space, it is not necessarily about circular floorplans but also including oval, triangular (Heiliggeistkirche, Bruck an der Mur) and polygonal plans (Serlio temples) . From there it is possible to complexify the selection as these spaces are often not strictly defined but its perimeter is composed of apses, alcoves and subspaces.

Finally an important geometric feature to be registered are the symmetry planes. There are different types of symmetry (not only determining the proportions

and the correlation of each element with the whole) and in this work are used to define how the repeating elements and shapes occurs within a composition. Among the case studies there are several variants in relation to this parameter, ranging from plants with bilateral symmetry, radial, biradial, tetrarradial symmetry, etc.

The importance of knowing and registering these geometric features does not have only a descriptive function but also has an operational role; these attributes are necessary when designing and drawing such spaces and therefore will become essential in the subsequent stages of re-tracing and parameterization.

4.3. Parallel compilation

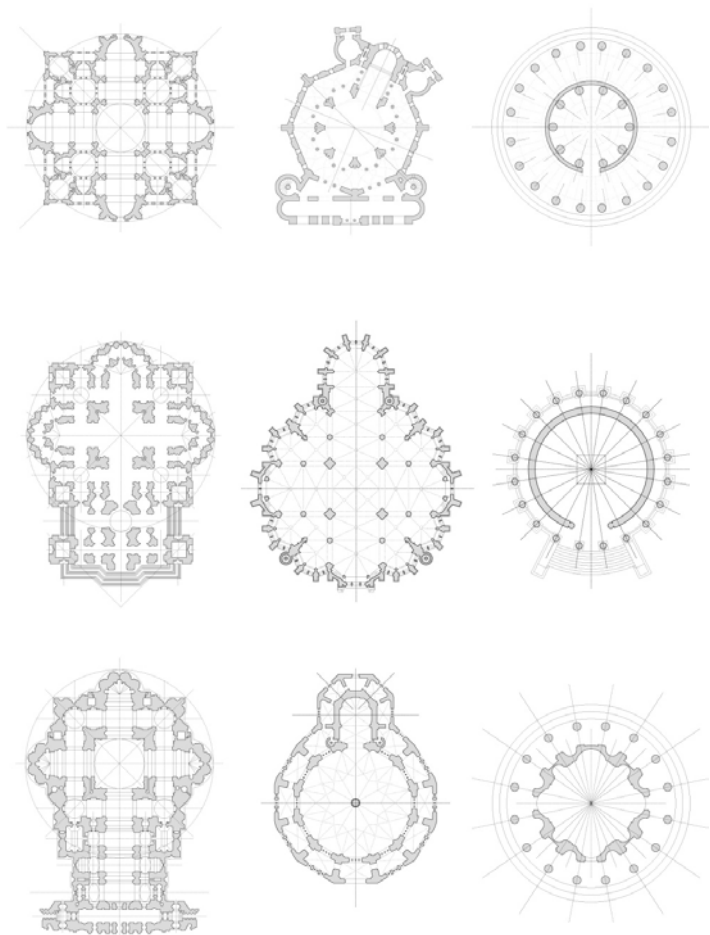
Parallel to the definition of criteria we proceeded to compile case studies to be analyzed and redrawn. This was done in parallel because often case studies came up, that did not fall under the first selection criterion, for example, did not correspond to a type of *tholos*, however did present interesting geometric and formal features to be taken into account later. For that reason the selection criteria were expanded and adjusted on throughout the selection process.

Having always the primary aim of understanding the 'classical' project mechanisms, the search of case studies focused initially on architectural treatises and manuals from different periods. Works such as the 'Ten Books of Architecture' by Vitruvius⁵, 'Study of the five orders' by Vignola or 'Five Books of Architecture' by Sebastiano Serlio were consulted sources at this stage. The interesting thing about this type of treatises and manuals is that, from its educational and informational purpose, they provide a series of measurements, formal and geometric canons based on the canonical models of ancient Greece and Rome. At the same time, they were subjected to different degrees of interpretation by of each author and the prevailing architectural principles of the time.

A second important reason is that these treatises and manuals used projects that today we might call 'conceptual' or even 'experimental' in order to illustrate concepts or ideas, mostly in relation to the proportions, morphology, spatial sequences, among others. For this reason projects like the temples and 'Houses

⁵ Ibid.

for a rich man' by Serlio are very useful to this research⁶. The works of James Gibbs and Peyre were also consulted and particularly, the texts and compilation of works by Wolfgang Götz and Paul Frankl in relation to Zentralbauten, or buildings with central plans. (FIGURE 3)



CATALOG 3. Central floorplan projects and variations (tracings by the author)

⁶ The Temples and 'Houses for a rich man' by Sebastiano Serlio, although not every project contains central spaces, they are indeed generated and conceived as relationships of symmetry and radially.

4.4. Standardization and re-tracing

The next step of the work was to present all case studies in a common and consistent graphical language, which is universal enough to be used in all cases, and at the time, specific to register accurately unique qualities in each example.

In addition to registering traditional architectural information such as walls, columns and enclosures, it was necessary to take into account flooring details, projections, ceilings and even furniture. It is important to clarify that these layers of information are relevant as long as they strengthen spatial qualities of centrality, symmetry and scale. At the same end, each drawing was traced with a series of guidelines, which helped their construction and also were preserved as part of the drawing

Each drawing was then 'built' (if it fits the term) again, trying to find the compositional principles that originated it. If the project was made by bi-radial symmetrical planes, or instead, if the repetition was irregular, the drawings were constructed in the same way. Hence the decision to retain the guidelines and construction aids; each drawing is itself a representation of an object and at the same time, the process that generated it.

In this re-draw a new entity is defined, simultaneously object and process, which differs from the original from which departed; the drawings are not just tracings of each project but are re-constructions of the graphic processes that originated them.

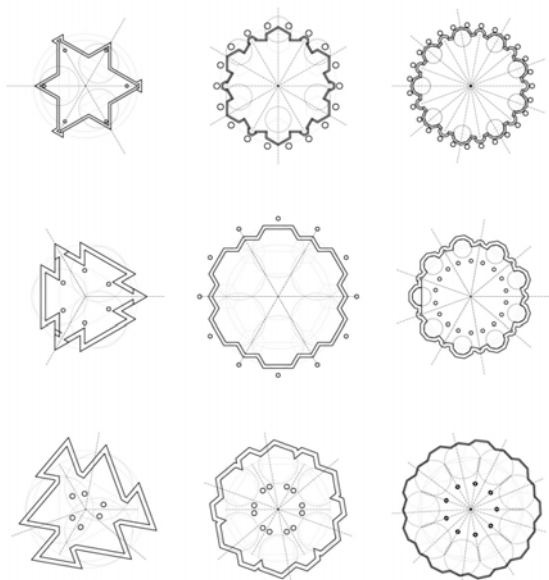
All drawings were designed and displayed in the same size (DIN A5) eliminating any difference in scale, and by presenting them with the same representation tools and techniques the task attempted to 'soften' or 'smoothing' the differences between them, trying to use representation as a standardization and cataloging tool.

4.5. Universal model

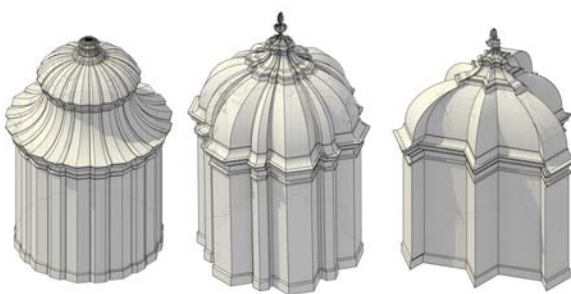
Finally the last task of this work is to create a parametric model based on the drawing rules and morphological strategies compiled in the previous steps. The purpose of this task is on one hand to create a digital model governed by various geometric variables, flexible enough to reproduce, at least schematically, the case studies compiled above.

The parametric model is itself a set of mathematical relationships between variables translated into geometric elements. The type of relationships between

variables and the values that each variable acquires define each instance of the parametric model, each instance is potentially an architectural floorplan with a central space. (FIGURE 4)



DIGITAL CATALOG. Schemes of digitally generated central floorplans (drawings by the author)



PAVILIONS. Digitally generated pavilions (images by the author)

For example, J. Schlaun's pavilions in Clemenswerth are organized from the division of a circle (or a regular polygon) in 4, while the Temple of Minerva Medica is divided into 10 and Gertrudenskapelle in Wolgast in 12. After this operation, apses, inner and outer niches are added in each division, along with interior and exterior columns, among other architectural elements. In turn, each of these elements has individual parameters such as the number, size and angle of rotation, further extending the composition possibilities of the model.

Importantly, each of these elements need in turn a series of drawing aids, for example, each regular polygon needs a circumference within which inscribes, each division of this polygon turn requires an axis to be fractionated, and so on. These drawing aids, as in the case studies redrawings are part of the final model just like its representation.

5. Conclusions

The product of this work has a dual nature; on the one hand a collection of 122 plants drawn in the same size, with the same tools, graphic aids and detail, with no scale and presented simultaneously. On the other hand, a generative digital tool for creating endless central plants from the variation of parameters and relationships extracted from the study of the previous catalog.

This catalog of floorplans tries to express fascination in face of the possibilities of complexity, repetition and variation from registering a seemingly simple typology. Not only have been relieved and redrawn project plans but true geometric tools and project strategies, while combining geometry, form and space. The ability to translate these tools into a generative digital device undoubtedly open many compositional and project possibilities in which the use of historical references is central to the design process.

References

- FRANKL P (1914) *Die Entwicklungsphasen der neueren Baukunst*. Berlin, B. G. Teubner
- GIBBS, J (2012) *A book of architecture containing designs of buildings and ornaments. Rules for drawing the several parts of architecture*. Gale Ecco.
- GÖTZ, W (1968) *Zentralbau und Zentralbautendenz in der gotischen Architektur*. Berlin: Gebr. Mann Verlag
- SERLIO, S. (2011) *Five books of Architecture*. Digitalized by Glasgow School of Art Library.
- SUMMERSON, J (2014) *El lenguaje clásico de la arquitectura*. De L.B. Alberti a Le Corbusier. Barcelona: Editorial Gustavo Gili.
- VIÑOLA, J.B (1944) *Tratado práctico elemental ó Estudio de los cinco órdenes*. Buenos Aires: Ediciones Internacionales.
- VITRUVIO, M. (1995) *Los 10 libros de arquitectura – Capítulo Octavo, Los templos circulares*. Madrid: Alianza Editorial (pag 110-112)

About the author

Federico Garrido graduated as an architect at the FADU UBA (Buenos Aires, Argentina). He received a postgraduate Master scholarship (FADU-UBA) and currently he is a Phd scholarship holder (DAAD) in Germany.

He has collaborated in several research projects and co-founded UAP (Parametric Architecture Unit), a research group devoted to the study of digital tools in Architecture. He taught at graduate and postgraduate courses in Argentina and Germany, specializing in digital design tools, parametric architecture, generative procedures and digital manufacturing. He has participated in exhibitions in Argentina and Germany.

Federico Garrido is currently a Phd student in T.U. Kaiserslautern under the direction of Prof. Lucas Merx (Chair : Contingency of design - T.U. Kaiserslautern, Germany) federgarrido@gmail.com

Projected illusions: space, light, and coordinates

Andrea Sosa

Abstract

This paper investigates the specificity of Projection Mapping. It explores the various denominations this practice has received in the Anglo-Saxon and Hispanic worlds, and analyses different artworks to identify the operations that enable the emergence of an optical illusion of amalgamation between projected image and physical support. The concept of innovation associated with the object of study is revised, as well as its technological mediation. With this purpose, the paper analyzes—using a Media Archaeology-related approach—the case of Chichen Itza, at the pyramid built to worship god Kukulcan which dates back to before the 12th century.

Keywords

Projection Mapping, Spatial Augmented Reality, History, Site Specific, Media Arts

1. Introduction

At the beginning of the 21st century, an audiovisual practice with apparently distinguishing features began to spread in the world of moving images. The term Video Mapping—or simply Mapping in the Spanish-speaking community—makes reference to an experience through which video projections transform spaces (mainly architectural spaces) by projecting 2D or 3D images. These huge projections, presented as a show and intended for entertainment, art, marketing or institutional commemorations, usually have an impact on the public space using images or illusions during a certain period of time. Even though this kind of production has been increasing exponentially during the last 10 years around the globe, the conceptualization of its specificity still remains barely explored. For this reason, in the present work we attempt to clarify some characteristics that may be among its differential features, establish the basis for a potential design methodology, and provide a historical perspective to the novelty principle.

The world is made of matter and bits, of multiple new relationships between physical and virtual. In this sense, the idea of *augmentation* and *expansion* traverses a significant number of modern configurations, both in the sphere of art and applied science. Lev Manovich, in his article “*The Poetics of augmented space*”, describes this process, which manifests itself in a series of experiences where space becomes transformable, changeable, expandable in terms of its limits and properties. In a general definition, the author says: “*augmented space is the physical space overlaid with dynamically changing information*” (Manovich, 2003). This statement and its scope are not restricted to the *Video Mapping* practice, but are

certainly appropriate to provide context, and open pathways to understand the particular experiences that arise within the framework of this practice.

A centrifugal force drives images and data towards space, bodies, and objects.

2. About pixels, photons and geodesy

The Spanish-speaking world has adopted the term *Video Mapping* by convention. In the English-speaking world, the same term is used, but it also has a synonym: *Projection Mapping*. Both compound names include two notions: 1) video or projection; 2) mapping.

In the case of the term *Video Mapping*, we can observe a focus on the technology being used, i.e. *video*—a specific technology among current image machines. As regards the word *projection*, this makes reference to a wider-scale optical phenomenon that can be articulated by means of a variety of technological devices, as well as non-technological devices such as *fire* or the *sun* as a source of light. This difference between a restriction to one technology and the use of broad terminology is not minor; on the contrary, it has an impact on the way the phenomenon is perceived.

In a wide sense, “*mapping*” is related to *space*, *Geodesy*, *the cartographic universe*. A map implies the reading and analysis of a territory and the subsequent development of a representation which—through a certain medium—accounts for the nature of the space or phenomenon it reflects. Every space representation requires *measuring the actual space* and establishing a *representation scale* that can create equivalences between the dimensions of both spaces. For any map to be correct it should be able to properly mirror a space, or the dimensions and coordinates of the space it represents.

A third denomination exists, not so widely spread, despite the fact that it was the first name these object projection techniques received. In 1998 Ramesh Raskar and Oliver Bimber proposed the notion of *Spatially Augmented Reality* (SAR) to refer to a particular manifestation of *Augmented Reality* whose imaging device would no longer be the See-Through Display (STD) headset, but a projector that emitted light directly to the physical environment objects. The authors provide the following definition:

“In Spatially Augmented Reality” (SAR), the user’s physical environment is augmented with images that are integrated directly in the user’s environment, not simply in their visual. For example, the images could be projected onto real objects using digital light projectors, or embedded directly in the environment with flat panel displays.” (Raskar, Bimber, 1998).

This new term derives from the *Mixed Reality* paradigm proposed in 1994 by Paul Milgram, Haruo Takemura, Akira Utsumi, and Fumio Kishino in the Reality–virtuality continuum. It should be noted that the concept of *Augmented Reality* implies the emergence of a phenomenon perceived as one: physical and virtual merge blurring the boundaries between them. A continuity illusion is built and the perception of being before a univocal, homogeneous phenomenon is created.

In this context *Spatially Augmented Reality* as a synonym of *Video Mapping* or *Projection Mapping* makes reference to a particular type of mixture, atoms and bits converge as a result of a projection and not the emission of a display that may add a virtual layer onto the direct view of reality, as with an STD.

Therefore *Spatially Augmented Reality* emerges when image and projection medium morphologically converge with complete precision, blurring their boundaries. The resulting optical effect unifies both entities and creates an illusion: the physical space acquires a tremendous capacity to transform and change in real time, impossible to conceive in the purely physical domain.

Mapping constitutes the procedure that allows the amalgamation of the projected image with the surface by precisely measuring the surface and adjusting the image to it.

3. The illusion of augmentation and novelty in video mapping

3.1. Not all *video mapping* is *video mapping*

When searching “*Video Mapping*” on the Internet, we are presented with thousands of results and projects categorized as such. In concrete exhibitions, there is also a growing number of productions defined as *Video Mapping*. To a great extent, productions share a common characteristic: the use of video projectors—generally having a strong lighting power— and the projection on unconventional surfaces, such as buildings, bodies, or objects. Based on the principle of *Spatially Augmented Reality*, we know that a distinguishing feature of these configurations is avoiding the resemblance to the cinema screen—that flat, rectangular, white window—in order to merge image and surface, transforming the surface and developing a series of events.

Now, this principle that makes illusion possible is not always present in productions associated to *Video Mapping*. In some cases, two different approaches can be distinguished within each work: one of *independence* between image and projection surface and/or one of *fusion* between image and projection surface.

In 2010, within the framework of an advertising campaign, *Projection Mapping* was performed on the statue Christ the Redeemer in Rio de Janeiro under the direction of Fernando Salis. Within this projection, we may find two different configurations. In Figure 1, we can observe Christ is acting as a screen, however unconventional; his body becomes a keyhole allowing access to a universe of images. The image and the sculpture are perceived as two different entities. Towards the end of the projection something changes: the image and the sculpture become so intertwined that we can see Christ fold his arms and join his hands on his heart at the same time his face turns downwards. We know that the rigidity of the material with which the Christ was built—stone—would never allow such flexibility of movement. However, by a morphological matching with the sculpture, the projection dissolves the sculpture-image duality, and unity emerges: a sculpture capable of movement.



Figure 1. Three still images of the projection on Christ the Redeemer. Director: Fernando Salis. 2010. Rio de Janeiro.

Source: <https://www.youtube.com/watch?v=2STmHsZiUr4>



Figure 2. Three still images of the projection on Christ the Redeemer. Director: Fernando Salis. 2010. Rio de Janeiro.

Source: <https://www.youtube.com/watch?v=2STmHsZiUr4>

The co-existence of two articulations between image and projection surface can also be observed in the *Video Mapping* done on the Buenos Aires City Cabildo by producer La Doble A for the celebration of the 200th anniversary of the May Revolution. Different stages can be distinguished along the almost 10 minutes of the show. Figure 4 illustrates three different moments in which the Cabildo functions as a screen to the universe of projected images. In contrast,

Figure 5 shows the mixture and fusion of the image, completely integrated into the original architectural morphology of the Cabildo.



Figure 4. Three still images of the projection on the Cabildo. Producer: La Doble A. 2010. Buenos Aires.

Source: <https://www.youtube.com/watch?v=2STmHsZiUr4>



Figure 5. Three still images of the projection on the Cabildo. Producer: La Doble A. 2010. Buenos Aires.

Source: <https://www.youtube.com/watch?v=2STmHsZiUr4>

The cases we have analyzed are only a few examples of a wider reality that reaches various productions categorized as *Video Mapping*.

3.2. The illusion of novelty in video mapping

... This rhetoric of the new is the vehicle of a well-defined double ideology: the ideology of rupture, of wiping the slate clean and, consequently, of the rejection of history. And also the ideology of continual progress (...)

Philippe Dubois

As we described in the previous section, a kind of myth can be envisioned in the horizon: projections on unconventional surfaces seem to become Video Mapping ipso facto based on what they were intended to be, and on the technologies employed for their production (in terms of hardware and software). Moreover, given that the term appeared and became deeply

institutionalized little more than a decade ago, the adjective ‘new’ was almost automatically associated with these practices. This is happening within a general landscape in which technologies are renewed at a very rapid pace, and the notion of *new technology* is widely spread. Besides, the notion of *new media* suggests an urge to distinguish techniques and procedures that have been recently inaugurated. Philippe Dubois (2004) in his writing “*La ligne générale (des machines à images)*” approaches this issue and states:

“It is indeed evident that this idea of 'novelty' associated to the question of technologies functions, first and foremost, as a linguistic effect, to the extent that it is produced, said and resaid endlessly by the numerous accompanying discourses that have always surrounded the history of these technologies (...).”

Regarding the optical illusion effect that *Video Mapping* provokes, this may be considered new if the point of reference we consider is classical cinema, but we need only look at pre-cinema history to find, in the 18th century *phantasmagorias* and the magic lantern—based on the perspective of authors Tom Gunning and Arlindo Machado—a concrete predecessor whose echo resounds through the proposition of immersive spaces and images that transform spaces without the presence of any frameworks or screens. We can still go further back in history to find—as theorist Oliver Grau notes—the 17th century *panorama*, a device that attempted to build a narrative and an immersive illusion blurring the boundaries between representation and reality. And we may even travel further back in time, and recognize a point of contact in the caverns and the people who inhabited them: the images inscribed were inseparable from the space, and created multi-sensory experiences.

In this context, we may indeed wonder if the principles presented by *Video Mapping* are completely new, or if this is actually a new technique for an imagery whose limits exceed the present time.

4. The equinox at Chichen Itza: projection mapping in the 12th century?

As metaphor, projection has a powerful place in the ways we construct our conception of humanity, from the idea of the self and its masks that recurs throughout social and anthropological reports, to the aspirations we have to beam some word of our existence out to the furthestmost reaches of the galaxy.

Sean Cubitt

In the Yucatán peninsula stands the pre-Hispanic city of Chichen Itza. The Mayas built, in the 12th century, a pyramid to worship the god Kukulcán. Every year, thousands of people gather there for the fall and spring equinoxes to

witness an ancestral spectacle: the descent of the feathered serpent. The combination of the pyramid's location and the Earth's movement produces, at dusk, the projection of seven inverted isosceles triangles of light onto one of the sides of the pyramid. The triangles are perceived as the body of a snake whose stone head rests at the base of the pyramid. As time passes and shadows change, an optical illusion is created in which the serpent's body descends down the stairs that are part of the structure and gradually disappears at the base of the pyramid where the head is located. This optical phenomenon starts a few hours before dusk, and the effect, in all its glory, lasts approximately 40 minutes.



Figure 7. On the left: the Kukulcán pyramid. On the right: the projection of the light triangles that form the serpent's body. Afterwards, the descent begins. Source: www.wikipedia.es

It is believed Mayan architects and astronomers studied the behavior of the Earth in its rotational movements around its axle and around the Sun to determine the effects of light and shadow. The pyramid's orientation is thought to have been determined according to the results of that study, based on precise calculations. Since then, the Sun—as a natural first projector—emits beams of light that reach and impact on the pyramid's stones.

Erkki Huhtamo, when describing the current types of screens based on emission (video/television) or on projection (cinema), makes use of analogies with the Sun and the Moon. “Screens can be tiny or huge, flat or thick, some are active like the Sun, irradiating life on their own, while others are like the Moon, passive, only reflecting the light that is projected on them.” (Huhtamo, 2009).

It is interesting to note that this phenomenon is linked to the effects generated by *Video Mapping* works in our time. By means of a projection that establishes a dialog with an architectural surface, an optical illusion of movement is produced. It is the precise amalgam between rays of light and the morphology of the pyramid that allows the emergence of the optical effect, through which a mythological narrative can be built up.

In Kukulcán, it is not the projection that adapts to the surface, but the surface, whose construction follows the trajectory of the rays of light, that enables the experience to take place. This is a *mapping* phenomenon that is produced without any kind of technological intervention, far away from bits and electronic signals. The *medium* that produces the effect is a deep knowledge of the phenomena involved and the possibility of articulating them on two axes: space and time.

6. Conclusion

In a few years, *Video Mapping* has become a widely spread manifestation in the field of moving images. As every emerging practice, it acquires values of novelty. When analyzing specific works associated with the *Video Mapping* practice, we find that the articulations between image and medium are dissimilar, hybrid, linking to other audiovisual approaches.

The proposition of *Video Mapping* is based on the creation of an optical illusion, focus is no longer on the image stream contained by a generic medium—as in the case of screens—but on the transformation that the medium undergoes as a result of the conjunction between the materiality of its making and the projected images. This fusion principle transforms the space, body, or object. For this to take place, technical tools are not enough—the dimension created by that amalgam equally requires conceptual tools, articulation operations.

The precision principle is a technical challenge but it is also essentially a linguistic challenge. The projection phenomenon and its relationship with the media where rays of light impact constitutes the specific feature that could characterize *Video Mapping*.

The fact that Mayan architects and astronomers found a precise relationship that allowed the rays of light emitted by the Sun to impact a surface in a specific way, without any electro-digital technologies, may allow us to discern the relative novelty of the conjunction between photons and media. In addition, it is worth noting the meticulousness with which the dimensions participating in the phenomenon were articulated. Today we are exposed to an illusion whose nature is not optical but conceptual: thinking that *hardware* and *software* are themselves the operation that builds the identity of the productions and the fusion between image and medium.

Our proposed conceptual framework is intended to provide notions that may enable the construction of sense in the field of image production using new

technologies, with one goal: to transform the *Video Mapping* technique into the potential emergence of a *Video Mapping* poetics.

References

- Huhtamo, Erkki. (2009) *Messages on the Wall. An archaeology of Public Media Displays*. En: Urban Screens. Edited by Scot McQuire, Meredith Martin and Sabine Niederer. Amsterdam: Institute of Network Cultures.
- Gunning, Tom. (2005) *La fantasmagoría y la fábrica de ilusiones mágicas: hacia una óptica cultural del aparato cinematográfico*. En Archivos de la filmoteca: Revista de estudios históricos sobre la imagen, N°50.
- Grau, Oliver. (2004). *Immersion and Interaction. From circular frescoes to interactive image spaces*. En línea:
[http://www.medienkunstnetz.de/themes/overview_of_media_art/immersion/]
- Manovich, Lev. (2005) *El lenguaje de los medios de comunicación. La imagen en la era digital*. Buenos Aires: Paidós Comunicación.
- Raskar, Ramesh; Bimber, Oliver. (2005). *Spatial Augmented Reality Merging Real and Virtual Worlds*. En línea: www.spatialAR.com.
- Manovich, Lev. (2005). *Poetics of Augmented Space: Learning from Prada*. En línea: www.manovich.net
- Machado, Arlindo. (2009). *El sujeto en la pantalla. La aventura del espectador, del deseo a la acción*. Barcelona: Gedisa editorial.
- Dubois, Philippe. (2001). *Máquinas de imágenes. Una cuestión de línea general*. En "Video, Cine, Godard". Buenos Aires: Libros del Rojas.
- Cubitt, Sean. (2007). *Projection. The coming and going of images*. En: "Media art histories". Editado por Oliver Grau. London: The MIT Press.
- Milgram, Paul; Takemura, H; Utsumi, A; Kishino, F. (1994). *A taxonomy of mixed reality visual displays*. IEICE (Institute of Electronics, Information and Communication Engineers) Transactions on Information and Systems, Special issue on Networked Reality, Dec.

About the author

Andrea Sosa is professor at Multimedia Design Department, Faculty of Fine Arts, National University of La Plata (UNLP), and the Transdepartamental Area of Multimedia Arts at the National University of the Arts in Buenos Aires. Email address: correo.andreasosa@gmail.com

Educator, Researcher, Media Artist. Graduated in Multimedia Design and Filmmaking, she is currently a Ph.D. candidate in Contemporary Art at the FBA-UNLP. Her works on media art theory have been selected in different festivals such as 404 International Festival of Electronic Art (Argentina), FILE 10 (Brazil), ISEA 2010 RUHR (Germany), FILE 2013 (Brazil), RENEW Festival (Denmark), ISEA 2014 (Dubai), Computer Art Congress (Brazil), SIGRADI (Uruguay), ISEA 2015 (Canada).

Art Exhibition

Mirages de Ville – First Words Last Acts

Alan Dunning

Abstract

An installation using bespoke speech recognition software to tease words, phrases and sounds from our sonic urban environment. It draws attention to how we might perceive space differently through the lenses of the misheard and the half-heard to perceive alternative realities. Referencing Electronic Voice Phenomena, and the uncanny transmissions of numbers stations - those unusual broadcasts, reading out lists of numbers, or incomprehensible fragments of sound and human speech - the project exploits the deficiencies of speech recognition software, to generate new emotional responses. For this installation the gallery space is treated as the source of the sound for analysis. Microphones monitor the space, computers process the audio, words are spoken and projected into the space and onto the walls of the gallery.

Keywords

Digital uncanny, speech recognition, EVP

1. The Installation



First Words, Last Acts, installation, 2016

Unbidden voices and texts generated by a speech recognition programme allow participants to experience new ways to see and navigate urban space. By analyzing ambient audio environments hitherto unheard voices and sounds are revealed to disturb our idea of our surroundings by changing our psychological and emotional states. It associates Freud's uncanny with the mirage of urban

life, looking for the presence of an unsettling unknown. As suggested by the titles of the projects the works take as their starting point ideas about the illusory nature of the city, through an exploration of the invisible, the unseen and unheard, and the uncanny as it conflates public and private imagination.

The work builds on historical and contemporary conceptual models to open the urban space to change through disorientation and drift, through the perception of the most ordinary objects and places as poetically exciting, uncanny, and even supernatural. It uses the disorientation experienced when something hidden is revealed, to draw attention to a disturbance in the relational field made of the self and its surrounding space.

Ambient noise is monitored and is analyzed using custom speech recognition software to reveal unbidden sound and speech. The results are reminiscent of numbers stations transmissions: fragments of sound, human speech, buzzing, sounding like gibberish, but uncannily and disturbingly suggestive of meaning and structure. The words and phrases, largely nouns and adjectives, but often strings of vowels, that emerge are often convincingly real, suggesting some actual voice or intelligence behind the words, though, however unsettling, in actuality they emerge only from algorithms carrying out the work of analyzing the audio, and the imagination of the listener.

The sounds and texts generated rely on their context to give them meaning, but in turn, they also bring new context to the environment that generates them. Fragmentary, poetic, usually descriptive in nature, the texts and sounds generated generate new emotional responses, and characterize spaces differently, in terms of more or less psychologically charged zones, new topographies and psycho-barometric maps.

The work explores the idea of many layers occupying the same physical space, but comprising different psychological dimensions conjured up through changing emotional valence - the intrinsic attractiveness or aversiveness of an event, object, or situation. Descriptors of place are fundamental in characterizing places. New descriptors are revealed as texts and sounds emerge from the analysis of ambient audio, and warp of our prevailing sense of space. In addition to the notion of numbers stations, the work builds on the legacies of Walter Benjamin's expression of profane illumination, Anthony Vidler's architectural uncanny, and the Surrealist and Situationist projects to open the city to change through disorientation and drift, through the perception of the most ordinary objects as poetically exciting, uncanny, and even supernatural, to open a new sense of the dimensions of the city, by changing its immaterial, psychic shape.

2. Space and context

The project naturally generates particularly rich and affecting words and phrases at sites with well known histories that can frame and contextualize the analyses, but the project considers, any one place is as good as another. Echoing a prime Surrealist sentiment - the most ordinary of places contains the possibility of new poetic engagement.

Some locations are more resonant than others. The generation of texts from the area around the Bataclan concert hall was highly charged in light of the recent terrorist attacks. Here, as in earlier works such as *Sound of Silence*, 2006, which was a site-specific audio work that took place above an interrogation unit in the Centro Popular de la Memoria, in Rosario, Argentina, the analysis was entirely framed by well known recent and distant past events. Other locales may carry much less in the way of evident history, but even the most mundane of locations – a newsagent, a bakery, a bus shelter or a plain room, have the potential for the reimagination and reclamation of past lives and events.

The sounds and texts generated rely on their context to give them meaning, but in turn, they also bring new context to the environment that generates them. The project relies on a participant's perceptual understanding of a place to contextualize many of the words and phrases that are produced by its processes. As such, apophenia and pareidolia - seeing connections, imagining patterns - are the true engines of *Mirages de Ville*, but the words that emerge are often felt as something else, as a very real, uncanny presence within the actual material of the city. The words don't have an indexical relation to reality - they were neither uttered nor truly heard - they emerge from the random false positives of a speech recognition programme, and have neither substance nor form other than chance interactions and collisions, but they are often felt as actual speech, suggesting some psychoacoustic space that exists within noisy information flows.

These works suggest that these spaces are not entirely of the body, are not simple imaginings, but are born out of a complex interplay of psychological states at the limits of and beyond the ego boundary. Shifting from subject to object, and from self to other, in an intricate dance that never fully establishes the relationship between body and world, they develop an increasing uncertainty as to who and what is imagined and, given the machine logic at work, who and what does the imagining.

References

- Benjamin, W., 'Surrealism' in *One-Way Street and Other Writings*, NLB, London, 1979
- Breton, André, Richard Seaver, and Helen R. Lane, "Manifestoes of Surrealism: André Breton" Trans. R. Seaver and H. Lane, University of Michigan Press, Ann Arbor, 1969
- Freud, Sigmund, James Strachey, Anna Freud, Alix Strachey, and Alan Tyson. "The Uncanny. The Standard Edition of the Complete Psychological Works of Sigmund Freud.", (1917-1919), Vintage, London, 2001
- Vidler, A., 'The Architectural Uncanny: Essays in the Modern Unhomely', MIT Press, Cambridge, 1994 and 'Warped Space: Art, Architecture, and Anxiety in Modern Culture', MIT Press, Cambridge, 2002
- Wollen, Peter, "On the Passage of a Few People Through a Rather Brief Moment in Time: The Situationist International 1957-1972", ICA, Boston, 1989

About the author

Alan Dunning is a widely exhibited independent media artist. He is an Adjunct Professor at the University of Calgary. He works and lives in Victoria, B.C. adunning@ucalgary.ca

Dimensioning n.1 – from live architectures a VR experience thru google cardboard, 2016

Chiara Passa

Abstract

Dimensioning n.1 is a VR animation part of Live Architectures, a series of digital artworks and interactive installations I created over time in a multi-faceted production developed to shake-up the static concept of architecture, of outer and indoor areas as an alive and vibrant entity. The 3D animation constituted by fragile lines, form complex architectural shapes, re-creating the impression of walking through a geometric equation. So, the viewers is forced to confront themselves within a fourth digital dimension, a place that has become intrinsic to our daily lives and is impossible to ignore!

Keywords

Art, architecture, geometry, vr, space/place, perception, math, generative, structure, design

1. Exhibition-artwork

"Dimensioning n.1" is a VR animation part of Live Architectures, a series of digital artworks and interactive installations I created over time in a multi-faceted production developed to reconsider the architecture of outer and indoor areas as an alive and vibrant entity.

I've always analyzed changes in liquid space through a variety of techniques, technologies and devices, often using AR and VR as mediums. Animation, video, installations, net art, interactive projects and video-mapping all become instruments of research targeted at the different ways space is configured and how it is generated from electronic language, from the interaction with humans to the way they blend and melt together at a given point.

Exploring architecture as interface, I have designed Dimensioning to create a multi-dimensional extension of space, allowing visitors travel through the space and into the moving diagrams. Fragile lines form complex architectural shapes create the impression of walking through a geometric equation. The complex shape becomes a window into a virtual world, where the moving diagrams take over and a new architectural dimension takes shape.

The Live Architectures act as if they were «alive», moving beyond their own conditioned by human intervention called to determine the different geometric configuration and structure. It is just the notion of space that the VR installation probes, searching new possibilities and 'dimensions', that the digital world, not so much separated from that "real one" offer us.

So, a performance idea is the base of this artwork, where the spectator perceive a place moving around him/her, beyond its functionality. Therefore, the term "Super-place" (I had invented on 1999) can be attributed to this VR experience. Exactly the contrary happens in the 'no-where' in which static presences have only the function to receive temporarily.

The synthetic shape becomes design, structure, architecture and truth. If the space is the extension in all the directions by our intuitions of the real world in which material bodies are placed, "Dimensioning n.1" wants to expand these possibilities of perception. The environments in motion crossing the spectator lead it to an 'unfinished space', facing him to confront himself with another atmosphere, a new 'digital-where'. This dimension is by now ours, is our fourth dimension we spend for real, everyday virtually.

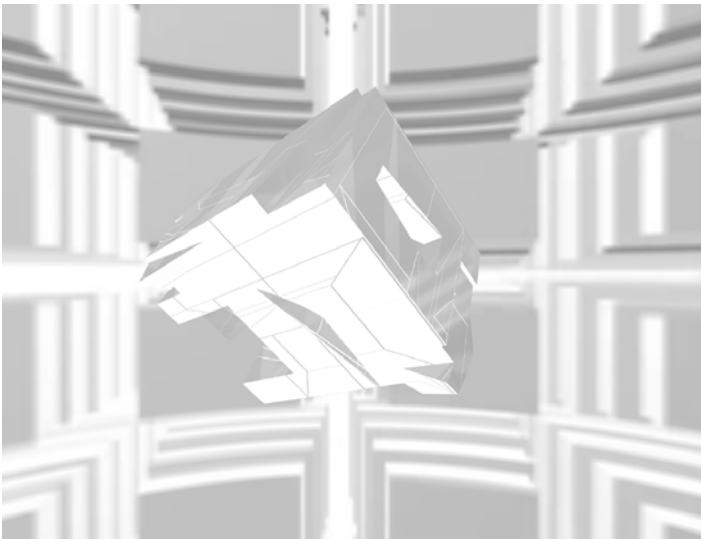


Figure 1 Dimensioning, VR frame.

References

Demo: <http://www.chiarapassa.it/videoenglish.html>
Images: <http://www.chiarapassa.it/images.html>

About the author

Chiara Passa (Rome, 1973). Studies: Artistic Lyceum, M.F.A. Fine Arts Academy of Rome; Master in new audio-visual mediums at the Faculty of Modern Literature. Lived around. At the moment I'm living and working in Rome.

My artwork combines different media as: internet-art projects, animations, interactive video-installations, digital art in public space as site-specific artworks, video-mapping and video-sculptures. I also develop art-applications (AR and VR) and widgets for mobile platforms).

<http://www.chiarapassa.it/Artisticprofile.html>

<http://www.chiarapassa.it/SelectedExhibitions.html>

24 Hour Social

Conor McGarrigle

3-channel generative video installation

Duration: 24 hours

2014-2016



Figure 1: 24 Hour Social Installation View

24 Hour Social is a three-channel, data-driven 24 hour long generative video installation that questions how identities are constructed as data in an era of social media that act simultaneously as authentic platforms for performances of the self and systems of mass data-collection and commodification.

This project focuses on Vine, Twitter's six second video sharing platform, appropriating a full day of data to mark 24 hours as social media performance in all its richness. Vine videos are engaging, creative, funny and often anarchic. In a very real sense they echo the creative energy of the early DIY Internet, framing the web as a space for individual creation. Yet, despite this, Vine is in essence a data collection platform designed to collect and sell data on its users. This project examines the tension between these opposing aspects of the platform through rendering both visible; the creative impulse that fuels 5 Vines per second and the vast accumulation of data that has become a ubiquitous part of our network society.

Vine explicitly sets out to hold a mirror to the everyday, describing Vines as "little windows into the people, settings, ideas and objects that make up your life". *24 Hour Social* presents a portrait of Vine as a social-media-fuelled Man with a Movie Camera, capturing the unfolding day across the Internet. However, this video content is simultaneously seen as data with one screen streaming the user-data extracted from the videos. The video installation is generated from the Vine database showing not only the video artefacts but the thick meta-data descriptions that describe each and every one as data.

24h Social shows 86,400 Vines in a 24-hour period, one for every second of the day. Each video is algorithmically synced to play at the time of its original creation and once played remains on-screen to be over-layered by subsequent videos building up a rich, multi-layered and kinetic screen reflecting the complexity and always-on nature of Vine's torrent of video data.

24h Social approaches Vine as a social media service where the creative expressions of its users are performances in data. It seeks to critique and unravel the entanglements of a platform that affords genuine creative and innovative expressions which are then commodified as a data-product. This is achieved through capturing a day of this data and re-commodifying it as an artwork, an act which knowingly appropriates the creativity of the platform's users.

24h Social seeks to reflect on this central dilemma of our networked society; the desire to engage with ubiquitous networked platforms that facilitate creativity and sociality in a myriad of ways whilst seeking to mitigate their codification of the everyday as so much data to be mined and manipulated.

What do we know of time when all we can know for real is now?

Daniel Buzzo

Abstract

How long is a moment ? How does a moment feel ? What is the past, what is the future ? The Moments project investigates the perceptual length of 'a moment' of attention and of the historical tension between the argument for and against time in the universe. Using real-time generative video editing techniques the multi-screen installation work remixes, collates and presents an infinite series of moments. The audience positioned between the internal and the external experience of time.

Keywords

generative media art; time visualisation; algorithmic editing; derive; multi-screen installation; psychogeography of time.

1. Introduction

With scientific estimates of what a perceptual 'moment' of- ten hovering between three and four seconds but opinions across the worlds of art, perception, philosophy and cognition often disagree widely. [1] The project investigated just how long a 'moment' might be and then asks the question;

'what is it to see the now, remember the past and anticipate the future, though we can conceive of the things are they truly real, do we truly experience them ?'

The 'moments' project recorded instances of noticing, moments of attention, short interstitial glances where you realize, you notice, that a moment has occurred. Collating video since early 2014 the project has so far recorded close to a thousand separate video clips. Contrasting this huge library of intimate moments of 'attention and 'presence' is a series of extended walking self-portrait video 'derives' inspired by Guy Debord, the French situationist and would-be father of psychogeography.

Extended walks through the streets of Hong Kong and Kowloon were filmed over a two week period in 2015. In the video material the viewer see a central character, the walker, moving through the neon metropolis city-scape and crowded back alleys in continuous framed shots.

These extended pieces of linear video have been treated, graded and finally their core data re-processed to allow each individual frame to be re-played in real-time in any order, at any speed, in any direction. Presenting the viewer with the direct visual equivalent of the universe as a zero energy quantum block

state. Where each of us passes through our individual time-lines, experiencing them in random, disconnected order. Unaware that in the next instant we may be 5 years old again or that in our previous moment we were reflecting on our lives from old age. The work investigates the challenge, laid down by McTaggart over a century ago [5] of how we decide if we live in a tensed or tenseless universe.

Using real-time evolutionary algorithms to select, edit, compile and present each discrete 'moment' this dynamic dual- screen installation situates the viewer in the centre of the emotional, philosophical and phenomenological debate on the existence and substance of time and lived experience. [4]

On one screen discrete moments of sense and attention, on the other a continuous central figure surrounded at every moment by a maelstrom of temporal shift in one of the complex cities in the world. Creating a temporal deep map in the style of William Least Heat-Moon's Psychogeographic Cartographies [3] of both a place and a time. At the same time weaving the challenge of input-output time. Where author, actors, reader and audience's timelines circle each other. [6] [2]

Time, connected and fractured confronts the viewer with the challenge of participation, a challenge of narratives of perception encased in visible temporal flux.

2.1. Technical Details

The work is portable and works in a variety of environments, display screen sizes can be variable to suit the spaces available. Screens can be placed side by side or can be placed in opposition (see fig 1 and 2)

Motion video captured via various Digital stills, video and DSL camera sources. Individual clips graded and edited into animation format (full keyframe). Algorithmic real-time image assembly routines written in C++ OpenFrameworks .

2.2 Playback/installation hardware

2 Mac OSX Mini or laptop computers
2 X HDMI or similar display screens (size variable)
2 x suitable stands or hanging for screens at eye height to viewers
Audio reinforcement (suitable for low volume ambient audio track, such as powered extension speakers)

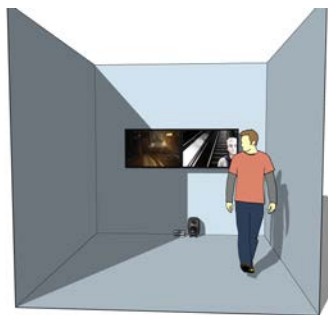
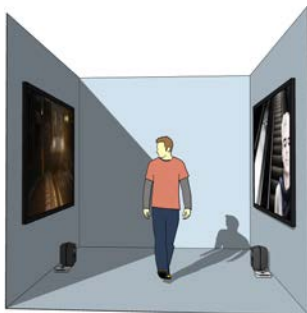


Figure 1 and 2. Installation detail for side by side and oppositional screening

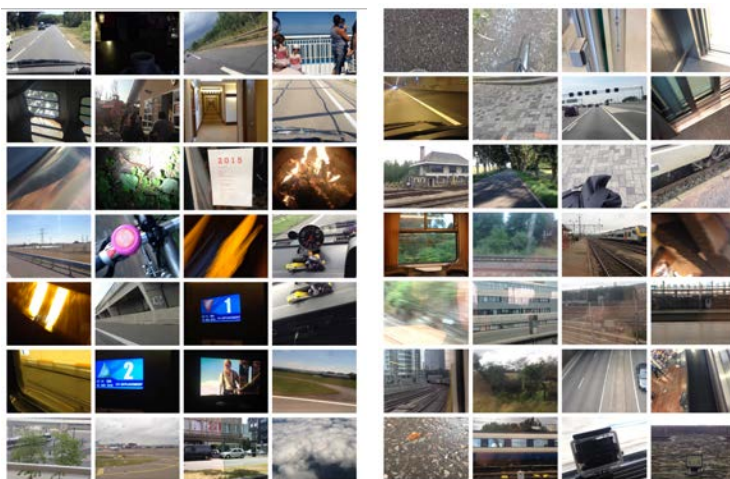


Figure 3 and 4. Moments





Figure 5 and 6. *Derive through Hong Kong*

References

- [1] Michel Bitbol. 1994. IS NOW A MOMENT IN TIME? In *Now, Time and quantum mechanics*, M. Bitbol and E. Ruhnau (Eds.), Editions Frontieres, 1–22.
- [2] D Buzzo. 2013. Lost time never. In *Input Outputs conference proceedings*. <http://www.inputs-outputs.org/>
- [3] Christopher C Gregory-guider. 2004. 'Deep Maps': William Least Heat-Moon's Psychogeographic Cartographies. 4 (2004), 1–17.
- [4] Chris Lorenz and Berber Bevernage (Eds.). 2013. *Breaking up Time Negotiating the Borders between Present, Past and Future*. Number January. Vanden- hoeck & Ruprecht. 3–5 pages. www.frias.uni-freiburg.de
- [5] John Ellis McTaggart. 1908. The Unreality of Time. *Mind: A Quarterly Review of Psychology and Philosophy* 17 (1908), 456–473. <http://www.ditext.com/mctaggart/time.html>
- [6] Nam June Paik. 1976. INPUT-TIME AND OUTPUT-TIME. *Video Art Journal* (1976).

About the author

Daniel Buzzo is an artist, designer, researcher and educator working with new media and creative technologies. His primary work is in generative media art, interaction design, and interdisciplinary research in arts and technology. An alumnus of the Telematic Fine Art programme at the University of South Wales and the Design Interactions studio at the Royal College of Art. His work has been published and shown widely including BBC tv, ISEA, Artists Television Access and SIGCHI and has appeared in publications as diverse as *The Face*, *The Guardian* and *Revolver*. Time is his (secret) superpower and he exhibits, writes and presents internationally on art and creative technologies.

Contact:

dan@buzzo.com

daniel.buzzo@uwe.ac.uk

<http://www.buzzo.com>

Transferring female reproductive labor and ephemeral and domestic forms of writing into the Archive: Remediating *Mamá Pina's Cookbook*

Gabriela Aceves Sepúlveda

Keywords

Remediation, domestic material culture, writing, cooking recipes, family archives

Abstract

Remediating Mamá Pina's Cookbook is an interactive four channel video installation that explores the role of women as agents and producers of the archive. By resorting to Bolter and Grusin's concept of remediation, the installation proposes a way in which female reproductive labor, ephemeral and domestic forms of writing, and material culture — traditionally viewed as outside of the archive— could be placed as central foci of the archive through the use of digital technologies. At its core, the installation also questions the material permanence of the archive and plays with the instability of digital technologies —or its anti-archival disposition.

1. The family cookbook as an archival technology

How are domestic practices transferred from generation to generation? How can digital technologies aid in archiving ephemeral and everyday domestic practices such as cooking? How can female reproductive labor and domestic forms of writing —traditionally viewed as outside of the Archive— be consider central foci of the Archive? And how, at the same time, can we maintain the liberating aspects of forgetting inherent in any archival practice?

Remediating Mamá Pina's Cookbook is an interactive four channel video installation that explores these questions by investigating the family cookbook as an archival technology through which gender roles, social status, and cultural memories are passed on from generation to generation. The installation also examines how digital technologies are transforming and disrupting our conceptions of what constitutes an archive; the relation between the content and the form of the archive; and the tensions between performative forms and recorded forms of transferring knowledge, cultural memories and social identities—what Diana Taylor refers to as “the distinction between the archive and the repertoire” (Taylor, 2003, p. 19).

In using the term archival technology to conceptualize a family cookbook, my objective is to bring forth a notion of the archive as process rather than a thing or a collection of documents no longer in use. For Ann Laura Stoler, the

archive as process is “an epistemological experiment that is always in the process of changing.” For Stoler, rather than serving as a source, archives are “cross-sections of contested knowledge”(Stoler, 2002, p. 23). Building on Stoler and drawing from the work of performance scholars Rebecca Schneider and Diana Taylor, I am interested in examining the archive as a performative and gendered activity that shapes a sense of self and which involves multiple temporalities and takes place across different media (Schneider, 2001, 2011; Taylor, 2003). Hence, in exploring how domestic material culture transmits and transfers cultural memories and social identities, I am not only interested in proposing artifacts traditionally gendered as female as valid sources of the archive (Burton, 2003; Eichhorn, 2013). By re-enacting family recipes in different forms, I am equally concerned with exploring its intangible and performative remains, its absences and the slippages produced in each act of remediation (Schneider, 2001, 2011).

2. Remediating *Mamá Pina’s Cookbook*

Using Bolter and Grusin’s concept of remediation, defined as “the logic by which new media forms refashion prior media forms” (Bolter & Grusin, 1999, p. 273), *Remediating Mamá Pina’s Cookbook* consists of various acts of remediation that attempt to reactivate the affective traces and the remains of lived experiences left in the handwritten record as well as the absences it produces as it is passed down from generation to generation. It explores the potential of digital technologies in keeping and transferring domestic practices, while acknowledging that this latency is unstable.

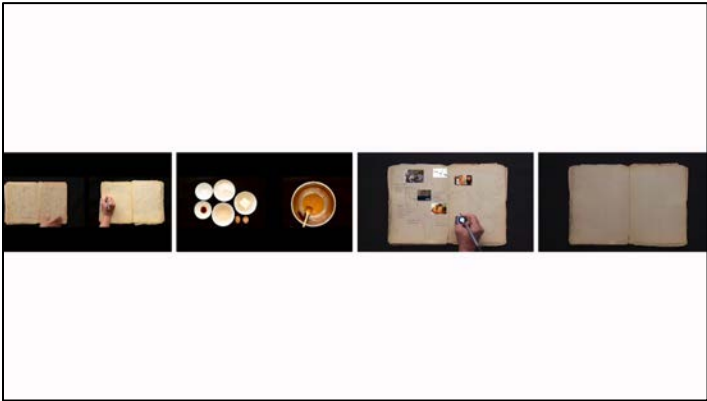


Figure 1. Remediating Mamá Pina’s Cookbook

The project includes a video that records my attempts to learn the different handwriting styles recorded in a family cookbook of food recipes that belonged to my great-grandmother, Mamá Pina (b. Guadalajara, Mexico 1885–1976).



Figure 2. *Remediating Mamá Pina's Cookbook (Still Image, Video 1)*

The cookbook was passed on to my grandmother, Gabriela (1918–1997), and her twin sister, Teresa (1918–1990), who continued to handwrite recipes, and then it was passed on to my mother, Gabriela (b.1944), who continued the process. Each handwriting style recorded in the cookbook has a particular history that represents the educational background and social status of each of these women. The recipes contain traces of domestic habits and economies as well as material remains of lived experiences. Some pages are smeared with grease or leftovers from food. Some recipes call for ingredients that no longer exist, such as *Tortuga en Lata* (Turtle in a Can) and list quantities that are no longer calculable, such as *2 centavos de azúcar de la tiendita* (two cents of sugar from the corner store). Other forms of writing, such as calligraphy exercises—possibly done by a child in the household, are also recorded in the cookbook. These different traces provide glimpses of domestic life. The video, which acts as a register of my process of learning the three different handwriting styles recorded in the cookbook, remediates both the written source and the performance by producing a digital record.

The second video shows the process of cooking one of the recipes as it is read out loud by my mother via Skype.

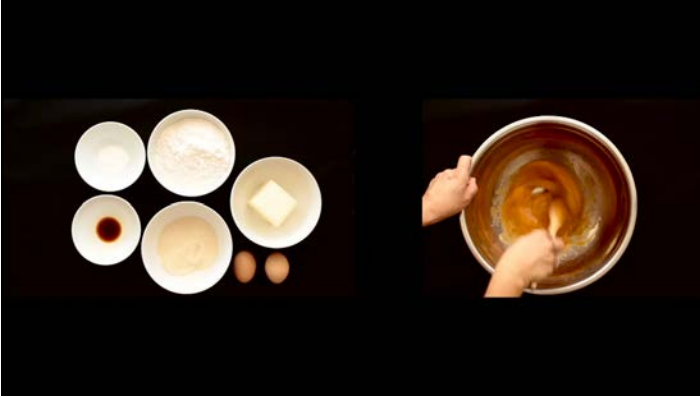


Figure 3. *Remediating Mamá Pina's Cookbook* (Still Image, Video 2)

The third video records the mapping and documenting of the collaborations of friends and colleagues who were invited to respond to some of the recipes from the cookbook in the media of their choice.



Figure 4. *Remediating Mamá Pina's Cookbook* (Still Image, Video 3)

A selection of 25 recipes was sent to 40 people via e-mail without translation or transcription. The collaborations are edited as part of the third video, which incorporates seven channels of video that are superimposed over a main video channel that shows my hand drawing a map of the world indicating the location of some of the collaborators. The collaborations, which include digital images, audio recordings, video and chat conversations, reactivate the handwritten record while unpacking its absences and creating new ones.

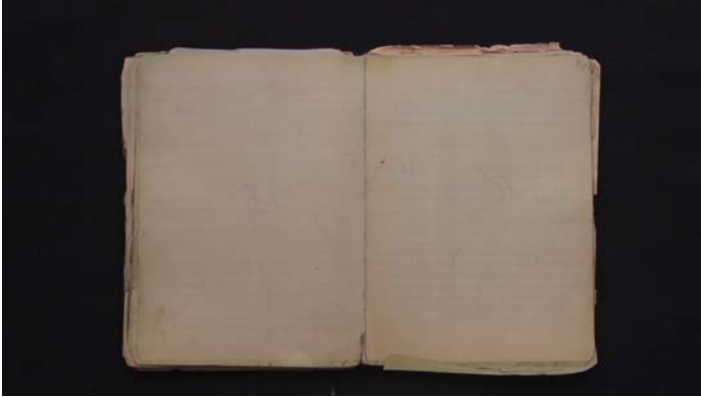


Figure 5. Remediating Mamá Pina's Cookbook (Still Image, Video 4)

The fourth video channel feeds live responses from the audience through a *wacom* tablet. The viewer is invited to interact by responding to the videos or to a description of the recipe book that is placed besides the tablet. Viewer's responses are not archived. They are only available in real time. With a delay of 10 seconds, the viewer's responses disappear as he/she types. Through this process, the installation attempts to mimic the absences of the archived record and anti-archival disposition of any archival practice.

References

- Bolter, J. D., & Grusin, R. (1999). *Remediation : understanding new media*. Cambridge, Mass.: MIT Press.
- Burton, A. (2003). *Dwelling in the Archive: Women, Writing House, Home and History in Late Colonial India*. . New York: Oxford University Press.
- Eichhorn, K. (2013). *The Archival Turn in Feminism: Outrage in Order*. Philadelphia: : Temple University Press.
- Schneider, R. (2001). Archives: Performance Remians. *Performance Research*, 6(2), 100-108.
- Schneider, R. (2011). *Performing Remians: Art and war in times of theatrical reenactment*. London and New York: Routledge.
- Stoler, A. L. (2002). *Along the Archival Grain, Epistemic Anxieties and Colonial Common Sense*. Princeton Princeton University Press.
- Taylor, D. (2003). *The Archive and the Repertoire: Performing Cultural Memory in the Americas*. Durham: Duke University Press.

About the author

Gabriela Aceves Sepúlveda is Assistant Professor at the School of Interactive Arts and Technology at Simon Fraser University where she leads cMAS (criticalMediaArtsStudio). cMAs is an interdisciplinary research studio that focuses on interrogating how old and new technologies have and continue to shape both the historical narratives and practices of media arts through a de-colonial and feminist perspective. As a media artist she creates

multimedia installations to explore the social, political, and cultural structures that shape our sense of self. She is a member of the Vancouver-based art collective AKA and sits on the board of VIVO Media Arts. (gacevess@sfu.ca / www.criticalmediartstudio.com)

DEFOOOOOOOOOOOOOOOOOOOOOOOREST

Joana Moll

How much pollution does the Internet generate?

DEFOOOOOOOOOOOOOOOOOOOOOOOREST is a net based piece that shows the amount of trees needed to absorb the amount of CO₂ generated by the global visits to google.com every second.

This project has been created with the aim to explore strategies able to trigger thoughts and actions capable to highlight the invisible connections between actions and consequences when using digital communication technologies.

Although it is intensively engaged in the logic of networks, the networked society has so far failed to transpose the logic of networking into daily life. We lazily assume that "everything is connected", but in fact we must remember that "everything is not connected", as Graham Harman stated. What Harman meant is that, rather than connecting between themselves by default, things seem to withdraw into their own vacuums of reality. But things do connect occasionally and, in those cases, an explanation of why the connection exists is needed. In other words, it is necessary to continuously trace the connections that exist between things in order to acquire a complex understanding of the world.

While humans are becoming increasingly machinelike and dependent on data, the connection between humans and their life giving natural habitats, is hastily fading away. We seem to have withdrawn into a machinic vacuum of reality which blinds us to the complexities of the world.

Google.com is the most visited site on the Internet. The site has an average of 52.000 visits per second [1] and weights around 2MB, resulting into an estimated amount of 500kg of CO₂ emissions every second [2]. On average a tree can absorb 21,77kg of CO₂ per year [3]. Thus, in order to counteract the amount of CO₂ emissions derived by the global visits to google.com, every second, we would need an approximate amount of 23 trees/second.

The actual configuration of technology reinforces cultural dynamics (rituals) that stress disconnectedness. In our contemporary algorithmic decision-making society, ecosystems are being increasingly considered as mere economic externalities. How can we rearticulate our relationship with the world if we are unable to see the actual impact of our actions in the concrete world? What can be the role of media art in the reinforcement of such process? What

fundamental shifts need to occur in the sphere of art in order to reveal the connections between actions and consequences, especially when those actions are mediated by technology? I believe it is crucial to set the environment as a main political agent within the networked society art discourse and to create mechanisms that might stimulate and re-appropriate subjectivity, an essential process in the generation of critical thought about the true nature of technology, and in the imagination of alternative techno-paradigms which may coherently respond to our environmental and human conditions.

Art statement

My work critically explores the way post-capitalist narratives affect the alphabetization of machines, humans and ecosystems. My main research topics include communication technologies and CO2 emissions, virtual civil surveillance on the Internet and language. The actual configuration of technology reinforces cultural dynamics (rituals) that stress disconnectedness. In our contemporary algorithmic decision-making society, ecosystems are being increasingly considered as mere economic externalities. How can we rearticulate our relationship with the world if we are unable to see the actual impact of our actions in the concrete world? What can be the role of media art in the reinforcement of such process? What fundamental shifts need to occur in the sphere of art in order to reveal the connections between actions and consequences, especially when those actions are mediated by technology? I believe it is crucial to set the environment as a main political agent within the networked society art discourse and to create mechanisms that might stimulate and re-appropriate subjectivity, an essential process in the generation of critical thought about the true nature of technology, and in the imagination of alternative techno-paradigms which may coherently respond to our environmental and human conditions.

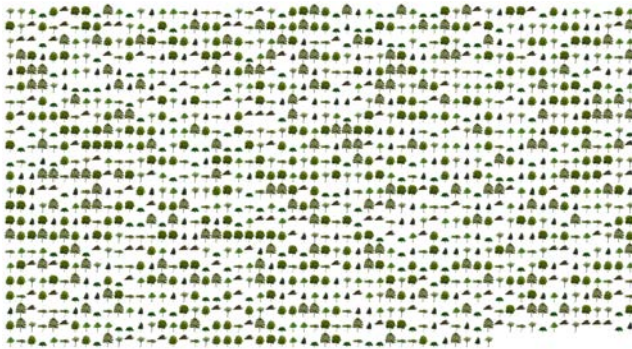
Software / language or environment used during production

Text editor – HTML/Javascript

About the author

Joana Moll is an artist and a researcher based in Barcelona. Her work critically explores the way post-capitalist narratives affect the alphabetization of machines, humans and ecosystems. Her main research topics include communication technologies and CO2 emissions, virtual civil surveillance on the Internet and language. She has exhibited and presented her work in different museums, art centres, festivals, universities and publications around the world. Furthermore, she is a member of the scientific and artistic committee of the transdisciplinary research project Antiatlas des Frontières [<http://www.antiatlas.net>] and co-founder of The Institute for the Advancement of Popular Automatisms [<http://www.ifapa.me>]. She is a visiting lecturer at College of Art

and Design of Vic and a lecturer at VIT Lab in Vic (Barcelona). Her work and full resume is available at <http://www.janavirgin.com>.



<http://www.janavirgin.com/CO2/DEF00000000000000000000REST.html>

MonkeyTURN

Naoyuki Tanaka

Keywords

robotic, noise, performance, audio-visual, dynamic mapping

Descriptions

« Were there such machines exactly resembling organs and outward form an ape or any other irrational animal, we could have no means of knowing that they were in any respect of a different nature from these animals. »

René DESCARTES - Discourse on the Method, 1637

Sarumawashi, - monkey performances - is a traditional Japanese street performance that monkeys disguised as men. This has inspired Artist for the conception of his work «MonkeyTURN», comparing these monkeys is manipulated by their master to humans today whose behaviors and emotions is completely conditioned by the information available on computer networks. However who manipulates them?

This artwork is a project using dynamic projection mapping on the body of a remote-controlled robot. The image fragment projected on the surface of this material describe what we might call new digital identities. That is to say, a reality undermined by unreality. The robot is driven by servo motors that has a noise gradually produces a musical space. «MonkeyTURN» was born from a reflection on the human and his copy, the man and his social representation, with an open question: Are we only monkeys manipulated by ourselves?

According to René Descartes, distinguishes humans from other species is the presence of «Thinking». However, how can we determine it? A human evolved from apes and if we believe «The Origin of Species» of Charles Darwin, and I suspect that our intelligence would not be a unique idiosyncrasy but an animal fundamental characteristic.

Scientifically, our thoughts are only an electrochemical reaction in the brain, the composition of 0 or 1, and our language is made up of fragments of these signals. But why we can find the beauty when we find a flower side of the river, why we lose against the darkness of solitude? Is this emotion has been programmed in advance by the Creator? This concept looks like an unpredictable software's bug, because our brain is a capacity for making the uncertainty. In other words, the separation of society and nature proves our existence as «human».

Today we can exchange a large amount of information in the world through by the SNS. By accessing the data, our ideas evolve slowly and our personality is determined without experience. Then, these new identities share another thing through the network. Finally, we reconstruct our world that made us by the words.

The performance «MonkeyTURN» highlights this notion of mind control, that mean “The identity that is transformed by me”. Audio-visual elements are adjusted by the generative movements of the robot programming and this initiative of manipulation shifts gradually in the hand of the performer. The Monkey doesn't evolve to man with his will, but it is a our shout and our anger.

References

Yokoyama, Terumutsu (1957) - *Gigantor*

Descartes, René (1637) - *Discourse on the Method*.

About the authors

Naoyuki TANAKA (aka NAO) is a Japanese artist living in France, working mainly audio-visual programming in the form of performance. His first art step start in Japan began with painting. After doing 5 years of studies of the Beaux Arts in Aix-en-Provence, it is moving towards the digital art.

NAO creates a noise universe using the feelings that lie behind his conscience, and unites them together through by the programming language. His performances range from questioning about the society and himself with his cynical view.

Artist multiplatform / developer app / developer audio-visual

Email: psychedelic.abs@gmail.com

“T[he]Issue”: a geospatial and mixed-locative colonisation document

Mez Breeze

Art Statement

For all the current hype surrounding the practice and implementation of Augmented Reality technology for artistic creation, there has been a complete lack of focus (artistic or otherwise) regarding the immaterial ownership/proprietary rights involved in colonising geospatial arenas. “T[he]Issue” is an arts project consisting of a "Geospatial and Mixed-Locative Colonisation Document" that asserts ownership rights to emergent Augmented and Mixed/Virtual Reality dimensions. The document asserts a blanket claim over all spatial and locative sectors involved in an updated version of the Virtual-Reality Continuum ¹ (think: [Geophysical]<—[Cartesian]–[Mixed]-->[Synthetic]). This "Geospatial and Mixed-Locative Colonisation Document" comprehensively outlines ownership adoption of non-colonised geospatial/geolocative vectors according to a contemporary interpretation of Geospatial Law². The aims and issues involved in the creation of “T[he]Issue” are associated with problems arising from disputes concerning the proprietorship of valuable locative sectors and to curtail AR avatar abuse. For instance, if an assumed virtual or augmented embodiment is created identical to a phenomenologically-defined “real” person, what are the governing guidelines regarding creative output, Mixed Reality copyright, trademark, and intellectual property issues? If a business or government stakes an exclusivity claim involving Augmented Reality output in a public or popular geographic area, then who owns the rights regarding AR delivery into that space? “T[he]Issue” was originally commissioned by Julian Staddon and Furtherfield Gallery for the Beyond the Interface Exhibition as part of the 2014 International Symposium on Mixed and Augmented Reality in Munich, Germany. The second site showing was held at Furtherfield’s Gallery at McKenzie Pavilion, Finsbury Park, until the 21st June, 2015.

Software / language or environment used during production

Internet-based interactive eBook software, Javascript and HTML5.

¹ http://en.wikipedia.org/wiki/Reality-virtuality_continuum

² <http://www.directionsmag.com/articles/the-centre-for-spatial-law-and-policy-a-legal-advocate-for-geospatial-/295571>

Hardware used during production

A High-end PC computer.



"T[he]Issue": A Geospatial and Mixed-Localive Colonisation Document

Metropolis

Paul Magee

Art statement

Ongoing series of digital inkjet prints. Photographs of urban architecture rearranged according to the HSL - Hue, Saturation and Lightness - values of the individual pixels.

Software / language or environment used during production

Custom software written on a Mac in XCode.

Hardware used during production

1m x 1m prints. Mounted on aluminium.

Apple Mac.



<http://www.p000m0000.com/work?tag=metropolis>

Signal

Paul Magee

Art statement

Sound object. 4 to 16 signal generators. Work in Progress.

Computer controlled bank of signal generators that speaks by modulating sine waves to match the frequencies of the human voice. Each voice consists of 4 generators, each of which produce waves within a different band of frequencies. Signal speaks a text of its own construction.

Software / language or environment used during production

Custom software written on a Mac in XCode.

Hardware used during production

Custom built computer controlled signal generators.



<http://www.p000m0000.com/work?tag=signal>

Organic

Ricardo Dal Farra

Abstract

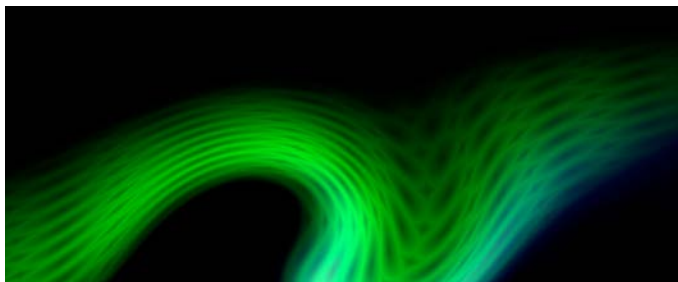
Organic is a visual-music work created by Ricardo Dal Farra in 2015 using mathematical algorithms to generate the synthetic images, with the sounds derived directly from the visual analysis.

Keywords

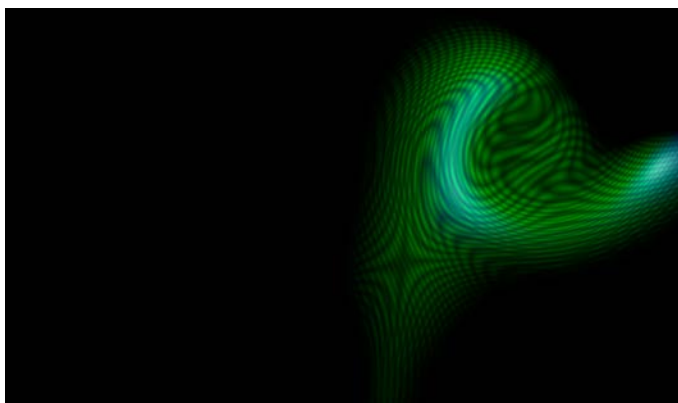
Visual-music, generative art, algorithmic art.

1. Program notes

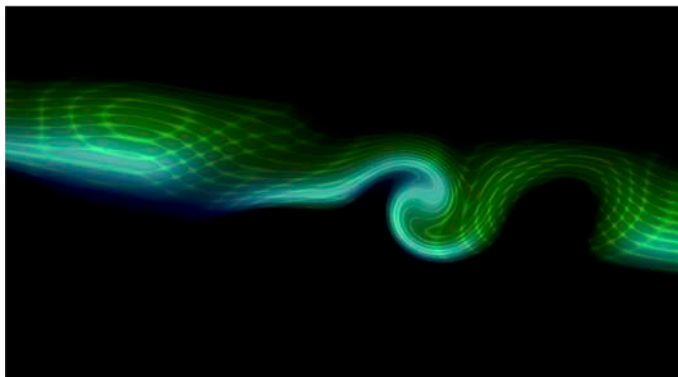
Organic, a living entity, an organism, a biological process.



Continuous fluidity.



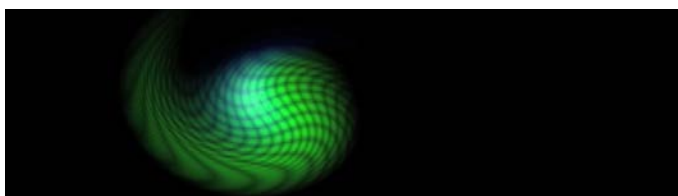
Related to living matter. Derived from living matter.



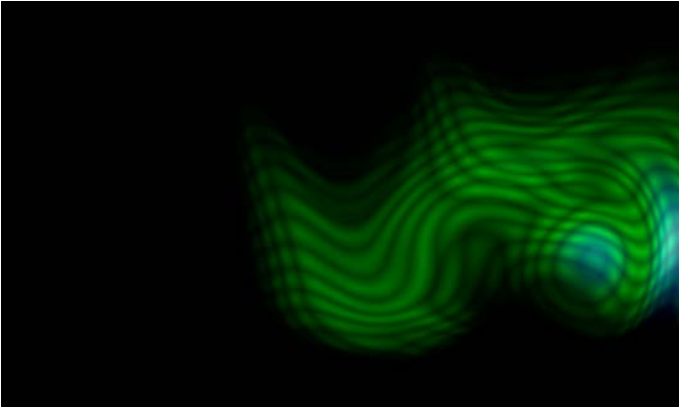
Organized, coherent, coordinated, integrated.
Unceasing development.



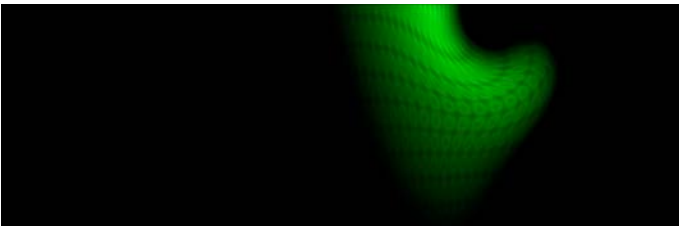
Elements that fit together harmoniously as part of a whole, in an endless transformation, dancing with the senses. Continuity (of life, of matter...)



Variability, flexibility, smoothness.



Difficulty to predict, to understand the plan, the system, the pattern, to perceive the connections.



2. Description

Organic is a generative piece of visual-music.

It was created in 2015 using mathematical algorithms to generate the synthetic images, with the sounds derived directly from the visual analysis.

Organic is preferably presented in an auditorium, using a concert format, but other arrangements are also possible (e.g. as a video installation).

Organic exists in three versions, with its audio in 2 (stereo), 8 and 24 separated channels. Its duration is 10:51.

About the author

Dr. Ricardo Dal Farra (ricardo.dalfarra@concordia.ca) is a composer, new media artist, curator and historian. He is professor at Concordia University, Canada and director of the CEIArtE-UNTREF Electronic Arts Research Centre, Argentina. His music has been presented in about 40 countries. He is the founder of the Balance-Unbalance and Understanding Visual Music conference series, and has been researcher for UNESCO in France, De Montfort University in the UK, Amauta in Peru and the National Ministry of Education in Argentina. Dal Farra was coordinator of DOCAM, the Documentation and Conservation of the Media Arts Heritage research alliance. He created the Latin American Electroacoustic Music Collection.

Composting the net (2012)

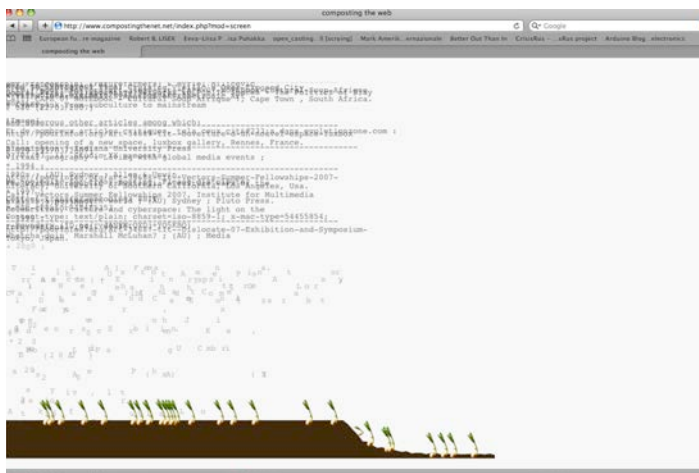
Shu Lea Cheang

Web interactive

<http://compostingthenet.net>

The Net as we know it is a seemingly bottomless site of data dump with data trash abound. With the rise of social networks, we willingly endorse the corporations to digest, devour and claim ownership of our personal data which cycles through AD littered web sites. *Composting the net*, a web interactive work, is an attempt to revisit our accumulated intellect data before it feeds the composting worms.

The net data chosen for reshuffling, reviewing and composting focuses on net culture mailing list archives that remain to be public accessible open archive. As a network artist, I'm part of these online mailing list communities, to name a few, nettime (lists for networked cultures, politics, and tactics), IDC (List of the Institute for Distributed Creativity), Spectre (list for media art and culture in Europe), empire (soft_skinned_space), these lists, dated back to 1990s, contain years/days/bytes/pixels of collective knowledge posted by the contributors, These open archives threaded by date, author, subject kept event announcements, ongoing debates and thematic research. They are both ephemeral and substantive. They are the legacy of our networked culture, our digital commons. These data debris are to be re(dis)covered in the future by net archaeologists or post-net bomb-defusers. Composting the Net proposes a hopeful version to revive the (non)trash data and further process the toppled digital landfills. We scramble the texts, check through the lines and words, trust that there are some relevant references to our very digital existence. Eventually the net composted generates fresh sprouts that crack through the compost-enriched data soil.



<http://compostingthenet.net>

Archive lists composted

<http://www.nettime.org/>
<http://post.in-mind.de/pipermail/spectre/>
<http://lists.cofa.unsw.edu.au/pipermail/empyre/>
<https://lists.thing.net/pipermail/ide/>
<http://post.in-mind.de/pipermail/rohrpost/>
<http://lists.ecn.org/pipermail/aha/>

Index

- algorithm, 126, 130, 160, 168, 326, 328, 342, 343
- architecture, 59, 118, 191, 194, 205, 218, 224, 228, 232, 277, 279, 282, 355, 367, 405, 407, 410, 411, 417, 418, 434, 435, 456
- archive, 87, 91, 92, 110, 113, 118, 125, 147, 148, 150, 153, 154, 157, 159, 160, 167, 174, 175, 204, 207, 209, 210, 211, 213, 215, 218, 222, 231, 240, 241, 242, 251, 258, 266, 270, 273, 293, 299, 345, 352, 368, 372, 373, 443, 462
- artwork, 9, 19, 27, 143, 147, 149, 151, 152, 155, 156, 157, 161, 164, 165, 166, 168, 172, 174, 175, 177, 180, 182, 189, 203, 221, 222, 224, 226, 229, 230, 232, 233, 236, 239, 240, 241, 242, 243, 244, 251, 255, 257, 258, 293, 294, 308, 310, 336, 339, 342, 345, 347, 349, 352, 353, 358, 366, 367, 368, 369, 370, 373, 374, 375, 385, 386, 387, 388, 389, 394, 398, 399, 401, 402, 404, 434, 435, 436, 438, 452
- code, 30, 37, 51, 52, 81, 82, 83, 85, 128, 170, 171, 191, 199, 227, 244, 267, 274, 340, 347, 351, 368, 374
- computer art, 9, 190, 191, 198, 200, 203, 269, 270, 273, 275, 338, 352, 353, 358
- culture, 16, 19, 21, 24, 27, 32, 47, 56, 65, 66, 69, 81, 82, 84, 85, 86, 94, 105, 108, 113, 117, 119, 120, 147, 148, 150, 154, 155, 156, 158, 161, 164, 166, 170, 172, 173, 190, 205, 206, 207, 208, 212, 219, 222, 225, 226, 260, 267, 275, 280, 281, 285, 311, 315, 316, 321, 324, 333, 335, 336, 369, 443, 444, 462
- cyberspace, 23, 166, 266
- data, 48, 51, 52, 72, 73, 74, 75, 76, 77, 78, 79, 81, 86, 92, 98, 104, 105, 108, 109, 110, 111, 112, 113, 114, 115, 117, 118, 119, 120, 121, 122, 123, 126, 127, 128, 135, 138, 139, 145, 150, 151, 155, 156, 159, 160, 164, 170, 175, 177, 178, 181, 204, 207, 208, 209, 211, 217, 226, 228, 230, 236, 241, 244, 245, 249, 251, 257, 258, 292, 297, 299, 301, 303, 304, 305, 309, 312, 326, 328, 329, 340, 341, 342, 344, 345, 346, 347, 348, 349, 353, 354, 357, 360, 361, 373, 377, 378, 379, 380, 381, 382, 383, 395, 437, 438, 439, 449, 453, 462
- digital art, 9, 23, 28, 126, 164, 165, 168, 180, 181, 200, 204, 205, 207, 209, 210, 212, 213, 214, 218, 221, 222, 223, 229, 232, 236, 238, 239, 336, 358, 389, 436, 453
- experience, 16, 18, 22, 30, 44, 47, 53, 65, 80, 84, 96, 122, 138, 139, 140, 141, 142, 143, 144, 151, 154, 156, 170, 174, 175, 177, 179, 184, 188, 207, 216, 219, 223, 226, 227, 230, 232, 233, 234, 235, 236, 248, 256, 265, 266, 281, 287, 289, 290, 291, 292, 293, 294, 295, 298, 302, 303, 309, 310, 313, 314, 315, 319, 320, 322, 324, 325, 334, 335, 347, 348, 350, 354, 358, 360, 367, 368, 381, 382, 383, 386, 391, 393, 398, 400, 401, 402, 430, 434, 435, 439, 440, 453
- film, 21, 48, 55, 86, 109, 110, 114, 118, 124, 152, 191, 205, 219, 335, 349
- geometry, 59, 68, 113, 141, 336, 345, 347, 411, 417, 434

graphics, 114, 127, 190, 191, 192,
 194, 195, 196, 197, 199, 200,
 201, 202, 251, 293, 333, 342,
 408
 image, 25, 26, 27, 31, 35, 37, 39,
 40, 42, 43, 45, 46, 47, 49, 50,
 51, 52, 63, 64, 65, 78, 82, 83,
 84, 88, 91, 92, 93, 94, 95, 96,
 97, 98, 99, 101, 102, 103, 104,
 105, 106, 107, 108, 109, 114,
 115, 118, 121, 126, 127, 128,
 129, 130, 132, 133, 134, 135,
 136, 137, 156, 184, 219, 228,
 236, 238, 244, 245, 257, 260,
 263, 264, 266, 277, 293, 306,
 309, 310, 314, 321, 322, 325,
 329, 332, 333, 342, 345, 352,
 355, 370, 372, 375, 386, 387,
 388, 389, 390, 391, 395, 398,
 399, 400, 401, 402, 440, 452
 immaterial, 19, 21, 22, 23, 30, 63,
 64, 67, 122, 123, 206, 265, 285,
 298, 304, 308, 310, 431, 454
 immersion, 354, 373
 interactive, 45, 72, 86, 90, 111,
 113, 114, 115, 119, 139, 149,
 152, 184, 185, 186, 205, 222,
 225, 226, 227, 228, 229, 230,
 231, 235, 236, 238, 260, 273,
 293, 301, 354, 358, 360, 361,
 366, 368, 369, 371, 379, 383,
 385, 386, 388, 389, 393, 395,
 397, 400, 402, 404, 434, 436,
 443, 454, 462
 Interface, 31, 33, 90, 113, 329,
 334, 368, 454
 internet, 17, 23, 24, 27, 28, 109,
 162, 165, 166, 170, 172, 173,
 179, 225, 238, 302, 355, 357,
 436
 machine, 24, 71, 78, 79, 80, 109,
 113, 127, 128, 137, 186, 190,
 191, 192, 195, 196, 199, 200,
 201, 228, 294, 310, 327, 328,
 329, 338, 348, 349, 350, 354,
 432
 material, 9, 16, 17, 18, 20, 21, 22,
 23, 29, 30, 31, 62, 63, 64, 67,
 75, 76, 79, 81, 83, 105, 109,
 110, 111, 112, 119, 121, 127,
 128, 130, 131, 141, 154, 155,
 156, 166, 168, 170, 174, 175,
 177, 186, 188, 201, 204, 209,
 222, 224, 229, 232, 235, 237,
 251, 263, 274, 278, 280, 281,
 282, 283, 284, 289, 298, 301,
 302, 304, 307, 308, 315, 322,
 324, 325, 328, 330, 331, 339,
 340, 342, 347, 349, 358, 366,
 370, 373, 405, 410, 432, 435,
 439, 443, 444, 445, 452
 materiality, 15, 16, 17, 19, 20, 21,
 22, 23, 27, 28, 29, 30, 31, 57,
 63, 66, 69, 76, 112, 121, 172,
 173, 179, 221, 222, 223, 224,
 229, 231, 233, 236, 260, 261,
 262, 265, 266, 281, 282, 311,
 313, 324, 339, 353, 358, 359,
 381
 Media Art, 15, 16, 21, 23, 24, 27,
 30, 31, 87, 162, 181, 182, 202,
 203, 222, 232
 Net Art, 15, 16, 181
 object, 9, 19, 21, 22, 28, 29, 58, 64,
 73, 78, 101, 116, 127, 128, 129,
 130, 136, 139, 145, 159, 167,
 187, 224, 226, 237, 259, 279,
 280, 282, 299, 305, 307, 316,
 321, 330, 331, 332, 333, 334,
 337, 339, 341, 343, 347, 353,
 385, 386, 387, 415, 431, 432,
 457
 perception, 59, 72, 77, 111, 114,
 121, 127, 140, 142, 143, 183,
 206, 269, 273, 291, 293, 299,
 313, 314, 315, 316, 336, 342,
 353, 354, 380, 385, 386, 387,
 397, 403, 404, 431, 434, 435,
 439, 440
 physical, 17, 19, 20, 22, 23, 24, 26,
 28, 29, 30, 31, 61, 62, 63, 64,
 65, 69, 71, 73, 74, 78, 82, 84,
 109, 110, 121, 122, 127, 139,
 152, 155, 171, 183, 184, 215,
 222, 224, 225, 226, 228, 229,
 234, 235, 236, 237, 248, 261,

265, 279, 282, 283, 284, 298,
 299, 301, 302, 303, 311, 312,
 313, 315, 327, 333, 334, 340,
 342, 366, 377, 378, 383, 386,
 387, 389, 390, 400, 431
 poetic, 41, 182, 188, 283, 300, 301,
 305, 313, 339, 340, 342, 353,
 431, 432
 programming, 115, 190, 191, 193,
 198, 202, 238, 240, 358, 453
 science, 9, 56, 57, 61, 65, 72, 81,
 83, 92, 108, 112, 114, 116, 117,
 146, 181, 199, 209, 211, 215,
 267, 298, 309, 327, 353, 377,
 378, 386
 sound, 35, 36, 37, 44, 45, 48, 86,
 129, 198, 240, 242, 243, 246,
 247, 248, 250, 257, 258, 259,
 260, 263, 264, 265, 266, 271,
 273, 292, 293, 294, 295, 299,
 301, 305, 307, 309, 315, 324,
 340, 389, 430, 431
 spatial, 9, 113, 127, 129, 139, 140,
 141, 142, 143, 144, 146, 181,
 183, 184, 281, 283, 287, 288,
 289, 290, 293, 294, 295, 301,
 314, 331, 340, 344, 358, 383,
 406, 410, 411, 413, 415, 454
 storage, 26, 30, 156, 168, 173, 179,
 180, 204, 218, 226, 228, 229,
 274, 383
 surface, 18, 37, 40, 41, 44, 45, 49,
 97, 112, 177, 184, 290, 291,
 311, 330, 331, 341, 342, 345,
 346, 350, 452
 vector, 115, 333, 342, 348
 visual, 17, 34, 37, 39, 40, 41, 66,
 91, 92, 93, 94, 95, 96, 97, 98,
 99, 103, 104, 105, 112, 113,
 114, 119, 126, 128, 129, 130,
 131, 132, 133, 134, 135, 136,
 145, 146, 147, 152, 178, 183,
 186, 191, 193, 194, 196, 197,
 198, 215, 235, 236, 244, 263,
 264, 274, 278, 282, 291, 301,
 308, 309, 311, 330, 337, 350,
 352, 366, 379, 381, 382, 386,
 387, 388, 403, 404, 435, 439,
 452, 453, 458, 460
 visualization, 81, 83, 84, 91, 92, 93,
 94, 98, 99, 102, 103, 104, 105,
 109, 111, 113, 114, 117, 118,
 119, 122, 126, 127, 137, 183,
 191, 203, 207, 245, 303, 348,
 349, 353, 360, 380, 383



ISBN-13: 979-10-90094-23-9



europa
productions